Prospect Highway Upgrade

Addendum Review of Environmental Factors

July 2016

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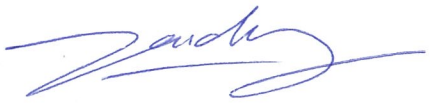
Approval and authorisation

Title	Prospect Highway Upgrade Addendum review of environmental factors
Accepted on behalf of NSW Roads and Maritime Services by:	Van Tran Project Manager
Signed:	
Dated:	12/07/2016

Executive summary

The proposal

Roads and Maritime Services 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. A Review of Environmental Factors (REF) (the "Approved Project REF") for the proposed upgrade of the Prospect Highway was prepared by Jacobs in May 2014 and determined by Roads and Maritime in September 2014.

Subsequent to the works described in the Approved Project REF, Roads and Maritime have refined the design, during the detailed design phase, to include the following work ('the proposal'):

- Provision of a kiss and ride facility for Shelley Public School within the school grounds
- Inclusion of four additional noise walls along sections of Prospect Highway, and amendments to the design of the four noise walls described in the Approved Project REF
- Powerline relocation and associated clearing of trees within private properties along a section of the project between Bungarribee Road/Leabons Lane and Blacktown Road, Seven Hills
- Modification of the intersection at Hadrian Avenue and Keyworth Drive to provide a roundabout and associated utilities relocation
- Additional drainage works at various locations along the alignment outside of the Approved Project boundary
- Additional road works at various locations along the alignment extending beyond the Approved Project boundary
- Additional site compound areas not assessed in the Approved Project REF
- Property works at residential properties to facilitate safe entry and exit to properties to and from Prospect Highway
- Amendment of the sign posted speed limit on Prospect Highway between Reservoir Road and Blacktown Road
- Test excavations for non-Aboriginal heritage items at Reservoir Road
- Inclusion of operational on-site detention basins
- At-property acoustic architectural treatments for eligible receivers
- Relocation of two Sydney Trains power poles outside the Approved Project boundary.

This Addendum REF has been prepared to assess the likely impacts of these proposed activities on the environment.

Need for the proposal

During detailed design of the Prospect Highway Upgrade, a number of elements required positioning outside the Approved Project site boundary (as per the Approved Project REF) to accommodate the road upgrade. As these works are located outside the Approved Project boundary, they are not covered by the existing approval and therefore are required to be assessed.

Several elements of the proposed design refinements were identified in the Approved Project REF however they have subsequently been developed to an extent where a detailed assessment can now be carried out. Specifically, these comprise the installation of noise walls along Prospect Highway, overhead powerline relocations between Bungarribee Road/Leabons Lane and Blacktown Road and at-property architectural treatments for eligible properties.

Two elements of the proposed design refinements were identified in the Submissions Report as a mitigation measure in response to community and stakeholder concerns. Specifically, these comprise the provision of a kiss and ride facility at Shelley Public School, and installation of a new roundabout at Hadrian Avenue/Keyworth Drive. These have been developed during detailed design to an extent where they can now be assessed. These are located outside of the Approved Project boundary.

The overall strategic need for the project is unchanged from that described in Section 2 of the Approved Project REF.

Statutory and planning framework

This proposal is assessed under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). In this Addendum REF, Roads and Maritime also considers clause 228 of the Environmental Planning and Assessment Regulation 2000 and matters of national environmental significance (MNES) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) applies to this proposal. Clause 94 of the ISEPP permits development on any land for the purpose of a road or road infrastructure facilities to be carried out by or on behalf of a public authority without consent.

Community and stakeholder consultation

Roads and Maritime has consulted with Blacktown City Council in accordance with clauses 13-15 of the ISEPP. Consultation with other relevant stakeholders including Department of Education and Communities, and Endeavour Energy has also been carried out.

Ongoing consultation during detailed design with residents and property owners has been conducted with regard to the following elements of the design:

- Property access adjustments
- Powerline relocation and clearing
- Kiss and ride facility at Shelley School
- New roundabout at Hadrian Avenue/Keyworth Drive
- Installation of noise walls.

Environmental impacts

The key environmental impacts associated with the proposal are related to:

- Noise and vibration
- Biodiversity
- Landscape, visual amenity and urban design
- Socio-economic and land use.

Noise and vibration

The Approved Project REF identified the need for noise walls to be further investigated during detailed design. The requirement for a total of eight noise walls has been identified along the highway corridor. These would generate some additional noise for nearby residents during construction.

Construction of the other proposed refinements, including the kiss and ride facility, powerline relocation and vegetation clearing, the new roundabout at Hadrian Avenue/Keyworth Drive and operational-onsite detention basins would have short term noise impacts on local residences and the school.

Once operational, the proposed refinements are not expected to have an impact on local residences and other sensitive receivers. The noise walls would, in addition to the proposed architectural at-property treatments, achieve a reduction in operational noise for properties.

Biodiversity

The proposed refinements would require the removal of additional trees and vegetation, including 0.64 hectares of additional Cumberland Plain Woodland TEC. This would not represent a significant impact on this EEC. The detailed design has sought to minimise the extent of vegetation clearing required to the greatest extent possible.

Landscape, visual amenity and urban design

Overall the proposed refinements would comprise an additional reduction in visual amenity for the Approved Project, largely through the introduction of noise walls, the powerline relocation activities, property access adjustments and clearing of trees at the proposed kiss and ride facility and Hadrian Avenue/Keyworth Drive roundabout. Overtime the proposed landscaping plantings would soften the impact of the additional proposed activities.

Socio-economic and land use

Community consultation raised concerns regarding perceived safety issues associated with the introduction of noise walls and the potential for concealment of intruders between the noise walls and the rear property boundaries in some locations. It was subsequently proposed that security fences and gates be installed at each end of the noise walls, extending from the property boundaries to the noise walls, to prevent unwanted access. Keys will be held by Roads and Maritime and Council for maintenance purposes.

Justification and conclusion

During detailed design, a number of refinements were proposed to the Approved Project to address construction requirements, and provide operational mitigation measures. Several elements of the Approved Project have also progressed to a detail that allows a complete and comprehensive assessment in this report. The Approved Project would increase capacity on Prospect Highway to reduce traffic congestion and improve road safety. This would have benefit to the local and broader community. The proposed refinements would support the construction of the Approved Project. The proposal would also provide a safer pick-up and drop-off area at Shelley Public School away from the highway, provide greater safety by providing a roundabout near the school, and further mitigate noise impacts of the Approved Project through the installation of additional noise walls and architectural treatments. On balance the proposal is considered justified.

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 7.2.

The benefits of the proposal are considered to outweigh the adverse impacts that may be generated by the proposal, which are mostly temporary and local in nature.

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1 Introduction

1.1 Proposal identification

Roads and Maritime Services (Roads and Maritime) propose to modify the design for the Prospect Highway Upgrade in order to include new works which have resulted from refinements to the design during the detailed design phase. The proposed works ('the proposal') include the following:

- Provision of a kiss and ride facility for Shelley Public School within the school grounds
- Inclusion of four additional noise walls along sections of Prospect Highway, and amendments to the design of the four noise walls described in the Approved Project REF
- Powerline relocation and associated clearing of trees within private properties along a section of the project between Bungarribee Road/Leabons Lane and Blacktown Road, Seven Hills
- Modification of the intersection at Hadrian Avenue and Keyworth Drive to provide a roundabout and associated utilities relocation
- Additional drainage works at various locations along the alignment outside of the Approved Project boundary
- Additional road works at various locations along the alignment extending beyond the Approved Project boundary
- Additional site compound areas not assessed in the Approved Project REF
- Property works at residential properties to facilitate safe entry and exit to properties to and from Prospect Highway
- Amendment of the sign posted speed limit on Prospect Highway between Reservoir Road and Blacktown Road
- Test excavations for non-Aboriginal heritage items at Reservoir Road
- Inclusion of operational on-site detention basins
- At-property acoustic architectural treatments for eligible receivers
- Relocation of one Sydney Trains power pole outside the Approved Project boundary.

1.2 Background

Roads and Maritime proposes to upgrade the Prospect Highway between Reservoir Road at Prospect and 200 metres north of St Martins Crescent at Blacktown, a length of 3.6 kilometres (refer to Figure 1-1) (the "Approved Project"). The original Review of Environmental Factors (the "Approved Project REF") was prepared in May 2014 by Jacobs (2014a) and following public display, a Submissions Report (Jacobs, 2014b) was prepared. The project was determined by Roads and Maritime in September 2014. Since then the project development has continued into the detailed design phase.

Prospect Highway is a south-north arterial road connecting Blacktown with the Great Western Highway, M4 Western Motorway, Reconciliation Road, and Greystanes Road in the south and the M2 Hills Motorway and M7 Motorway to the north.

Prospect Highway services private vehicles, buses and 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 the project
- A sign posted 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 overall project area, there are 14 existing signalised and unsignalised intersections with Prospect Highway.

During detailed design, a review of the noise assessment identified the requirement for a total of 10 noise walls for the project. This represented a further six noise walls in addition to the four noise walls identified in the Approved Project REF.

Targeted consultation was conducted during detailed design with property owners and issues relating to rear property access, visual amenity, and safety were raised. Feedback received during this time was taken into consideration by Roads and Maritime and resulted in two noise walls being removed from the final proposal. Further detail is provided in Chapter 2 and Chapter 5.

1.3 Purpose of the report

This Addendum REF has been prepared by SMEC on behalf of Roads and Maritime, Sydney Region. For the purposes of these works, Roads and Maritime is the proponent and a determining authority under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This Addendum REF should be read in conjunction

with the Approved Project REF *The Prospect Highway Upgrade – Reservoir Road, Prospect to St Martins Crescent, Blacktown* (Jacobs, 2014a).

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

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

The findings of the Addendum REF would be considered when assessing:

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

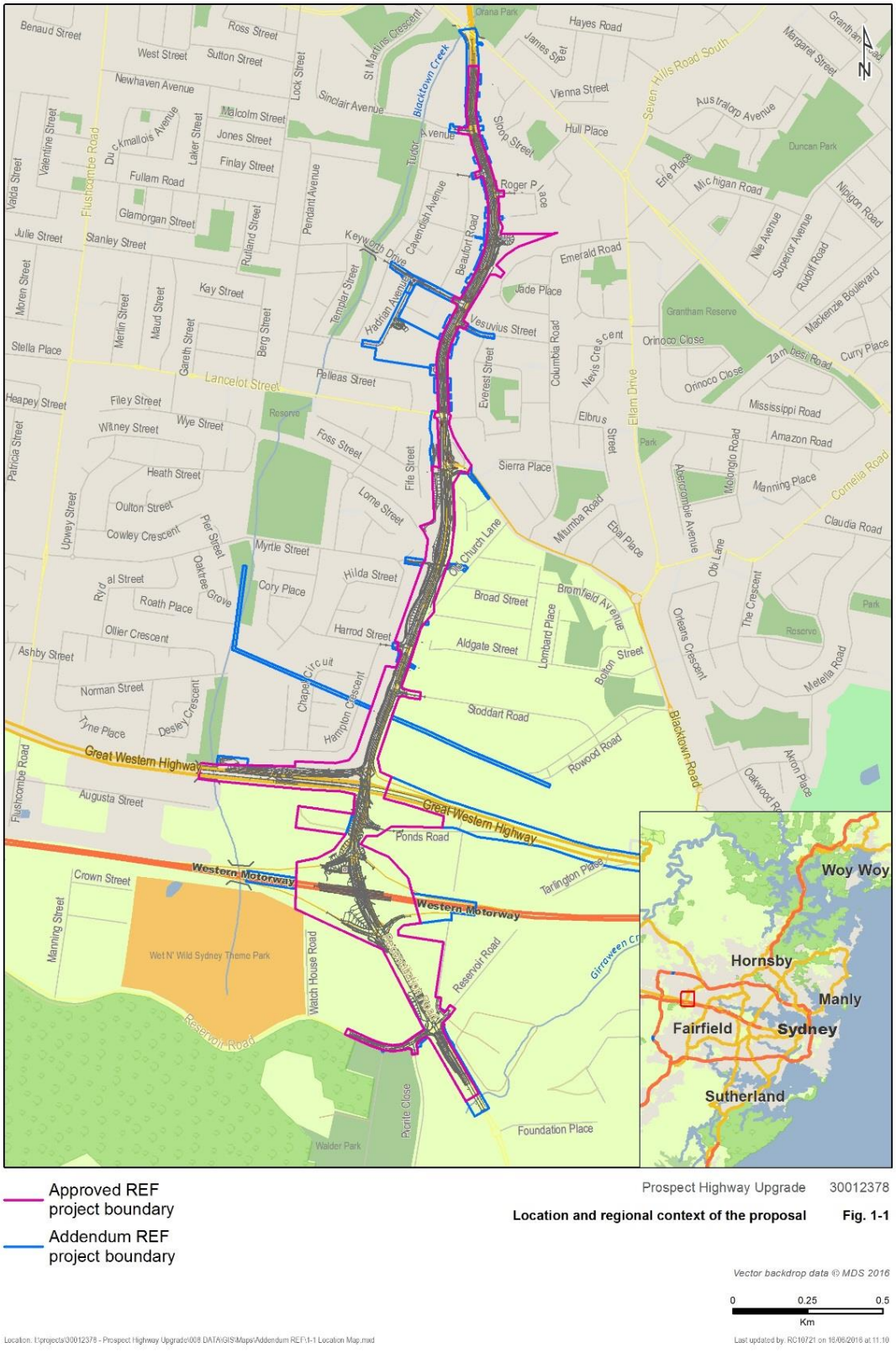

Figure 1-1 Location and regional context of the proposal

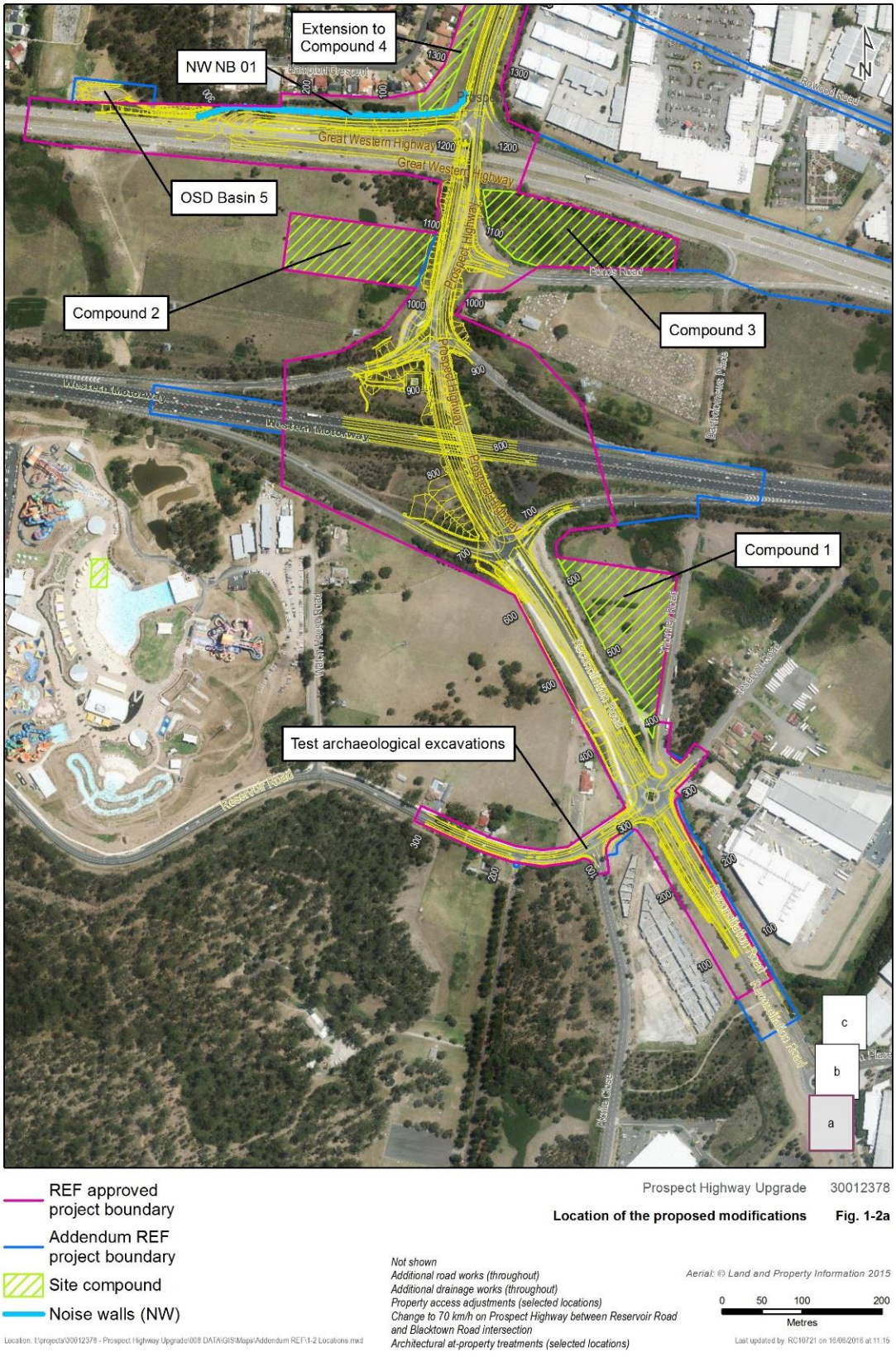

Figure 1-2a Location of the proposed refinements

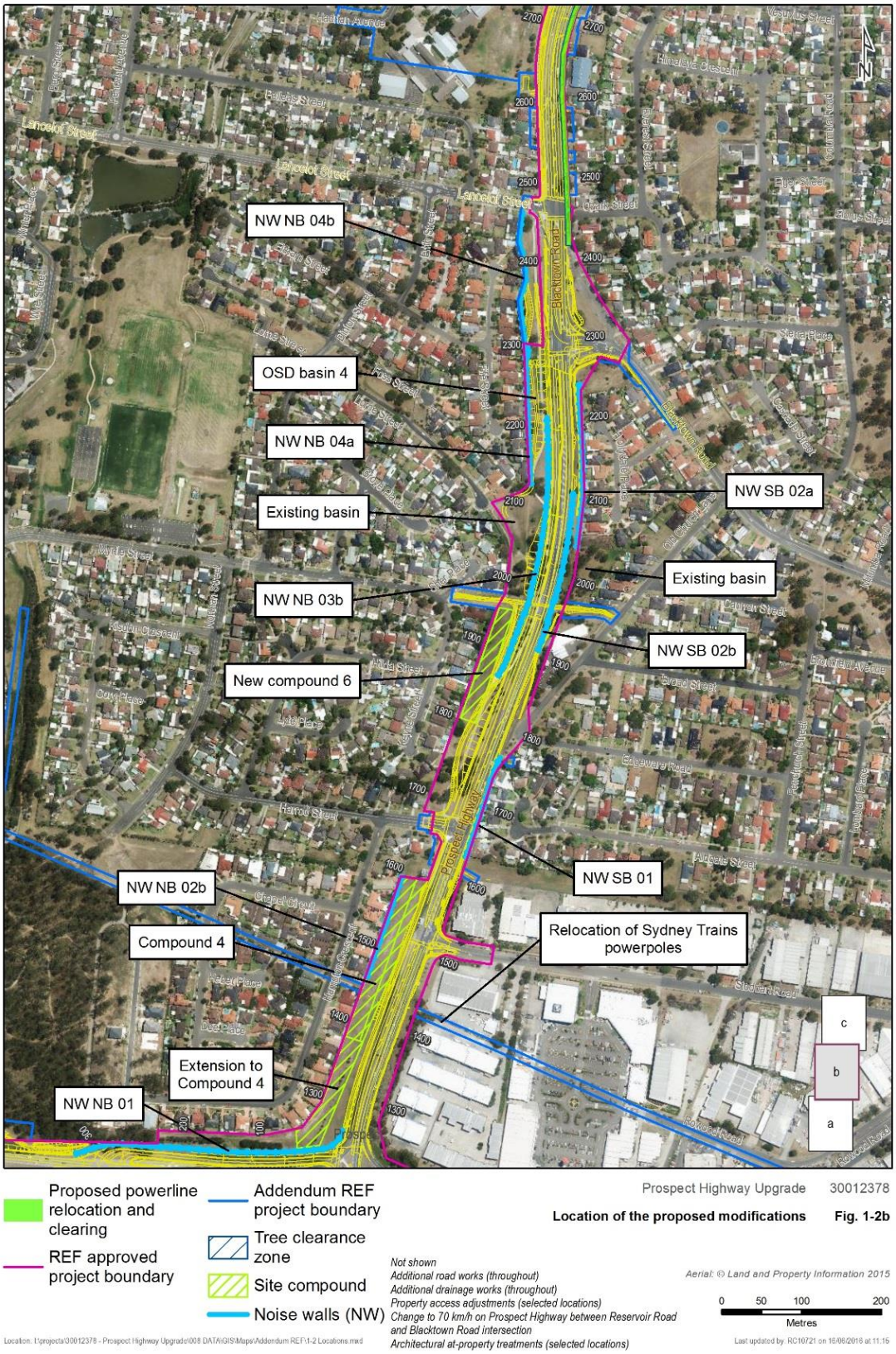

Figure 1-2b Location of the proposed refinements

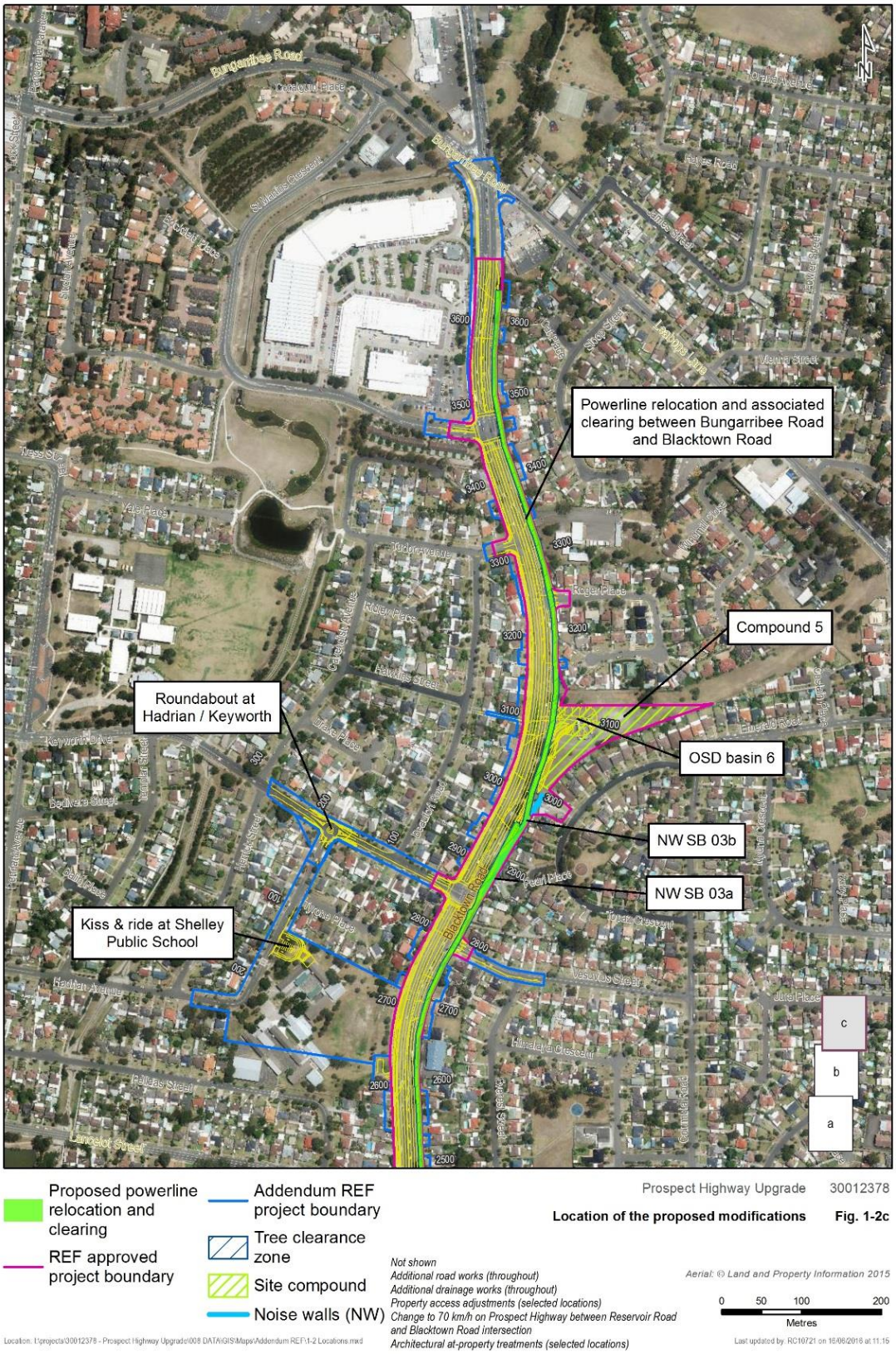

Figure 1-2c Location of the proposed refinements

2 Need and options considered

2.1 Strategic need for the proposal

Following development of the detailed design for the Prospect Highway Upgrade, it was identified that a number of elements are positioned outside the Approved Project site boundary (as per the Approved Project REF). These elements are positioned outside the Approved Project boundary due to design refinements which cannot be further reduced. As these works are located outside the Approved Project boundary, they are not covered by the existing approval and therefore are required to be assessed.

Several elements of the proposed design refinements were identified in the Approved Project REF however they have subsequently been developed to an extent where a complete and comprehensive assessment can now be carried out. Specifically, these comprise the installation of noise walls along Prospect Highway, overhead powerline relocations between Bungarribee Road/Leabons Lane and Blacktown Road and at-property architectural treatments for eligible properties.

Two elements of the proposed design refinements were identified in the Submissions Report as a mitigation measure in response to community and stakeholder concerns. Specifically, these comprise the provision of a kiss and ride facility at Shelley Public School, and installation of a new roundabout at Hadrian Avenue/Keyworth Drive. These have been developed during detailed design to an extent where they can now be assessed. These are located outside of the Approved Project boundary.

The overall strategic need for the project is unchanged from that described in Section 2 of the Approved Project REF.

2.2 Existing road and infrastructure

Prospect Highway and the local roads located in the study area and their infrastructure are consistent with those described in Section 2.2 of the Approved Project REF.

Hadrian Avenue is a local road, managed by Council, which runs from Keyworth Drive to Pendant Avenue. Hadrian Avenue comprises two unmarked lanes, one in each direction, with a speed limit of 40km/h along a section of it, due to the presence of the school. The remainder of the road has a speed limit of 50km/h.

Keyworth Drive is a local road, managed by Council, which extends from Blacktown Road (Prospect Highway) through to Lock Street. Keyworth Drive comprises two marked lanes, one in each direction, with kerbside parking. The speed limit is 50km/h.

2.3 Proposal objectives

The overall objectives of the proposal are unchanged from those described in Section 2.3 of the Approved Project REF. The main objective of the Approved Project is to provide increased capacity on the Prospect Highway between Reservoir Road, Prospect and 200 metres north of St Martins Crescent, Blacktown to allow for forecast traffic growth to 2031. Other objectives are to:

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

The objectives which are specific to this proposal are:

- To provide a kiss and ride facility and staff parking facility for Shelley Public School to replace the informal access which would be lost by removal of the service road which was identified in the Approved Project REF as requiring removal in order to accommodate the highway upgrade
- To meet the environmental commitments relating to the provision of parking and access at Shelley Public School and noise attenuation as outlined in the Approved Project REF (Jacobs, 2014a) and Submissions Report (Jacobs, 2014b)
- To provide noise mitigation in accordance with the requirements of the Environmental Noise Management Manual and Roads and Maritime's Noise Mitigation Guidelines
- Powerline relocation and associated vegetation trimming and removal to create a safe clearance zone around the relocated power lines in accordance with current Endeavour Energy requirements
- Enable property access adjustments to allow safety exiting from properties with direct access along Prospect Highway
- Enable test excavations to occur for archaeological remains of State Heritage Register listed Former Great Western Road beneath Reservoir Road.

2.4 Alternatives and options considered

A number of the proposed design refinements have emerged as a consequence of detailed design development and the resolution of construction requirements. As such, alternatives and options were not considered for all of the proposed design refinements.

Table 2-1 provides a summary of the evaluation for the need for the consideration of alternatives and options for the proposed design refinements.

Table 2-1 Need for alternatives and options assessment

Design change	Outside Approved Project boundary	Options considered
1) Provision of parking and access for Shelley Public School within the school grounds	Yes	Yes
2) Inclusion of four additional noise walls along sections of Prospect Highway, and amendments to the design of the four noise walls described in the Approved Project REF	No	Yes – following community consultation, re-evaluation of the proposal was required
3) Powerline relocation and associated clearing of trees within private property along a section of the project between Bungarribee Road/Leabons Lane and Blacktown Road, Seven Hills	No	No – need identified through consultation with utility owner and their policies and procedures

Design change	Outside Approved Project boundary	Options considered
4) Modification of the intersection at Hadrian Avenue and Keyworth Drive to provide a roundabout and associated utilities relocation	Yes	Yes
5) Additional drainage works at various locations along the alignment outside of the Approved Project boundary	Yes	No – design refinements to facilitate construction
6) Additional road works at various locations along the alignment extending beyond the Approved Project boundary	Yes	No – design refinements to facilitate construction
7) Additional site compound areas not assessed in the Approved Project REF	No	No – design refinement to facilitate construction
8) Property works at residential properties to facilitate safe entry and exit to properties to and from Prospect Highway.	Yes	No – developed as a site by site response to access requirements
9) Amendment of the sign posted speed limit on Prospect Highway between Reservoir Road and Blacktown Road	No	No
10) Test excavations for non-Aboriginal heritage at Former Great Western Road	No	No – required under the Heritage Act.
11) Operational on-site detention basins	No	No – design refinements to meet Blacktown City Council guideline requirements.
12) At-property acoustic architectural treatments	Yes	No – identified in accordance with the Noise Criteria Guidelines.
13) Relocation of Sydney Trains power pole	Yes	Yes

2.4.1 Identified options for the kiss and ride facility

Option 1: Do nothing

The ‘do nothing’ approach would not provide an access and parking area for the school.

Option 2: Kiss and ride facility with diagonal parking bays

This option would involve the provision of a drop-off and pick-up facility and 12 diagonal staff parking bays within the school grounds.

Option 3: Kiss and ride facility with parking bays perpendicular to the roadway

This option would involve the provision of a drop-off and pick-up facility and 12 staff parking bays perpendicular to the roadway within the school grounds.

Option 4: Kiss and ride facility with straight parking bays and a footpath leading from the kiss and ride facility to the school

This option would be the same as Option 3 with the addition of a footpath leading from the kiss and ride facility to the school buildings.

2.4.2 Identified options for the noise walls

Option 1: Do nothing

The 'do nothing' approach would proceed with the installation of the 10 proposed noise walls as identified by detailed design modelling.

Option 2: Modification of noise wall proposal

This option would remove two of the proposed noise walls (NW_NB02a and NW_NB03a) and reduce the height of a third wall (NW_SB02b).

Option 3: Modification and relocation of noise wall proposal

This option would remove two of the proposed noise walls (NW_NB02a and NW_NB03a), relocate three noise walls (NW_NB02b, NW_NB04a and NW_NB04b) from the proposed location adjacent to property boundaries to the roadside edge, and reduce the height of a wall (NW_SB02b).

2.4.3 Identified options for the Hadrian Avenue/Keyworth Drive intersection

Option 1: Do nothing

The 'do nothing' approach would not allow for any changes to be made along Hadrian Avenue and Keyworth Drive.

Option 2: Installation of a roundabout

This option would provide a small 'local road' style roundabout at the intersection of Hadrian Avenue and Keyworth Drive, some minor kerb widening and associated utilities relocations.

2.4.4 Identified options for Sydney Trains electricity pole relocation

Option 1: Replacement of pole 6 with a 23 metre pole (pole 6A) at the property boundary (Lot 50 DP1208240), and no other works.

Option 2: The installation of new pole 5A, a 23 metre pole at the property boundary, on the eastern side of the highway (within the existing easement over private property (industrial warehouse zone), and the replacement of a similar-sized 23 metre pole (pole 6), approximately 25 metres to the west of the current location within Lot 50 DP1208240, on the western side of the highway. Re-tensioning of the existing mains would also be undertaken.

Option 3: Replacement of pole 6 with a 23 metre pole (pole 6A) at the property boundary (Lot 50 DP1208240) on the eastern side of the highway, and the replacement of pole 5 with an 18.5 metre pole (pole 5A), five metres to the west of the current

location (within the existing easement over private property (industrial warehouse zone)) on the western side of the highway.

2.5 Analysis of options

2.5.1 Kiss and ride facility

A comparison of the options concluded:

- **Option 1:** This option would not meet the objectives of this proposal. By doing nothing, the project would have the potential to increase pressure on local roads due to the closure of the service road required to accommodate the highway upgrade. Vehicles that would normally use the service road would be required to use local roads near the school, such as Hadrian Avenue and Pelleas Street, for parking, drop-offs and pick-ups. By doing nothing, there would be no formalised facility for school drop-offs and pick-ups and no additional staff parking within school grounds.
- **Option 2:** The diagonal parking bays would increase the construction footprint area required for the kiss and ride facility. This option would not provide pedestrian connectivity between the kiss and ride facility and the school buildings and facilities.
- **Option 3:** This option is preferred over Option 2 as the straight parking bays would occupy a smaller footprint. It would not provide pedestrian connectivity between the kiss and ride facility and the school buildings and facilities.
- **Option 4:** This option would provide an additional benefit to Option 3 by providing pedestrian connectivity between the kiss and ride facility and the school buildings and facilities.

2.5.2 Noise wall refinements

During detailed design, targeted consultation was undertaken with property owners located behind the 10 proposed noise walls through a serious of doorknocks and face to face discussions which allowed a range of individual opinions to be raised.

Following consultation with potentially affected properties, all proposed noise walls were individually examined to re-evaluate their inclusion in the proposal. Considerations including the following aspects:

- Noise mitigation outcomes
- Urban design
- Community concerns

In evaluating the options, the following was concluded:

- **Option 1**: This option would result in the installation of noise mitigation measures to reduce noise levels for residents. The noise walls would allow for passive surveillance of the reserve in accordance with Crime Prevention Through Environmental Design (CPTED) principles, however they would represent a new built element in the visual landscape. This option would result in several sections of the community receiving noise walls outside their properties to which they object. This was deemed to be undesirable where alternatives were available.
- **Option 2**: This option would remove the noise walls most objected to by affected residents (NW_NB02a and NW_NB03a) and reduce the height of one wall (NW_SB02b) to the same height as the adjacent wall, reducing the visual impact

that was raised as a concern by affected residents. The removal of the two noise walls would increase the exposure of residents situated behind the walls to traffic noise. The removal of the two noise walls would also address the residents' concerns regarding access and safety at their rear boundaries at these locations. Passive surveillance of the reserve in accordance with CPTED principles would be provided. Two properties behind NW_NB02a and all properties behind NW_NB03a would be eligible for architectural noise treatment assessment.

- **Option 3**: Similar to Option 2, this option would remove the two noise walls most objected to by affected residents, for reasons of safety, access and visual impacts. Additionally, this option would relocate three noise walls (NW_NB02b, NW_NB04a and NW_NB04b) from the property boundaries to the roadside edge. The removal of the two noise walls would increase the exposure of residents situated behind the walls to traffic noise. The relocation of the three noise walls to the roadside edge would improve the noise mitigation benefits of the noise walls compared to the property boundary location. This option is not consistent with key urban design principles in CPTED which calls for design and structures to reduce opportunities for crime by using place management and natural surveillance.

2.5.3 Intersection treatment at Hadrian Avenue and Keyworth Drive

Option 1: Do nothing

This option would not recognise the closure of the service road and informal access point on Prospect Highway or provide appropriate accommodation for vehicle movements on Hadrian Avenue and Keyworth Drive. This would increase congestion and safety risks at this intersection and decrease accessibility for local residents.

Option 2: Installation of a roundabout at Hadrian Avenue and Keyworth Drive

This option would improve connectivity to Shelley Public School via Keyworth Drive and Hadrian Avenue in addition to improving safety on local roads in this area through the introduction of a roundabout at this T- intersection.

2.5.4 Sydney Trains electricity pole relocation

Option 1: This option would move pole 6 out of the upgraded highway footprint. The minimum clearance to the ground would be less than 6.7 metres but more than 5.5 metres at the lowest point, located over the driveway/hardstand of the neighbouring industrial warehouse property. This is acceptable according to *AS 7000:2010*, but would prevent high vehicle access the warehouses. This option would not replace pole 5, which was identified as having a defect in the pole inspection report. This option would not achieve acceptable clearances to the upgraded Prospect Highway or the Endeavour Energy existing 33kV undercrossing.

Option 2: This option would maximise the ground clearance over the proposed road work (6.7 metres to 9 metres) compared to Option 1, and would also achieve clearance over Endeavour Energy 11kV mains. High vehicle access would be possible. This option would replace the defective pole 5. This option is the preferred option.

Option 3: This option achieves the minimum clearance requirements, however the clearance provided would be less than Option 2.

2.6 Preferred option

2.6.1 Kiss and ride facility

Option 4 is the preferred option because it best meets the objectives of this proposal which includes the provision of a safe access and parking facility for the school, it

occupies a smaller footprint than Option 2 and it provides connectivity from the kiss and ride facility to the school buildings and facilities, which Options 2 and 3 do not.

2.6.2 Noise wall refinements

Option 2 was selected as the preferred option as it provided, on balance, the most appropriate response to community concerns while also considering the noise mitigation and urban design outcomes of the proposed noise walls. Table 2-2 provides a summary of the proposed noise wall refinements following community consultation.

Table 2-2 Proposed noise walls refinements following consultation

No.	Noise wall reference	Noise wall identified in REF?	Retained following consultation?
1	NW_NB01	Yes	Yes, the proposed noise wall will be retained. It was supported by the property owners that Roads and Maritime met with during targeted consultation
2	NW_NB02a		No, the proposed noise wall will not be retained or installed. This option was removed due to community opposition from a majority of property owners that Roads and Maritime met with during targeted consultation
3	NW_NB02b		Yes, the proposed noise wall will be retained. It was generally supported by the residents behind this wall. The length of the wall will be adjusted slightly as a consequence of removing NW_NB03a
4	NW_NB03a		No, the proposed noise wall will not be retained or installed. This option was removed due to community opposition from the majority of property owners that Roads and Maritime met with during targeted consultation
5	NW_NB03b		Yes, the proposed noise wall will be retained. It was generally supported by the property owners that Roads and Maritime met with during targeted consultation
6	NW_NB04a	-	Yes, the proposed noise wall will be retained. It was generally supported by the property owners that Roads and Maritime met with during targeted consultation
	NW_NB04b	-	Yes, the proposed noise wall will be retained. It was generally supported by the property owners that Roads and Maritime met with during targeted consultation
7	NW_SB01	Yes	Yes, the proposed noise wall will be retained. It was generally supported by the property owners that Roads and Maritime met with during targeted consultation

No.	Noise wall reference	Noise wall identified in REF?	Retained following consultation?
8	NW_SB02a	Yes	Yes, the proposed noise wall will be retained. It was generally supported by the property owners that Roads and Maritime met with during targeted consultation
9	NW_SB02b		Yes, the proposed noise wall will be retained. The wall height will be reduced from 4m to 3.5m to address residents' concerns.
10	NW_SB03a	Yes	Yes, the proposed noise wall will be retained. It was generally supported by the property owners that Roads and Maritime met with during targeted consultation
	NW_SB03b		Yes, the proposed noise wall will be retained. It was generally supported by the property owners that Roads and Maritime met with during targeted consultation

2.6.3 Intersection treatment at Hadrian Avenue and Keyworth Drive

Option 2 is the preferred option because it best addresses the project objectives to reduce traffic congestion and improve traffic flows and to improve safety for all road users. The associated kerb, driveway and utility adjustments are required to accommodate the proposed intersection treatment in accordance with the relevant road design guidelines.

2.6.4 Sydney Trains electricity pole relocation

Option 2 is the preferred option as it maximises ground clearance over the proposed road work and also clearance over Endeavour Energy 33kV mains which pass underneath the Sydney Trains line. This option also replaces Pole 5 which has a large pipe shaped defect.

3 Description of the proposal

3.1 The proposal

The proposal involves a number of refinements and additions to the Approved Project in order to allow for the following works, as shown in Figure 1-2:

- Provision of a kiss and ride facility for Shelley Public School within the school grounds
- Inclusion of four additional noise walls along sections of Prospect Highway, and amendments to the design of the four noise walls described in the Approved Project REF
- Powerline relocation and associated clearing of trees within private properties along a section of the project between Bungarribee Road/Leabons Lane and Blacktown Road, Seven Hills
- Modification of the intersection at Hadrian Avenue and Keyworth Drive to provide a roundabout and associated utilities relocation
- Additional drainage works at various locations along the alignment outside of the Approved Project boundary
- Additional road works at various locations along the alignment extending beyond the Approved Project boundary
- Additional site compound areas not assessed in the Approved Project REF
- Property works at residential properties to facilitate safe entry and exit to properties to and from Prospect Highway
- Amendment of the sign posted speed limit on Prospect Highway between Reservoir Road and Blacktown Road
- Test excavations for non-Aboriginal heritage items at Reservoir Road
- Inclusion of operational on-site detention basins
- At-property acoustic architectural treatments for eligible receivers
- Relocation of one Sydney Trains power pole outside the Approved Project boundary.

3.1.1 Kiss and ride facility

The Approved Project requires the removal of an existing service road on the western side of Prospect Highway to accommodate the upgrade of the highway. The service road is currently used as an informal set down and pick-up area for Shelley Public School along with two other drop-off areas on Hadrian Avenue and Pelleas Street. The school does not have a formalised off-road drop-off area. The Approved Project REF and Submissions Report state in the mitigation measures:

Roads and Maritime will investigate measures to improve traffic flow and access to Shelley Public School as part of the proposal in consultation with the school and Blacktown City Council.

Pedestrian fencing and controlled access to Shelley Public School via Hadrian Avenue and Pelleas Street would be introduced to remove access to Shelley Public School from Prospect Highway.

In order to meet the commitments of the Approved Project (i.e. to provide access to the school), Roads and Maritime are proposing to construct a kiss and ride facility within the school grounds, accessed from Hadrian Avenue. This facility would provide a safer drop-off and pick-up area for students and parking area for staff of the school. The layout of the parking facility has been optimised to reduce its footprint on the school's property (refer Figure 3-1). All turning movements would be allowed into and out of the parking facility. The parking facility would operate similar to a 'normal' commercial driveway type arrangement with typical give way requirements for vehicles exiting the facility. Some tree removal would be required.

The kiss and ride facility would provide a safe entry and exit manoeuvre from Hadrian Avenue with a 3.2 metre wide internal roadway, 12 staff parking bays, and a two metre wide footpath adjacent to the drop-off and pick-up area, which would provide access to the school buildings. A concrete hardstand and covered 'assembly' area is also proposed adjacent to the school building.

The proposed staff parking bays would be perpendicular to the roadway. Provision has also been made for access to the refuse bins (directly from Prospect Highway) and adequate provision has been made for turning movements of refuse collection vehicles. The time-restricted (no parking during school drop-off and pick-up times) on-street parking outside the school (around three spaces) would be removed to accommodate the new car park access.

Kerbs have been proposed between the kiss and ride area and the two metre footpath for the following reasons:

- To provide a nominal drainage facility to accommodate any surface runoff
- To accommodate a 0.3 metre clear area for opening and closing doors
- To provide delineation between the kiss and ride area and the footpath.

Timing of the construction of the kiss and ride facility would be co-ordinated with school authorities and the Department of Education however it is proposed that a Department of Education approved contractor would be engaged to carry out the works. The works would be programmed such that the kiss and ride facility would be built and operational before the informal service road drop of facility is removed.

Figure 3-1 Proposed kiss and ride facility at Shelley Public School

3.1.2 Noise walls

The Approved Project REF identified four locations where noise walls were to be installed to mitigate noise impacts. Since then, further noise modelling has been undertaken based on the detailed road design, and based on consultation carried out with affected property owners an additional four noise walls are proposed on the western (northbound) side of Prospect Highway to adequately mitigate the operational noise impacts associated with the project (refer to Figure 3-2 to Figure 3-4 and Table 3-1). This Addendum REF will assess the potential impacts of all proposed noise walls, based on the final detailed design.

The proposed noise walls would be located along the Prospect Highway in the cleared road corridor, with the exception of NW_NB01 which would be located along the Great Western Highway near the intersection with Prospect Highway (refer Figure 3-2). The design of the noise walls has taken into consideration access requirements to the shared path running along Prospect Highway as well as the pedestrian underpass which crosses under the Prospect Highway between Old Church Lane and Keyne

Street, providing gaps in noise walls NB02, NB03, NB04 and SB03 in order to provide cross access mid-way for pedestrians and cyclists.

The noise walls would vary in height from 2.5 to 4.5 metres. The noise walls typically comprise three panels, with the lower two-thirds comprising a precast concrete panel and the top third a transparent material. The exceptions are noise walls NW_NB03b and NW_SB02a (roadside panels at the pedestrian underpass bridge) which are comprised of a clear transparent material for their full height. The transparent panels reduce potential shading impacts on adjacent properties and are aimed at improving the urban design outcome by reducing the overall bulk and scale of the wall. CPTED requirements have also been adopted in the development of the noise wall design. The bottom two thirds would comprise two colours of similar shades to reduce the visibility of the solid panels. The panels would have a finish on both sides of the panel to discourage graffiti. Further detail on the urban design criteria for the design of the proposed noise walls is provided in Section 3.2.3. Security fencing and gates would be installed at the end of the noise walls, extending from the property boundaries to the noise walls, to prevent unwanted access. Keys will be held by Roads and Maritime and Council for maintenance purposes.

With the exception of noise walls NW_NB01, NW_NB03b and NW_SB02a (roadside panels), all other noise walls are positioned approximately 1.5 metres from property boundaries. The space between the existing property boundary, and the noise wall would be treated with a low maintenance surface treatment, such as gravel. It is anticipated that a five metre wide area would be required for construction access along the proposed locations of noise walls. This area would be turfed to match the existing site conditions following installation of the noise walls.

The noise walls are predominately ‘surface’ structures which follow the profile of the existing ground. Minimal excavation would be required aside from piled foundations and no permanent drainage controls would be required. Some tree removal would be required to facilitate the construction of the noise walls. A construction access track would be constructed in front of the walls to accommodate construction access. The noise walls would be constructed progressively over the course of the construction contract.

Table 3-1 Noise walls proposed in the Approved Project REF and proposed additional noise walls

No.	Noise wall reference	Identified in Approved Project REF?	Noise wall details						Comments
			Length (m)		Height (m)		Style	Offset from property boundary	
			Approved REF	Proposed refinement	NMG[1] Optimised	RMS Final			
1	NW_NB01	Yes	310	345	3.5	3.5	2/3 concrete and 1/3 transparent	n/a – road side	Wall length and position consistent with Approved Project REF
2	NW_NB02b	No	-	135	3.0	3.0	2/3 concrete and 1/3 transparent	1.5m	New wall identified in detailed design. Southern section of wall (NW_NB02a) removed as a consequence of community concerns. Utilities easement located at southern end of NB02b which constricts wall extent.
3	NW_NB03b	No	-	330	2.5	2.5	Fully transparent	n/a – road side	New wall identified in detailed design. Southern section of wall (NB03a) removed as a consequence of community concerns. Northern section at roadside (NB03b) on bridge infrastructure. NB03b is split

No.	Noise wall reference	Identified in Approved Project REF?	Noise wall details						Comments
			Length (m)		Height (m)		Style	Offset from property boundary	
			Approved REF	Proposed refinement	NMG[1] Optimised	RMS Final			
									into 3 sub sections as it crosses over the pedestrian underpass bridge.
4	NW_NB04a	No	-	170	6.0	3.5	2/3 concrete and 1/3 transparent	1.5m	New wall identified in detailed design. Access provided to existing footpath through a break in the middle of wall.
	NW_NB04b	No	-	185	6.0	3.5	2/3 concrete and 1/3 transparent	1.5m	
5	NW_SB01	Yes	152	135	4.0	4.0	2/3 concrete and 1/3 transparent	0.1m	Wall length and position consistent with Approved Project REF Wall is offset approximately 0.5m from property boundary.
6	NW_SB02a	Yes	305	200	4.0	3.5	Fully transparent	n/a – road side	Wall location consistent with Approved Project REF. Southern section of wall at roadside (SB02a), northern section at property boundary (SB02b). SB02b is split
7	NW_SB02b			205	7.0	3.5	2/3 concrete and 1/3 transparent	1.5m	

No.	Noise wall reference	Identified in Approved Project REF?	Noise wall details						Comments
			Length (m)		Height (m)		Style	Offset from property boundary	
			Approved REF	Proposed refinement	NMG[1] Optimised	RMS Final			
									into 3 sub sections as it crosses over the pedestrian underpass bridge.
8	NW_SB03a	Yes	160	45	4.5	4.5	2/3 concrete and 1/3 transparent	1.5m	Wall length and position consistent with Approved Project REF. Access provided to existing footpath through a break in the middle of wall.
	NW_SB03b			105	4.5	4.5	2/3 concrete and 1/3 transparent	1.5m	

1. NMG = Noise mitigation guidelines

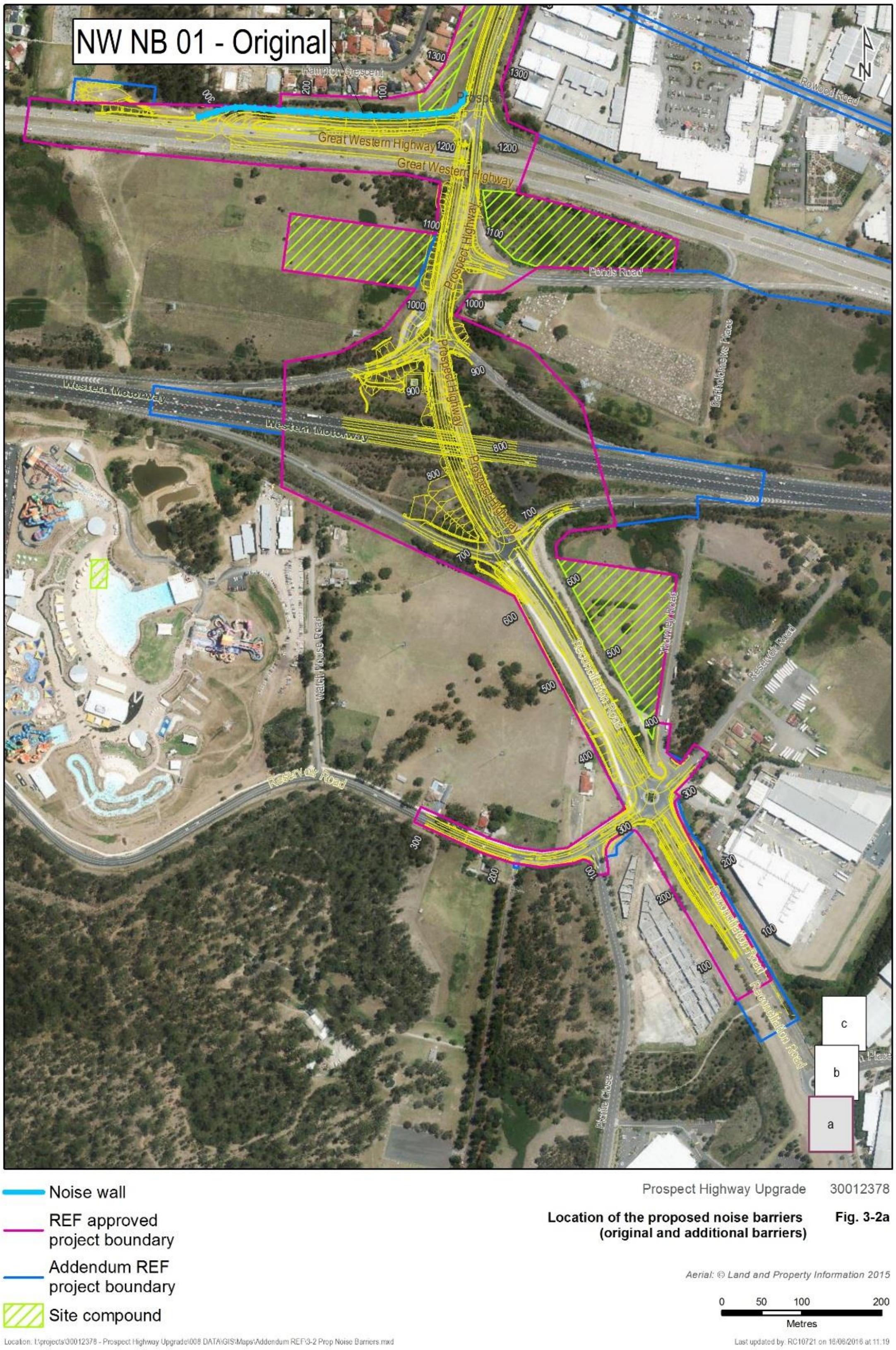

Figure 3-2 Proposed noise walls (original and additional walls)

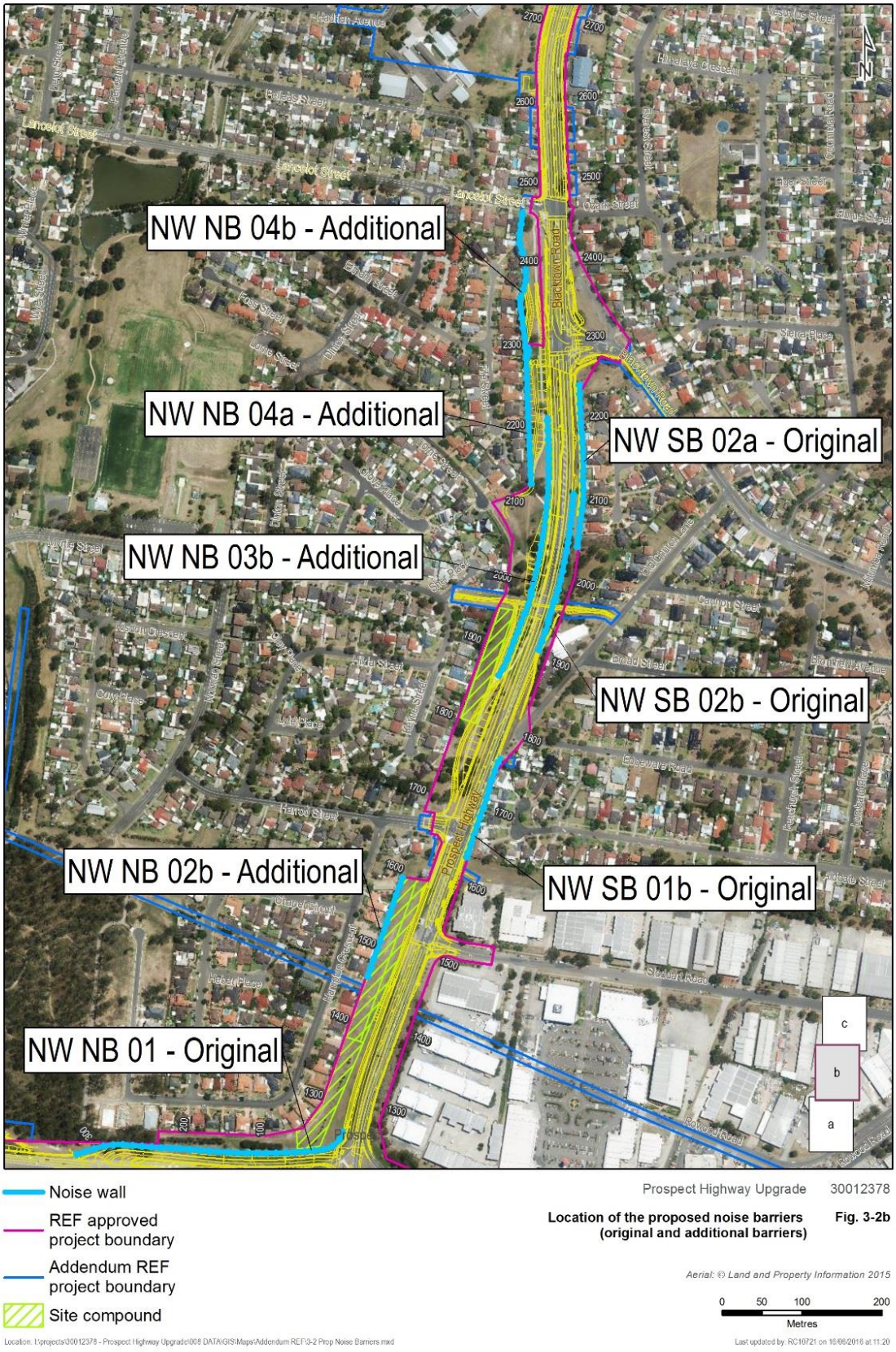

Figure 3-3 Proposed noise walls (original and additional walls)

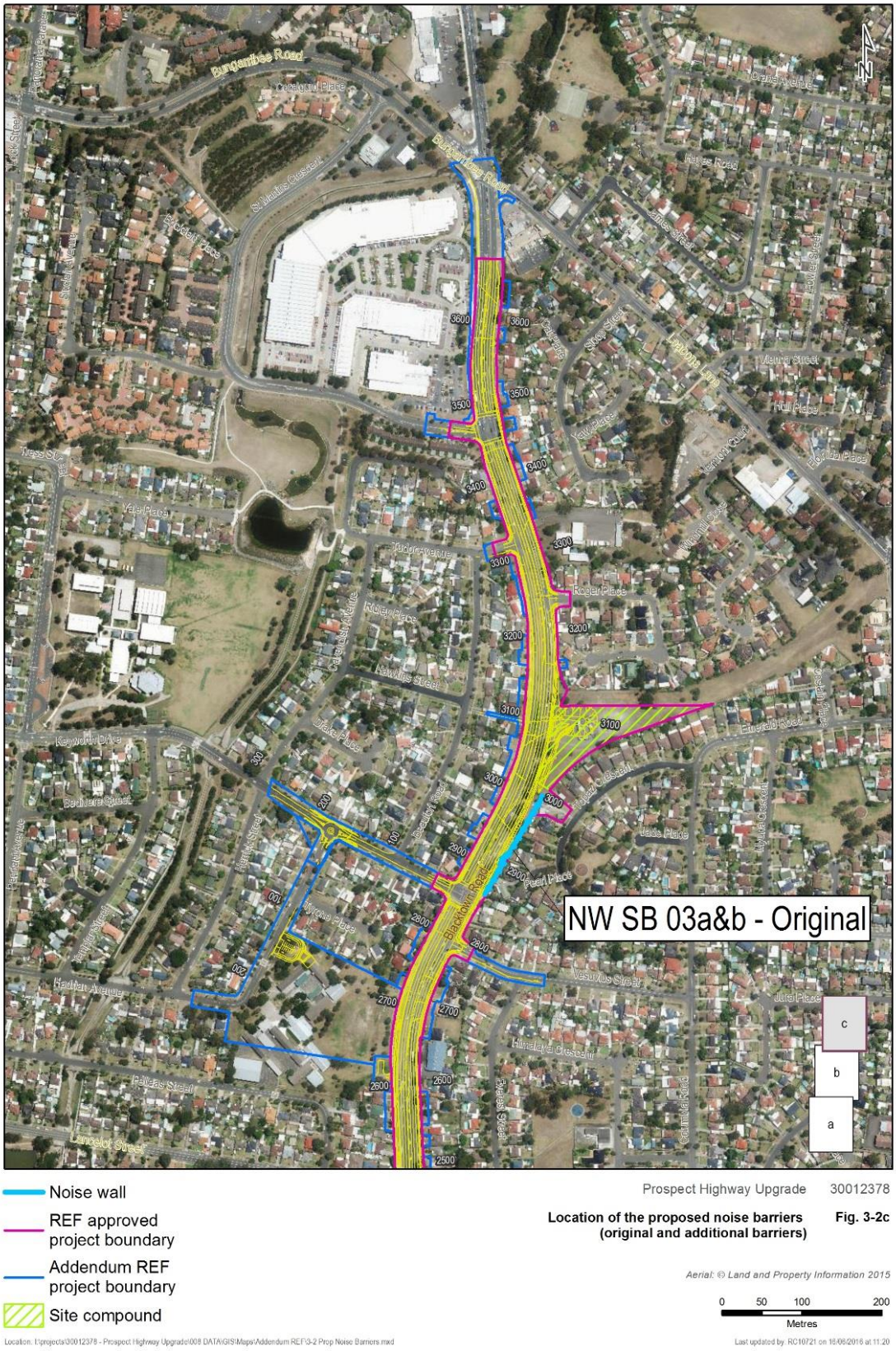

Figure 3-4 Proposed noise walls (original and additional walls)

3.1.3 Powerline relocation between Bungarribee Road and Blacktown Road

The Approved Project REF identified the requirement for utilities relocation associated with the project, including the relocation of powerlines between Bungarribee Road/Leabons Lane and Blacktown Road, Seven Hills.

The existing powerlines must be relocated in order to create room for duplication of Prospect Highway on the western side. There is no room on the western side, between the new edge of carriageway and the existing property boundaries to accommodate either overhead or underground cables. Furthermore the underground space is already congested with existing utilities such as water and sewer, with no space for additional powerlines. Undergrounding of utilities typically costs around three times the amount for overhead utilities, and for these combined reasons, undergrounding of utilities at this location was not considered as an option. Consequently the eastern side of the road was the only available remaining alternative for the relocation of the powerlines.

During detailed design, it was identified that the proposed relocation would require the pruning or removal of trees and shrubs on the eastern side of the road in order to accommodate the powerlines and to achieve the energy authority's safe clearance requirements, as shown in Figure 3-5.

The powerlines would be relocated within the road reserve, along the property boundaries, however trees on private property would also be affected. The area where the relocation would occur is shown in Figure 3-6 and Figure 3-7.

Roads and Maritime would be responsible for undertaking the required vegetation clearing however once complete ongoing maintenance would be the responsibility of Endeavour Energy.

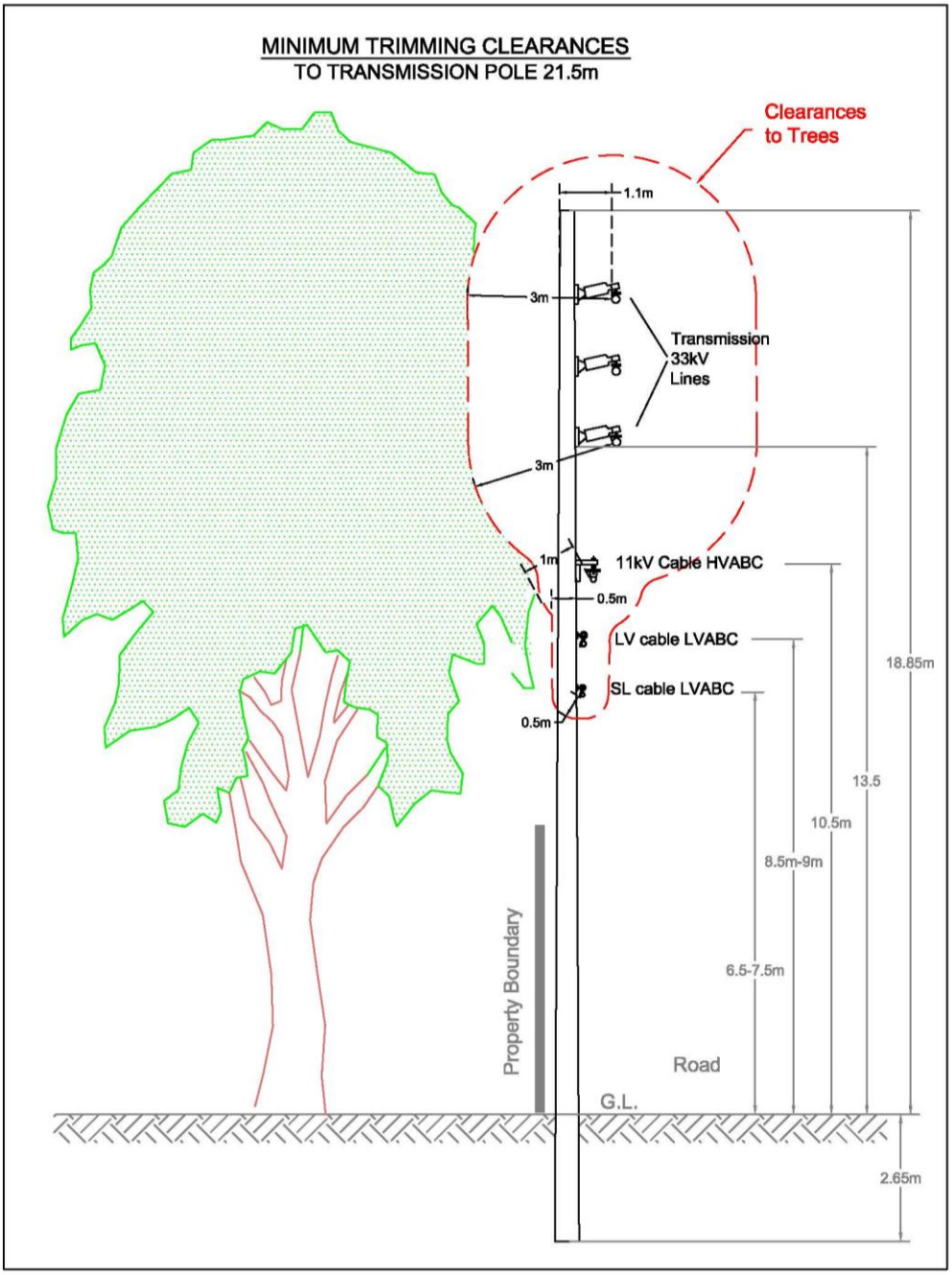

Figure 3-5 Endeavour Energy's standard clearance requirements for 33kV transmission lines

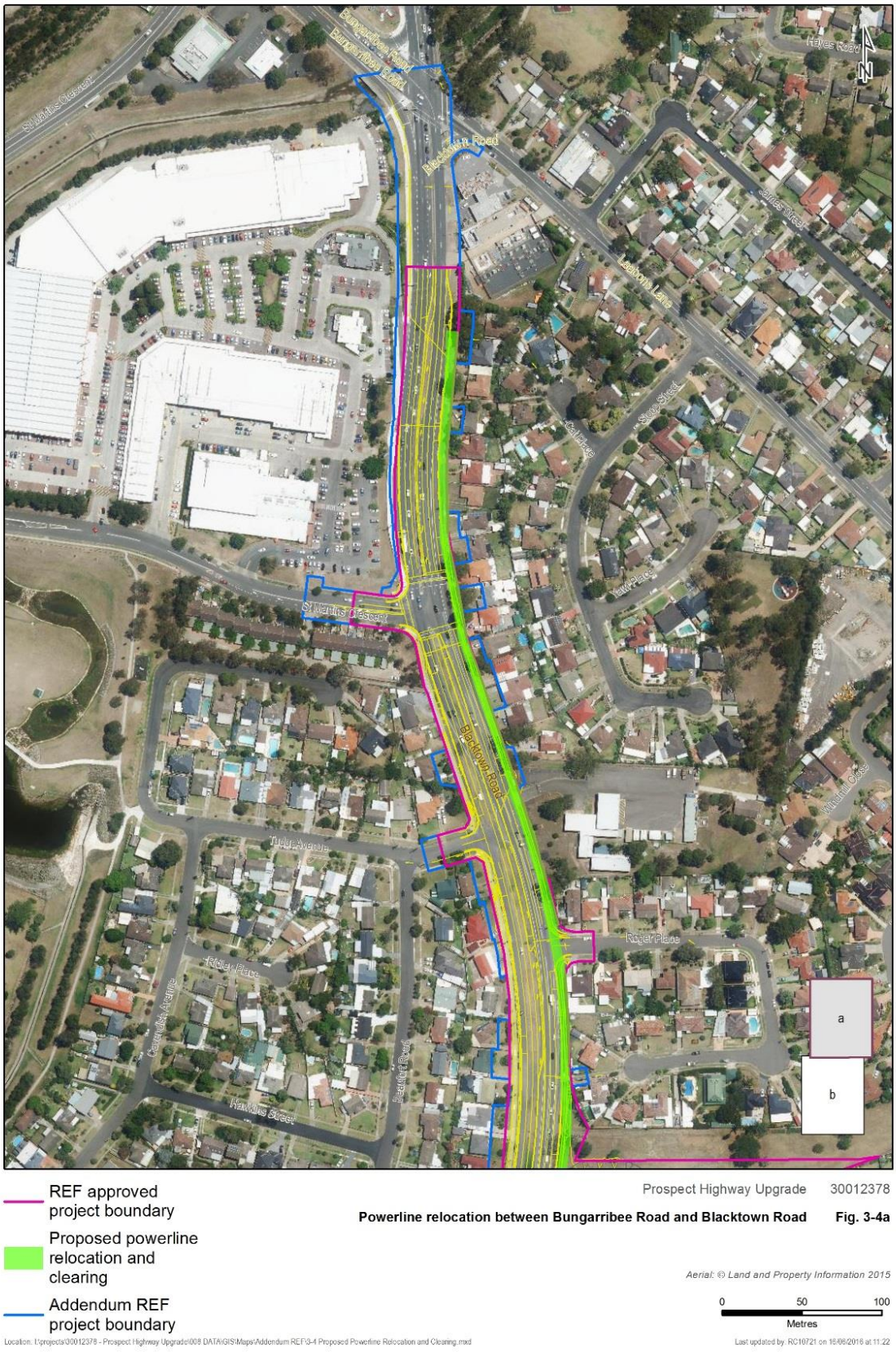

Figure 3-6 Powerline relocation between Bungarribee Road and Blacktown Road

Figure 3-7 Powerline relocation between Bungarribee Road and Blacktown Road

3.1.4 Modification of the intersection at Hadrian Avenue and Keyworth Drive to provide a roundabout

The proposed kerb extension and roundabout at the intersection of Hadrian Avenue and Keyworth Drive was not part of the concept design and was not assessed under the Approved Project REF. It was identified in the Submissions Report as a proposed design change to be developed in detailed design.

The proposed modification requires installation of a small 'local road' style roundabout at the intersection of Hadrian Avenue and Keyworth Drive (refer Figure 3-8). Minor widening is required at the corner of Hadrian Avenue and Keyworth Drive to accommodate appropriate turn paths for the turning traffic. Minor widening is also required on Keyworth Drive (northern kerb line) for the same reason. New footpath connections would be built, along with traffic control islands in the road to control traffic on approach and departure from the roundabout. Minor driveway adjustments are required on Keyworth Drive. A new concrete annulus (slightly raised disc) would be constructed, and new pavement surfacing to accommodate the new linemarking. Underground and overhead utility adjustments would also be required. The equivalent of around 12 on street parking spaces would be lost in the vicinity of the roundabout due to the new works.

The proposed modification is required due to the closing of a service road adjacent to Prospect Highway which was used as an informal school drop-off facility, which would direct a portion of school-related traffic that previously used the service road down Keyworth Drive and Hadrian Avenue. Community concerns regarding the increase in traffic on the local road network have dictated the inclusion of the roundabout at this existing intersection. The roundabout would improve the safety of the intersection under the increased traffic volumes.

Figure 3-8 Roundabout at Hadrian Avenue and Keyworth Drive

3.1.5 Additional drainage works at various locations along the alignment outside the Approved Project boundary

During detailed design, the requirement for some additional drainage works along the length of the Approved Project which extend beyond the Approved Project boundary was identified. Generally these additional drainage works have been identified in order to enable connections to existing Council drainage systems and to accommodate other proposed refinements identified in this Addendum REF, such as the kiss and ride facility and the Hadrian Avenue/Keyworth Drive roundabout. The additional proposed works typically extend between five metres and 95 metres beyond Approved Project boundary.

The details of additional works are provided in Section 6.6.

3.1.6 Additional road works at various locations along the alignment extending beyond the Approved Project boundary

During detailed design, the requirement for additional road works along the length of the Approved Project which extend outside the Approved Project boundary was identified. Details of the proposed refinements are provided in Section 6.2 and identified on the design drawings attached in Appendix B.

Generally the need for the additional road works has arisen during detailed design as a consequence of design refinement and detailed survey. The refinements include:

- Additional earthworks, such as batters and fill, to achieve design levels
- Longer tie-ins to existing pavement to achieve acceptable grades
- Kerb and line marking adjustments
- Provision of adequate space for a bus stop
- Temporary pavement widening on the M4 (around 200 metres east and west of the new bridge location) to allow safe construction space in the median for the new Prospect Highway bridge piers.

3.1.7 Additional site compound areas not assessed in the Approved Project REF

The approved concept design included five temporary construction compound sites. Two additional compound areas have been proposed in order to support the construction of the Approved Project (refer Figure 1-2) and are discussed below.

Extension of construction compound 4

Construction compound 4 (identified in the Approved Project REF, west of Prospect Highway near the intersection with Stoddart Road) would be extended by approximately 0.35 hectares to the south on land within the Approved Project boundary (Lot 91 DP803853). Site access to the compound would remain via Prospect Highway and/or the Great Western Highway. The additional land is required for retaining wall work along the Great Western Highway and stockpiling of materials. The site is bounded by a shared footpath to the east and property boundaries to the west.

Construction compound between Chainage 1820 and 9160 (new compound 6)

A new construction compound is proposed to be located south of the proposed footpath linking Old Church Road with Keyne Street. The compound extends south for approximately 140 metres and is bound by public footpaths adjacent to Prospect Highway to the east and property boundaries along Keyne Street to the west. The total compound area measures approximately 0.29 hectares, and is required to support the construction of the proposed footpath (the proposed footpath upgrade was approved

by Roads and Maritime via a separate consistency review prepared by SMEC on 6 November 2015). The compound is located within the Approved Project boundary and is located on land identified as Lot 94 DP246005. Site access would be via Prospect Highway.

3.1.8 Property access adjustments at residential properties to facilitate safe entry and exit to properties to and from Prospect Highway

The requirements for the provision of appropriate turning facilities for affected private properties along Prospect Highway were investigated during detailed design. The property access works would be required to facilitate safe entry and exit to properties along Prospect Highway. Forty residential properties located outside the Approved Project boundary would require property access works, which are described in more detail in Section 6.2.

Works would generally involve provision of new pavement area to facilitate vehicle turn around within the property boundary. This would allow residents to exit onto Prospect Highway from a safer forward facing position. Grading to tie in the new highway levels with existing levels within private properties would also be required.

The property access adjustments have been developed and agreed on a property by property basis. Individual agreements have been signed off with each property owner. Arrangements for construction activities would be agreed directly with each property owner. These arrangements would be provided based on property adjustment meetings and plans that were agreed and approved by Roads and Maritime and property owners throughout the detailed design phase of the project.

3.1.9 Amendment of the sign posted speed limit on Prospect Highway between Reservoir Road and Blacktown Road

The Approved Project REF stated that the signposted speed for the entire project would be 60 km/h. All design development and noise modelling undertaken throughout the project has utilised a design speed of 70 km/h. During detailed design it was identified that increasing the speed limit to 70 km/h would have a beneficial outcome for operational noise impacts and it is now proposed that the sign posted speed limit between Reservoir Road and Blacktown Road signalised intersection would be 70 km/h. The speed limit between Blacktown Road and St Martins Crescent would remain at 60 km/h as this section is more urbanised and contains numerous direct accesses from private properties onto the highway.

3.1.10 Test excavations for non-Aboriginal heritage at Former Great Western Road

The Approved Project REF identified that the project has the potential to impact on a section of the former Great Western Road at Prospect, now Reservoir Road. At the time of approval, the State Heritage Register nomination was still pending. The Former Great Western Road was formally gazetted on 27 June 2014. The listing included an exemption for needing approval under section 57(1) of the *Heritage Act 1977*, "*provided that the Heritage Council or its Delegate is satisfied that the criteria in (a), (b) or (c) have been met and the person proposing to undertake the excavation or disturbance of the land has received a notice advising that the Heritage Council or its Delegate is satisfied that … (b) disturbance of land will have a minor impact on archaeological relics including the testing of land to verify the existence of relics without destroying or removing them*."

Roads and Maritime is now proposing to undertake an archaeological test excavation to support the application for exemption under section 57(2).

The test excavation program would be guided by an approved archaeological management plan and would comprise the excavation of five test trenches within the road pavement under the guidance of a suitably qualified archaeologist. Trenches would be about two by three metres in size and with a depth of around 0.4 metres.

Field work would take around one to two weeks, depending on the final approved program.

Further details on the statutory requirements associated with the exemption are provided in Section 4.3.4 and a discussion on the heritage impact associated with the proposed work is provided in Section 6.7.

3.1.11 Operational on-site detention basins

The concept design did not take into consideration Council's requirements for new developments to provide on-site detention. The Prospect Highway Upgrade lies within the Upper Parramatta River catchment. Accordingly Blacktown City Council requires that on-site detention be provided in accordance with the Upper Parramatta River Catchment Trust handbook "On-site Stormwater Detention Handbook" (2005) (OSD Handbook). This requirement was confirmed in a meeting with Council staff on 31 March 2015. The OSD Handbook requires the provision of 455 m^3 of storage per hectare of developed area.

In addition to the proposal identified in detailed design to modify one of the two existing Council owned detention basins within the project area, it was identified that three additional permanent on-site detention basins would be required to manage stormwater flows during operation.

The basins have been designed utilising the DRAINS modelling software and in accordance with the OSD Handbook. Basins have been designed for both minor (10 year ARI) and major (100 year ARI) flood events which requires a staged outlet structure. Basin outlet pipes would be connected to Council's piped drainage except for Basin No. 5 where the outlet pipe would connect to an open channel that drains to Blacktown Creek. The modelling identified that the proposed on-site detention would slightly reduce the 100 year ARI discharge compared to existing conditions.

The proposed basins are shown on Figure 1-2 and are described in Section 6.6. All basins would be fenced off and no public access would be permitted.

3.1.12 Acoustic architectural treatments

The noise assessment undertaken for the Approved Project REF identified that where residual impacts remain after the use of noise walls, there would be a number of properties where the preferred option for mitigation noise would be at-property architectural treatment. Modelling undertaken during detailed design has identified properties that would be eligible for at property architectural treatment of dwellings. A total of 194 receivers were identified to be eligible for consideration of at-property treatment as part of the project. This comprises:

- 163 residential receivers on a first or second floor (1142 individual lots)
- 31 other sensitive receivers on a first or second floor (23 individual lots).

During construction, consultation would be undertaken with the individual eligible properties to determine whether the properties would be physically suitable to receive treatments. Roads and Maritime and the construction contractor, would negotiate agreements on an individual basis.

3.1.13 Sydney Trains electricity pole relocation

As part of the proposed highway widening it has been identified that one Sydney Trains 33kV pole (pole 6) would need to be relocated. Pole 6 is located on the western side

of Prospect Highway at approximate Chainage 1440, within the existing road corridor. Pole 6 would be replaced by a similar-sized 23 metre pole (pole 6A) at the property boundary of Lot 50 DP1208240, 25.5 metres to the west of its current location. There would be a new pole 5A installed on the eastern side of Prospect Highway at approximate Chainage 1440, within the existing road corridor. Pole 5A would be a similar-sized 23 metre pole as pole 6, located 28.6 metres to the west of the current location of pole 6.

3.2 Design

3.2.1 Design criteria

Generally the design criteria for the proposed refinements are consistent with those identified in Section 3.2 of the Approved Project REF.

The kiss and ride facility has been designed in accordance with:

- Austroads
- Building Code of Australia.

The noise walls have been designed in accordance with RTA Noise Wall Design Guideline (February 2007).

The vegetation pruning or removal associated with the powerline relocation has been developed in accordance with Endeavour Energy design standards.

3.2.2 Engineering constraints

Generally the engineering constraints for the proposed refinements are consistent with those identified in Section 3.2 the Approved Project REF.

The following engineering constraints apply to the proposed kiss and ride facility:

- Established trees on the school grounds
- Proximity of residential properties and school buildings to the kiss and ride facility site
- Width of Hadrian Avenue and existing property access driveways and existing pedestrian crossing
- Geometric design constraints associated with the design vehicle to use the facility
- Building Code of Australia design constraints related to the pedestrian access ramps.

The following engineering constraints apply to the proposed noise walls:

- Proximity of residential properties
- Presence of side roads
- Requirement to maintain existing pedestrian access along Prospect Highway
- Proximity of utility easements (across which noise walls cannot be installed)
- Proposed and existing drainage channels and other underground (and above ground) utilities.

The following engineering constraints apply to the on-site detention basins:

- Physical space between the road and property boundaries limit the size and shape of the basins
- The topography of the area limit the depth to which excavation of the basin can occur. The basins need to drain to existing Council drainage systems

- Both of the items above thus limit the storage capacity of the basins.

3.2.3 Urban design criteria

The design criteria identified in the REF have been adopted and developed through the detail design process. The following design criteria have been adopted for the proposed noise walls to minimise their visual impact:

- Establish an identity along Prospect Highway for the road user which reflects the southern entry to Blacktown
- The noise wall panel design is to consider both the road users' and road neighbours' views
- Noise wall heights are to be rationalised to limit the number of height changes. A consistent top edge line should be provided
- Stepping of the top edge is to be avoided wherever possible. Panels should generally run parallel to the ground plane
- Panels should have a sand blasted or bead blasted finish to discourage graffiti. The same finish should be implemented on both sides of the panels
- A concrete panel base with a transparent top section is to be adopted. The wall is to consist of three equal parts:
- The top third is to be a transparent panel to minimise overshadowing of residences and to maximise visibility
- The bottom two thirds are to consist of two colours of similar shades to reduce the visibility of the solid panels. Any variation in the height of the wall is to be taken up in the bottom third
- Steel 'T' section posts are to be utilised between the panels of the noise walls.

The clearance of existing vegetation is to be minimised where possible.

3.3 Construction activities

3.3.1 Work methodology

The construction of the proposed refinements is considered to largely be consistent with the construction activities described in Section 3.4 of the Approved Project REF. This includes the work methodology, staging, construction hours and duration and plant and equipment. The following sections outline where potential changes are likely as a result of the proposed refinements.

Kiss and ride facility

The potential pre-construction and construction activities associated with the kiss and ride facility are presented in Table 3-2. It is anticipated that the kiss and ride facility would be constructed prior to the removal of the service road and informal drop off area along Prospect Highway. This is to minimise impacts on the operation of the school and to avoid undue traffic congestion on Hadrian Avenue once the existing service road is closed.

Table 3-2 Indicative construction methodology for the kiss and ride facility

Stage	Activity
Pre-construction	Notify residents and school of construction works

Stage	Activity
Site establishment	Fence the construction area
	Implement initial environmental safeguards, including sediment and erosion controls
Site preparation	Mark trees to be removed
	Remove trees
Earthworks	Excavation to establish construction footprint, including footpaths and the sheltered slab area. Total area impacted by excavation activities is approximately 2500 square metres. The proposed finished survey level is approximately 1.0 m below existing ground level (at its deepest location), but pavement excavation a further 350 mm below that is also required. The finished survey level will be consistent with that of Hadrian Avenue.
Pavement works	Construct the pavement layers and concrete hardstand area Construct footpaths including ramps and steps
Structural works	Construct shelter over the hardstand area
Other works	Install signposts, bins and handrails
	Tie-in to existing stormwater drainage system, including excavation along Hadrian Avenue
	Line-mark to identify and separate the footpath, drop-off and pick-up lane and parking bays
	Landscaping
Finishing works	Rehabilitate disturbed areas
	Site clean-up, reuse of or disposal of any remaining surplus waste materials

Noise walls

The noise walls would be constructed in accordance with standard procedures and as part of the Approved Project program. Indicative pre-construction and construction activities associated with the installation of the noise walls are presented in Table 3-3.

Table 3-3 Indicative construction methodology for the noise walls

Stage	Activity
Pre-construction	Notify residents and other relevant stakeholders
Site establishment	Secure/cordon off the construction area as required

Stage	Activity
	Implement initial environmental safeguards, including sediment and erosion controls
	Construct temporary access track, if required
Site preparation	Mark vegetation to be removed, if applicable
	Remove vegetation, if applicable
Earthworks	Prepare ground surface for the installation of the noise walls (clearing and grubbing) Earthworks excavation for pile installation at regular intervals along each noise wall. The depth of the pile varies at each site
Structures	Install piles for noise wall foundations Construct pile capping beam Install reinforced concrete noise wall panels Install transparent noise wall panels
Other works	Landscaping
	Treatment of residual area between rear of noise wall and property boundaries
Finishing works	Rehabilitate disturbed areas
	Site clean-up, reuse of or disposal of any remaining surplus waste materials

Powerline relocation and associated vegetation removal/pruning

The potential activities associated with the powerline relocation and vegetation removal/pruning are presented in Table 3-4.

It is anticipated that the proposed powerline relocation would largely be undertaken prior to the main construction program. Works would be undertaken progressively along the highway.

Table 3-4 Indicative construction methodology for the powerline relocations

Stage	Activity
Pre-construction	Notify Council and nearby residents of construction works
Site establishment	Secure the work area
	Implement initial environmental safeguards, including sediment and erosion controls
Tree removal	Mark trees to be pruned or removed
	Prune / Remove trees

Stage	Activity
	Appropriately dispose vegetation. Reuse as wood chips / mulch where possible
Powerline relocation	Minimal excavation at discrete locations for new poles Installation of new poles on eastern side of highway
	Stringing of new overhead lines
	Cut over of power supply (including traffic controls across highway)
	Decommissioning of old poles and wires
	Site clean-up, reuse of or disposal of any remaining surplus waste materials
Finishing works	Site clean-up, reuse of or disposal of any remaining surplus waste materials

New roundabout at Hadrian Avenue/Keyworth Drive

The potential activities associated with the construction of the new roundabout at Hadrian Avenue/Keyworth Drive are presented in Table 3-4.

It is anticipated that the proposed roundabout would be constructed prior to:

- Removal of the northbound access to Vesuvius Street from Prospect Highway and
- Roadworks starting between Keyworth Drive and the northern extent of the project.

Table 3-5 Indicative construction methodology for the new roundabout

Stage	Activity
Pre-construction	Notify Council and nearby residents of construction works
Site establishment	Secure the work area
	Implement initial environmental safeguards, including sediment and erosion controls
Tree removal	Mark trees to be pruned or removed
	Prune / Remove trees
	Appropriately dispose vegetation. Reuse as wood chips / mulch where possible
Utilities	Adjust existing utilities (where required)
Earthworks	Minor earthworks at roundabout side to accommodate kerb adjustments

Stage	Activity
	Excavation for installation of road pavement to a depth of approximately 350 millimetres
Road works	Kerb adjustments and minor road widening
	Construction of new footpath section and tie-ins
	Installation of traffic control islands and annulus (concrete disc at centre of roundabout) and install new line marking
Finishing works	Site cleanup, reuse of or disposal of any remaining surplus waste materials

3.3.2 Construction hours and duration

Construction hours would generally be as per the Approved Project, which are:

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

Due to the importance of maintaining through traffic on Prospect Highway, particularly during peak periods, work outside of normal hours would be required. Out of hours work is undertaken to minimise disruptions to motorists while also reducing safety risks for workers and the travelling public.

Work outside of standard construction hours and extended construction hours would be undertaken in accordance with the Environment Protection Licence (EPL) and the *Interim Construction Noise Guideline* (DECC, 2009) and in accordance with Roads and Maritime's Environmental Noise Management Manual Practice Note VII.

Activities undertaken at night would minimise road safety risks, minimise disruption to daytime regional and local traffic flows, and minimise impacts as a consequence of utility outages. Examples of such activities are provided below.

Out-of-hours work would generally occur Sunday to Thursday. Work on Friday or Saturday nights would be avoided where possible but circumstances could occur that may require work on these nights.

Some examples of out-of-hours work would include:

- Completion of tie-ins between new work and the existing roads, completion of temporary pavement and diversions, and during traffic switches
- Bridge construction activities at the Great Western Highway and the M4 Western Motorway and pedestrian underpass bridge
- Delivery of materials or oversized structural elements such as pre-cast bridge girders
- Transverse drainage works
- Traffic signal works
- Utility adjustments and cut overs

- Where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm
- As agreed through negotiations between Roads and Maritime and potentially affected sensitive receivers. Any such agreement would be recorded in writing and a copy kept on-site for the duration of the works.

Other specific activities may require out-of-hours works and would be determined and agreed with Roads and Maritime on a case-by-case basis.

Works would be undertaken in accordance with a detailed construction noise and vibration management plan required to be prepared under the Approved Project REF. This would include notifying local residents prior to any construction activities undertaken outside of standard construction hours and a complaints handling procedure.

The majority of the proposed refinements would be undertaken within the 18-24 month contract period as described in the Approved Project REF. Some enabling works where possible would be undertaken ahead of the main construction works. These would include:

- Kiss and ride facility
- Powerline relocation between Bungarribee Road/Leabons Lane and Blacktown Road, Seven Hills
- Modification of the intersection at Hadrian Avenue and Keyworth Drive to provide a roundabout and associated utilities relocation
- Test excavations for non-Aboriginal heritage items at Former Great Western Road.

Timing and duration of each of these activities would be determined once the relevant approvals and permits have been obtained and contractors appointed.

3.3.3 Plant and equipment

Table 5.6 of the Approved Project REF provides a detailed list of plant and equipment that would be required for construction of the Approved Project. Plant and equipment that would be required for the activities being assessed in this REF are included in that list. It is not anticipated that any additional plant and equipment would be required.

3.3.4 Earthworks

Some earthworks would be required for the construction of the proposed refinements, however the works required at each location would be minor in the context of earthworks required for the overall Approved Project. The work methodology described in Section 3.3.1 above describes the earthworks at each location in more detail.

3.3.5 Source and quantity of materials

Construction of the proposed refinements would require various materials and pre-cast elements including, but not limited to:

- Small quantities of general fill for use in earthworks
- Pavement materials
- Aggregate for use in concrete and asphalt
- Sand
- Cement and concrete
- Bitumen

- Water
- Precast concrete and plexiglass panels for the noise walls
- Steel erection supports for the noise walls
- Handrails for the kiss and ride facility
- Steel sections for sheltered area at the kiss and ride facility, including roofing material
- Power poles and electrical wires.

A more comprehensive list of construction materials needed for the overall Approved Project is provided in Section 5.4.5 of the Approved Project REF.

Construction materials would be sourced from local commercial suppliers where feasible.

3.3.6 Traffic management and access

Traffic management

Generally, traffic management associated with the proposed refinements would be undertaken as part of the Approved Project. 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 Work Sites Manual* (Roads and Traffic Authority, 2010) and Roads and Maritime *G10 Specification for Traffic Management* (Roads and Maritime, 2011). Similar traffic management measures would be adopted for the construction of early works activities including the kiss and ride facility, powerline relocation, Hadrian Avenue/Keyworth Avenue roundabout and the archaeological test excavations.

Access

Generally, access would be as detailed in the Approved Project REF.

Pedestrian and vehicular access would be maintained to the school. Construction vehicles would access Shelley Public School from Hadrian Avenue. Access to the proposed noise wall locations would be undertaken from the Prospect Highway. Access to private properties for the tree clearing activities associated with the powerline relocations and the property access adjustments would also be required. Where access would be temporarily disrupted, alternative temporary arrangements would be established.

3.4 Ancillary facilities

Temporary compound sites would be established during construction of the Approved Project. Five potential sites were identified in the Approved Project REF (refer Figure 3-12 in the Approved Project REF).

The kiss and ride facility would be constructed prior to the commencement of the main construction period. Temporary ancillary facilities, including stockpiles, would be located within the proposed footprint at the school. Stockpiles would be located and managed in accordance with Roads and Maritime's Stockpile Site Management Guidelines.

It is proposed to undertake the powerline relocation and associated vegetation clearing/pruning as early works prior to the main construction period. The construction contractor would be responsible for the securing and establishment of any required site compounds and ancillary facilities required. If any additional site compounds are

located outside of the construction footprint, further environmental assessment would be required.

Two additional site compound areas are described as part of the proposed refinements. These would be located within the revised construction footprint identified in this Addendum REF. The additional site compounds would be utilised in a manner consistent with the activities described in the Approved Project REF.

3.5 Public utility adjustments

Public utility adjustments associated with the Approved Project have been assessed as part of the Approved Project REF.

The powerline relocation activities between Bungarribee Road and Blacktown Road are described as part of the proposed refinements.

The design of utility relocations for the Approved Project has taken into account the installation of the noise walls.

In order to construct the roundabout at the intersection of Hadrian Avenue and Keyworth Drive several utilities would require relocation works including NBN, Telstra and Sydney Water assets.

3.6 Property acquisition

Details of property acquisition required for the Approved Project are provided in Section 3.6 of the Approved Project REF.

The majority of the proposed refinements would be constructed within the road corridor and would not require property acquisition.

The noise walls would be constructed within the road corridor however the footprint of the noise wall and the residual area between the noise walls and property boundaries would be acquired from Council, as detailed in Table 3-6.

Table 3-6 Property acquisition proposed for noise walls

String / Chainage	Noise wall reference	Lot and DP	Area of Council land to be acquired by Roads and Maritime (m^2)
MC10 2415 - 2465	NW NB 04b	3 / 817053	130
MC10 2410 – 2415	NW NB 04b	6 / 621559	8
MC10 2810 – 2410	NW NB 04b	2 / 817053	215
MC10 2130 – 2810	NW NB 04a and NW NB 04b	25 / 815687	360
MC10 1385 – 1600	NW NB 02b	92 / 803853	270

No additional property acquisition is required for the activities being assessed in this Addendum REF.

4 Statutory and planning framework

4.1 State Environmental Planning Policies

4.1.1 State Environmental Planning Policy (Infrastructure) 2007

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

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

As described in the Approved Project REF, the proposal is for a road and associated works. As the Roads and Maritime is the proponent for the proposal, it can be assessed under Part 5 of the *Environmental Planning and Assessmen*t *Act 1979* (EP&A Act). Development consent from Blacktown 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 the ISEPP (where applicable), is discussed in Chapter 5 of this REF.

4.2 Local Environmental Plans

4.2.1 Blacktown Local Environmental Plan 2015

As outlined in Section 4.1.1, the ISEPP removes the requirements for development consent.

Development within the Blacktown LGA is generally subject to the provisions of the Blacktown Local Environmental Plan 2015 (LEP) which came into effect on 7 July 2015, replacing the Blacktown LEP 1988 in its entirety. The provisions of the LEP zonings within the proposal area are identified in Table 4-1.

Table 4-1 Zonings relevant to the proposed activities assessed in this REF

Zoning	Objectives
Kiss and ride facility	
SP2 (Educational Establishment)	To provide for infrastructure and related uses.
R2 (Low Density Residential) (immediately adjacent to the proposal site)	To provide for the housing needs of the community and to enable land uses that provide facilities or services to meet the day to day needs of the residents.
Noise walls and tree removal/pruning for powerline relocation	
SP2 (Infrastructure - Classified Road)	To provide for infrastructure and related uses.

Zoning	Objectives
RE1 (Public Recreation)	To enable land to be used for public open space or recreational purposes.
Keyworth Drive roundabout	
R2 (Low Density Residential)	To provide for the housing needs of the community and to enable land uses that provide facilities or services to meet the day to day needs of the residents.
Shared footpath modification	
SP2 (Infrastructure - Classified Road)	To provide for infrastructure and related uses.
RE1 (Public Recreation)	To enable land to be used for public open space or recreational purposes.
Drainage works	
SP2 (Infrastructure - Classified Road)	To provide for infrastructure and related uses.
R2 (Low Density Residential)	To provide for the housing needs of the community and to enable land uses that provide facilities or services to meet the day to day needs of the residents.
Roadworks	
SP2 (Infrastructure - Classified Road)	To provide for infrastructure and related uses.
R2 (Low Density Residential)	To provide for the housing needs of the community and to enable land uses that provide facilities or services to meet the day to day needs of the residents.
Site compound changes	
Site 1: RU4 (Primary Production Small Lots)	To enable sustainable primary industry and other compatible land uses and to encourage diversity and employment opportunities in relation to primary industry enterprises.
Site 2: WSEA (unzoned land)	The Western Sydney Employment Area (WSEA) is marked as ‘unzoned’ on the Blacktown LEP map sheet 14. The purpose of the WSEA is to provide businesses in the area with land for industry and employment, including transport and logistics, warehousing and office space.
Site 3: RE1 (Public Recreation)	To enable land to be used for public open space or recreational purposes.

Zoning	Objectives
Site 4: RE1 (Public Recreation)	To enable land to be used for public open space or recreational purposes.
Site 5: SP2 (Infrastructure - Classified Road)	To provide for infrastructure and related uses.
Site 6: RE1 (Public Recreation)	To enable land to be used for public open space or recreational purposes.
Property driveway adjustments	
SP2 (Infrastructure - Classified Road)	To provide for infrastructure and related uses.
R2 (Low Density Residential)	To provide for the housing needs of the community and to enable land uses that provide facilities or services to meet the day to day needs of the residents.
Test archaeological excavations	
SP2 (Infrastructure - Classified Road)	To provide for infrastructure and related uses.

Part 5, clause 5.9 of Blacktown LEP 2015 sets out the requirements for the preservation of trees or vegetation and requires that trees or vegetation must not be cut or removed without (3)(a) development consent or (3)(b) permit granted by Council.

However clause (8)(d) provides "this clause does not apply to or in respect of … action required or authorised to be done by or under the *Electricity Supply Act 1995*, the *Roads Act 1993* or the *Surveying and Spatial Information Act 2002*".

The proposed removal of mature trees would be associated with works to be done under the Roads Act and therefore no application to Council would be required.

4.3 Other relevant legislation

4.3.1 Environmental Planning and Assessment Act 1979

Under Part 5 of the EP&A Act (sections 111 and 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. The TSC Act also lists Key Threatening Processes, which are matters that threaten the survival or evolutionary development of a species, population or ecological community.

The potential impacts of the proposal on threatened species are discussed in Section 6.

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* (NPW Act). Under section 90, an Aboriginal heritage impact permit may be issued in relation to a specified Aboriginal object, Aboriginal place, land, activity or 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 Approved Project (Jacobs, 2014a) and it was determined that an application for an Aboriginal heritage impact permit would not be required.

A Stage 1 assessment under the *Roads and Maritime Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI) (Roads and Maritime, 2011) identified that the proposal is unlikely to harm known Aboriginal objects or places and that no permit would be required. Copies of the Stage 1 letters are provided in Appendix H.

4.3.4 Heritage Act 1977

The *Heritage Act 1977* 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 proposed refinements due to the low likelihood of archaeological potential.

The Approved Project REF identified the potential to impact on a section of the former Great Western Road at Prospect, now Reservoir Road. At the time of approval, the State Heritage Register nomination was still pending. The Former Great Western Road was formally gazetted on 27 June 2014. The listing included an exemptions for needing approval under section 57(1) of the *Heritage Act 1977*, subject to all excavation or

disturbance of land being carried out in accordance with any archaeological management plan required in accordance with a determination of environmental assessment by the determining authority under Part 5 of the EP&A Act.

Roads and Maritime is now proposing to undertake an archaeological test excavation to support the application for exemption in accordance with Exemption 2(b). The Heritage Council has advised they understand the works to fall under Site Specific Exemption 1 and that no further comment or approval from the Heritage Division would be required.[1]

4.3.5 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) is administered by the NSW Environment Protection Authority (EPA). It provides an integrated system of licenses to set out protection of the environment policies and to adopt more innovative approaches to reduce pollution in the environment, having regard to the need to maintain ecologically sustainable development.

The Approved Project constitutes a scheduled activity (main road construction of more than three kilometres in length in a metropolitan area as per Schedule 1) under the POEO Act and therefore would require an EPL. The proposal would not alter this requirement. The EPL issued for the Approved Project would incorporate restrictions on working hours, noise levels, and air and water quality impacts.

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 of this REF.

Roads and Maritime currently has an approved strategic assessment agreement in place under the EPBC Act for impacts on biodiversity matters subject to Part 5 (but not Part 5.1). The primary effect of the approval is that Roads and Maritime road projects that are subject to Part 5 of the EP&A Act that would have a significant impact on nationally listed biodiversity matters no longer need to be referred to the Australian Government for approval.

The assessment of the proposal's impact on matters of national environmental significance and the environment of Commonwealth land found that there is unlikely to be a significant impact on relevant matters of national environmental significance.

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.

[1] Correspondence dated 14 March 2016.

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

5.1 Consultation strategy

Community consultation will be undertaken in accordance with the Communications and Community Involvement Plan prepared for the Approved Project. Consultation undertaken during the concept design is detailed in Chapter 5 of the Approved Project REF and the Submissions Report.

The following sections outline what consultation has been undertaken since project approval.

5.2 Community involvement

Table 5-1 details the consultation activities that have been undertaken to date during detailed design.

Table 5-1 Community consultation during detailed design

Consultation activity	Date	Description	Feedback	Roads and Maritime response	Section addressed
Letter and individual meetings - Property adjustment agreements	September 2015 – April 2016	- Letter notifications (up to 3 rounds) sent to all affected properties, inviting owners to call to arrange an on-site meeting - On-site meeting with property owners to discuss and agree proposed access adjustments. Signed agreement to be obtained from all affected properties. - Door knocking at some properties to attempt to initiate contact where no response to letters had been received.	- Range of individual concerns raised regarding site specific provisions, individual requests for site specific actions, such as preservation of specific trees.	- Site specific requirements have been detailed on the individual property adjustment agreement plans that will be agreed and signed by both Roads and Maritime and the property owners prior to any works commencing.	Section 6.2
			- Several residents raised concerns with the removal of the service lane (on western side)	- This was identified in the Approved Project REF and is required in order to accommodate the proposed widening of the highway. Property access adjustments are proposed in order to mitigate the potential safety aspects of this change.	Section 6.2
			- Concerns raised regarding access during construction	- Standard Roads and Maritime policies and procedures regarding notification and	Section 6.2

Consultation activity	Date	Description	Feedback	Roads and Maritime response	Section addressed
			and blocked access to driveways	facilitation of access would be applied during construction.	
Letter and individual meetings – Powerline relocation and tree clearing (sent jointly with property access adjustments where relevant)	September 2015 –April 2016	- Letter notifications sent to all affected properties, inviting owners to call to arrange an on-site meeting - On-site meeting with property owners to discuss and agree proposed access adjustments. Signed agreement to be obtained from all affected properties.	- Some property owners raised concerns regarding moving powerlines closer to residential properties and the potential health impacts.	- The powerlines to be relocated from the western side of the highway are 33kV, which do not present a risk to human health.	Section 6.8
			- Many residents were attached to specific trees and requested specific measures to protect them, or replacements.	- Site specific requirements have been detailed on the agreement plans that will be agreed and signed by both Roads and Maritime and the property owners prior to any works commencing.	Section 6.4
			- Concerns raised regarding additional noise exposure once hedge removed.	- Vegetation does not provide measureable noise screening benefits. Noise walls have been included in the design in accordance with the guidelines. Architectural acoustic treatments would also being considered at eligible properties.	Section 6.3

Consultation activity	Date	Description	Feedback	Roads and Maritime response	Section addressed
Meeting with Shelly Public School and neighbours	29 January 2016	Meeting with school and neighbours close to the school along Hadrian Avenue	- Concerns regarding additional traffic that will now be directed to Hadrian Avenue for the school and associated with proposed kiss-and-ride	Traffic studies undertaken for the Approved Project REF found that the majority of school drop-offs already occur at the Hadrian Avenue or Pelleas Street and that the small amount of additional traffic would be acceptable.	Section 6.2
			- Existing issues of parking/ access and congestion during peak school drop-off and pick-up	The proposal has been designed to alleviate congestion on Keyworth Drive and Hadrian Avenue to the extent possible.	Section 6.2
			- How will congestion, parking and access issues be policed?	- As a local road, Council and NSW Police are responsible for local traffic and parking issues	Section 6.2
			- Would like left in/ left out at kiss-and-ride facility so to avoid cars queueing up	- All movements have been accommodated.	Section 6.2
			- Concern about safety of children with the car parking in the middle of the kiss-and-ride as proposed.	- The proposal has been designed in accordance with the relevant road safety guidelines. Parking would be for staff only so it is unlikely that children would typically access the parking area.	Section 6.8

Consultation activity	Date	Description	Feedback	Roads and Maritime response	Section addressed
Doorknocking – Hadrian Avenue, Keyworth Drive and Tyrone Place changes	1 February 2016	- Door knocking to 52 properties inform residents and property owners of the proposed changes from the roundabout and the kiss and ride facility at the school - "Sorry we missed you" cards were left at the 28 properties where no contact could be made	- Concern that current problems with driver behaviours, such as illegal parking etc, would continue	- Concerns noted however enforcement is a responsibility for Council or NSW Police	
			- Concern that roundabout would not address speeding behaviour and that speed humps would be preferable	- Consultation with Council has indicated that a roundabout is the preferred solution at this location - As the local road owner, Council is responsible for any proposed signage or traffic arrangements once the roundabout is constructed.	Section 6.3, 6.8
			- Increased local street signage (speed and parking) and enforcement is required	- As above	
			- Will construction be scheduled at a time to minimise disruption to the school and local residents?	- It is noted that timing of construction at the school is a sensitive issue and every endeavour would be made to ensure the needs of the school	

Consultation activity	Date	Description	Feedback	Roads and Maritime response	Section addressed
				and local residents are taken into consideration.	
			- Will a "lollipop" lady be guaranteed for the pedestrian crossing?	- Local traffic controls would be a matter for the school and Council to discuss.	
Doorknocking – notification of proposed noise walls	February-March 2016	- Doorknocking to 92 properties proposed to have a noise wall located off their boundary to notify them of the proposed inclusion in the proposal. - Letters detailing the proposed noise wall locations were also provided to all 92 properties - "Sorry we missed you" cards were left at the 17 properties where no contact could be made.	Issues raised by property owners varied depending on which location was being doorknocked. The majority of proposed noise walls were well received, with many property owners grateful for the added protection from the noise and viewed a noise wall as the best mitigation for the noise.	Acceptance noted.	Section 6.3
			A number of residents raised concerns, main issues raised included: - Security measures to protect properties that run behind the proposed noise wall	Following community concerns, the proposal will now include security fencing and gates closing off the residual space between property boundary fences and the noise walls.	Section 6.2

Consultation activity	Date	Description	Feedback	Roads and Maritime response	Section addressed
			- Maintenance of the land between the wall and the property boundary fence	Maintenance would be the responsibility of Roads and Maritime and would be carried out as part of regular maintenance activities along Prospect Highway.	Section 3.1.2
			- Restricted access to properties as back entrances taken away	These are informal access points, and where enclosed by the proposed noise walls and security gates, access would be removed.	Section 6.2
			- Devaluation of property	There are many factors apart from the proximity of a property to any surrounding development that may influence the ultimate value of a property. Roads and Maritime recognises that there may be concerns in sections of the community with regards to this but believe that the benefits that would be delivered by the noise walls with regards to long-term traffic noise reduction in an already highly affected area would outweigh any other impacts associated with the proposed introduction of noise walls along Prospect Highway.	
			- Lighting concerns - reduced lighting in houses despite Perspex material being used	Design of the noise walls has been undertaken in accordance with Roads and Maritime's Noise Wall Design Guideline and best practice	Section 6.5

Consultation activity	Date	Description	Feedback	Roads and Maritime response	Section addressed
			- General amenity – including concerns that properties will feel barricaded and they will lose the breeze/view.	principles. Visual impacts and overshadowing have been considered in this Addendum REF.	
			- Preference for other noise mitigation treatment works.	Identification of appropriate noise mitigation measures across the project has been undertaken in accordance with Roads and Maritime's Noise Criteria Guidelines and Noise Mitigation Guidelines. As a consequence of some community objections, the number of proposed noise walls has been revised where possible.	Section 2, Section 6.3 and Appendix D
			- Prefer an alternative location for the noise wall as the road side rather than close to residential properties (in several locations – Hampton Crescent/ Keyne Street)	The project team considered other options including providing noise walls closer to the road. This solution is not consistent with urban design principles of Crime Prevention Through Environmental Design (CPTED) and therefore is not recommended.	Section 2.4-2.6
One-on-one meeting with residents behind proposed noise wall	4 March 2016	Two residents behind proposed noise wall NW_NB01 (behind Hampton Crescent) made representations on behalf of all residents at this location, to	- Raised feedback received from the community about concerns regarding the maintenance easement of 1.5m from the back fence/ property line,	Feedback from residents has been noted and taken into consideration in the revised noise wall proposal. Additional door knocks were arranged to capture more feedback	Section 2.4-2.6, Section 6.3

Consultation activity	Date	Description	Feedback	Roads and Maritime response	Section addressed
		Roads and Maritime PM at Parramatta office Signed petition for the proposal to be relocated to the road side or removed altogether was tabled.	- Supported the noise wall NW_NB01 behind their property, however raised concerns/issues - Proposed noise wall is not supported by affected residents and suggest a better outcome would be to have it further away from the back fence, located along the road edge	from those residents behind NW_NB02a and NW_NB02b. NW_NB02a has been removed from the final proposal.	
Additional door knocks along Keyne Street	7 - 8 March March 2016	Additional door knocks were conducted along Keyne Street for residents located behind proposed noise wall NW_NB03a, due to the high amount of interest received from a number of residents. The team wanted to talk with as many of the property owners as possible to see if there was consensus in views. Residents indicated that they would be signing a petition (subsequently received) for the proposal to be relocated to the road side or removed altogether was tabled.	- Concerned with security and safety of wall located 1.5m from the back fence/property line - Do not support or accept location of the proposed noise wall, would prefer it is located at the road side - If not possible to be at road side would like it to be removed altogether as not supported - Would prefer the traffic noise over the proposed wall.	Feedback from residents has been noted and taken into consideration in the revised noise wall proposal. NW_NB03a has been removed from the final proposal.	Section 2.4-2.6, Section 6.3

Consultation activity	Date	Description	Feedback	Roads and Maritime response	Section addressed
Additional door knocks along Hampton Crescent	7 March and 8 March 2016	Additional door knocks were conducted along Hampton Crescent for residents located behind proposed noise walls NW_NB02a and NW_NB02b due to a low response from the initial door knock and letter drop and concerns raised by other residents (located behind NW_NB01).	- Concerned NW_NB02a is too close to the property boundary - Preference for NW_NB02a to be along the road side like NW_NB01 - Safety/ security concerns related to the location of the noise walls at 1.5m from property boundaries - Support was received for the noise wall to reduce traffic noise for residents.	Feedback from residents has been noted and taken into consideration in the revised noise wall proposal. NW_NB02a has been removed from the final proposal. NW_NB02b has been retained in the final proposal.	Section 2.4-2.6, Section 6.3

5.3 ISEPP consultation

Part 2, Division 1, clauses 13-15 of the ISEPP specify consultation requirements for infrastructure development to be carried out under the ISEPP. These largely relate to the requirement for public authorities other than local councils to consult with the relevant local council as part of the assessment process. Consultation is required if the proposal would affect council infrastructure or services, impact on a local heritage item or if development would impact on flood-liable lands.

Table 5-2 provides a summary of the consultation requirements for the proposal with reference to the ISEPP.

Table 5-2 Summary of ISEPP consultation requirements

Clause	Details	Response
13(1)(a)	Likely to have a substantial impact on stormwater management services provided by council.	No
13(1)(b)	Likely to generate traffic to an extent that will strain the capacity of the road system in the local government area.	No. The proposed kiss and ride facility is likely to increase the traffic using Hadrian Avenue and other local roads to reach the new facility. A change in the local road network usage would result would occur. This impact would be very localised and limited to school drop-off and pick-up times. It would not generate traffic to an extent that would strain the capacity of the road system in the Blacktown LGA.
13(1)(c)	Involves connection to, and substantial impact on the capacity of any part of a sewerage system owned by council.	No
13(1)(d)	Involves connection to, and use of a substantial volume of water from, any part of a water supply system owned by council.	No
13(1)(e)	Involves the installation of a temporary structure on, or the enclosing of, a public place that is under council's management or control that is likely to cause a disruption to pedestrian or vehicular traffic that is not minor or inconsequential.	No
13(1)(f)	Involves excavation that is not minor or inconsequential of the surface of, or a footpath adjacent to, a road for	Some earthworks would be required on the Hadrian Avenue footpath near the school for the purpose of constructing the entry and exit of the

Clause	Details	Response
	which council is the roads authority under the Roads Act.	kiss and ride facility. Hadrian Avenue is a Council managed road. The proposed roundabout at Hadrian Avenue/Keyworth Drive would be located on Council owned roads
14(1)(a)	Is likely to have an impact that is not minor or inconsequential on a local heritage item (other than a local heritage item that is also a State heritage item) or a heritage conservation area.	No
15(2)	Development that is to be carried out on flood liable land that may be carried out without consent and that would change flood patterns other than to a minor extent.	No
16(2)(a)	Development adjacent to land reserved under the *National Parks and Wildlife Act 1974*.	No
16(2)(b)	Development adjacent to a marine park declared under the *Marine Parks Act 1997*.	No
16(2)(c)	Development adjacent to an aquatic reserve declared under the *Fisheries Management Act 1994*.	No
16(2)(d)	Development in the foreshore area within the meaning of the *Sydney Harbour Foreshore Authority Act 1998*.	No
16(2)(e)	Development comprising a fixed or floating structure in or over navigable waters – the Maritime Authority of NSW.	No
16(2)(f)	Development for the purposes of an educational establishment, health services facility, correctional centre or group home, or for residential purposes, in an area that is bushfire prone land (as defined by the Act).	No

A formal letter of notification, in accordance with clauses 13-15 of the ISEPP, was sent to Blacktown City Council on 9 October 2015. The letter was sent due to potential impacts on Council-related infrastructure and/or services and the potential impacts of

construction activities on traffic. At the time of writing this Addendum REF, no response had been received from Council.

A copy of the letter sent to Council is included in Appendix C.

5.4 Government agency and stakeholder involvement

During development of the detailed design, Roads and Maritime has consulted with Shelley Public School, Department of Education and Communities, and Blacktown City Council regarding improvements to parking and access to Shelley Public School. Stakeholders have given the relevant approvals to proceed.

The project team has worked with these stakeholders to deliver a traffic management solution that improves the safety of school children, access to the school and reduces school zone traffic impacts for residents in the vicinity of Shelley Public School.

Roads and Maritime has consulted with Blacktown City Council about the project on a regular basis, including all works on local roads such as the Hadrian Avenue roundabout. Recent consultation includes a meeting with Council's traffic management committee in October 2015 and a meeting with Council on 19 November 2015 and again on 1 December 2015.

Roads and Maritime has worked closely with Endeavour Energy and other utility providers to co-ordinate the relocation of utilities required for the Approved Project and the proposed refinements identified in this Addendum REF.

Endeavour Energy certification for the electrical relocation design would be provided prior to construction commencement.

5.5 Ongoing or future consultation

Ongoing consultation for the proposal would be undertaken in accordance with the Communications and Community Involvement Plan developed for the Approved Project (refer to Section 5.1 of the Approved Project REF). Communication will include:

- Providing current proposal information through the project website and a Community Update newsletter
- Ongoing consultation with relevant stakeholders, including Blacktown City Council
- Completion of property access adjustment agreements and notification of the intent to install noise walls at locations near residential properties
- Informing and updating Blacktown City Council, nearby residents and the school community about the proposed kiss and ride facility, including when construction is proposed to commence, of any proposed night-work and any changes to access or parking
- Informing and updating Blacktown City Council and the relevant property owners of the proposed noise walls, including noise wall locations, when work is expected to start and if any night-work is to be undertaken
- Providing the relevant stakeholders with contact details, a helpline for further information and to raise concerns, and a project information telephone number for the construction phase.

6 Environmental assessment

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

6.1 Issue identification

The proposal has been reviewed in the context of the receiving environment to identify any new issues for assessment. The review is documented below in Table 6-1.

Table 6-1 Issues summary review for Addendum REF

Environmental factor (section in Approved Project REF)	Further assessed within Addendum REF	Proposed modification/Reason
Traffic, transport and access (Section 6.1)	Yes	Kiss and ride facility Noise walls Powerline relocation Hadrian Avenue/Keyworth Drive roundabout Additional road works Property access adjustments Speed limit change Test excavations at former Great Western Road
Noise and vibration (Section 6.2)	Yes	Kiss and ride facility Noise walls Powerline relocation Hadrian Avenue/Keyworth Drive roundabout Additional site compounds Property access adjustments Test excavations at former Great Western Road Operational on-site detention basins At-property acoustic architectural treatments
Biodiversity (Section 6.3)	Yes	Kiss and ride facility Noise walls Powerline relocation

Environmental factor (section in Approved Project REF)	Further assessed within Addendum REF	Proposed modification/Reason
		Hadrian Avenue/Keyworth Drive roundabout Additional drainage works Additional road works Property access adjustments
Landscape, visual amenity and urban design (Section 6.4)	Yes	Kiss and ride facility Noise walls Powerline relocation Hadrian Avenue/Keyworth Drive roundabout Additional site compounds Property access adjustments
Water quality and hydrology (Section 6.5)	Yes	Kiss and ride facility Noise walls Additional drainage works Additional road works Operational on-site detention basins
Non-Aboriginal heritage (Section 6.6)	Yes	Test excavations at Former Great Western Road.
Aboriginal heritage (Section 6.7)	No	No Aboriginal heritage items identified in Approved Project REF. PACHCI clearance letters are provided in Appendix H.
Socio-economic and land use (Section 6.8)	Yes	Kiss and ride facility Noise walls Powerline relocation Additional site compounds Property access adjustments Sydney Trains power pole relocation
Landform, geology and soils (Section 6.9)	No	Proposal all within previously disturbed areas. No changes in impact expected.
Air quality (Section 6.10)	Yes	Kiss and ride facility Powerline relocation Additional site compounds Property access adjustments
Greenhouse gas emissions and climate change (Section 6.11)	No	Construction and operational impacts are consistent with those identified in the Approved Project REF.

Environmental factor (section in Approved Project REF)	Further assessed within Addendum REF	Proposed modification/Reason
Resource use and waste management (Section 6.12)	Yes	Minor increase in earthworks material and vegetation waste
Cumulative environmental impacts (Section 6.13)	No	Construction and operational impacts are consistent with those identified in the Approved Project REF.

6.2 Traffic, transport and access

6.2.1 Existing environment

The existing environment for traffic, transport and access are described in detail in Section 6.1 of the Approved Project REF and the Traffic and Transport Assessment (SMEC, 2014) in Appendix D of the Approved Project REF.

The following proposed refinements are located outside the area described in the Approved Project REF.

Kiss and ride facility

Hadrian Avenue

The proposed kiss and ride facility would be located off Hadrian Avenue to the west of the Prospect Highway. Hadrian Avenue provides a link between Pendant Avenue and Keyworth Drive.

Hadrian Avenue is a two way road under the care and control of Blacktown City Council. The speed limit on this road is 50 km/h with a school zone speed limit of 40 kilometres per hour operating during the school zone times (8am to 9:30am; 2:30pm to 4pm). Parking restrictions apply along the road immediately outside the school during school drop-off and pick-up times. A pedestrian crossing is present on Hadrian Avenue near the entrance gate to the school.

Shelley Public School has two main and one emergency access points for students, their carers and staff as shown in Figure 6-1. The main access to Shelley Public School is located off Hadrian Avenue, for pedestrians and also for an existing staff car park.

As part of the Approved Project REF, a survey was undertaken between 21 November and 4 December 2013 to assess the drop-off and pick-up 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 the majority of the students walked to school (at 54 per cent) with other students driven to school by car as the main second option (at about 44 per cent). Access to the school was predominantly via Hadrian Avenue and Pelleas Street (42 per cent and 43 per cent respectively).

For students driven to school, drop-offs and pickups were mainly at Hadrian Avenue and Pelleas Street (40 per cent and 52 per cent respectively) with the remaining preferring drop-off and pick-up via Prospect Highway.

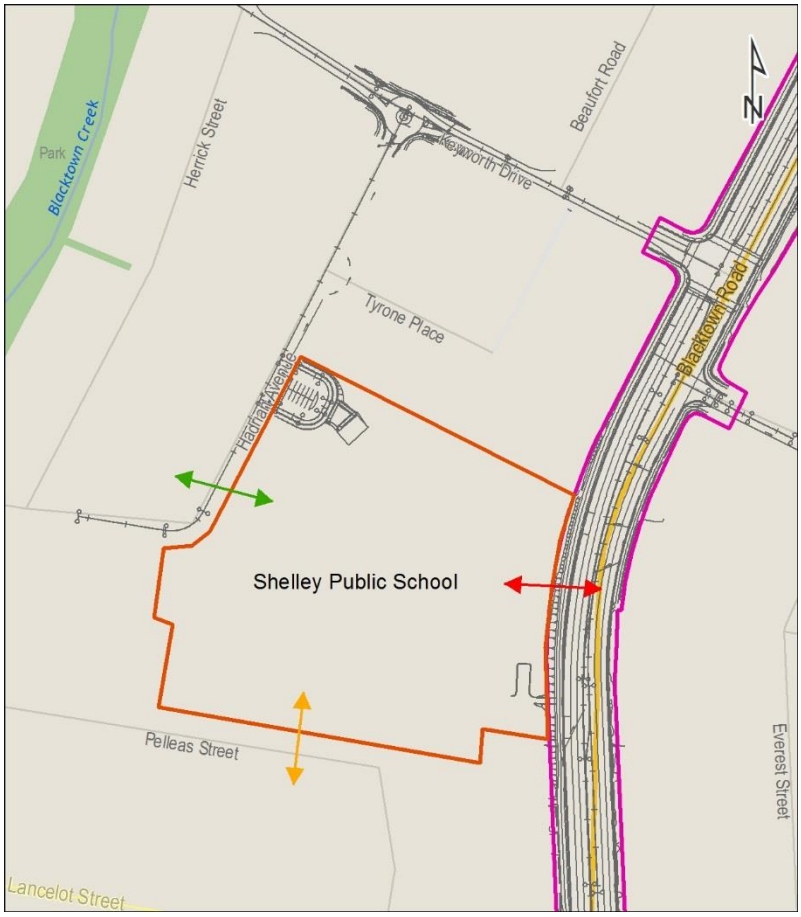

Figure 6-1 Current Shelley Public School access points

Keyworth Drive

Keyworth Drive is located to the west of Prospect Highway. The intersection with Hadrian Avenue is currently a T-junction as shown in Figure 6-1. The intersection is located around 194 metres from Prospect Highway.

6.2.2 Potential impacts

Construction

Kiss and ride facility

During construction, there would be potential for some minor traffic-related impacts on Hadrian Avenue caused by potential lane closures, presence of construction plant, equipment and vehicles, and potential minor delays. For safety reasons during construction, temporary changes to student drop-offs and pickups along Hadrian Avenue may be required, potentially increasing traffic at the alternative school access gate on Pelleas Street. There may also be potential changes to parking restrictions along Hadrian Avenue during construction. These impacts would be localised and limited to the area immediately near the school. The kiss and ride facility would be constructed and brought into use prior to the removal of the informal service lane on the Prospect Highway, which should minimise potential traffic impacts. Construction truck movements would be limited during school peak drop off times.

Bus stop locations and routes were identified in the Approved Project REF. There would be no change in impact over what was identified in the Approved Project REF during construction.

Noise walls

The installation of the noise walls would be undertaken as part of construction of the overall Approved Project, when a wider range of potential traffic, transport and access impacts is likely to be experienced by the community. As such, the installation of the noise walls is not expected to noticeably impact on traffic along Prospect Highway.

Any potential disruptions to pedestrian and cyclist paths along Prospect Highway are associated with the overall project and would be managed as part of the overall project. Pedestrian and cyclist access would be maintained or suitable alternative routes would be provided.

The installation of noise walls would be expected to have only a minor impact on traffic, pedestrian and cyclist movements.

Powerline relocation

The majority of the proposed powerline relocation and associated tree clearing and pruning is likely to be undertaken in advance of the main project construction. Some temporary closures of the kerbside lane may be required in order to accommodate construction vehicles undertaking the activity. This would occur over only a short distance at any one time as work would be progressively undertaken along the highway.

The powerline relocation would occur within public property however access to private properties would be required in order to enable the tree clearing and pruning.

Hadrian Avenue/Keyworth Drive roundabout

It is proposed that the new roundabout would be constructed in advance of any road construction works on Prospect Highway between Vesuvius Street and Leabons Lane and prior to the removal of north bound access to Vesuvius Street.

Short-term traffic delays would be expected during the construction of the proposed intersection treatment, some temporary impacts to private property access may be required and some temporary restrictions to on-street parking may be required to accommodate construction vehicles.

Additional road works

Short-term traffic impacts, would result during the road works, and would be managed through a detailed traffic management plan. Short-term traffic and access impacts may include:

- Footpath closure and pedestrian access issues
- Property access and parking issues during property works at individual residences
- Minor increase in traffic numbers as a result of construction vehicles
- Traffic flow impacts during staging works required for the bridge realignment along the M4

The road works located outside of the Approved Project boundary would not have any impacts inconsistent with the assessment documented in the Approved Project REF.

Property access adjustments

Short-term traffic impacts would occur during the construction of the proposed property access adjustments and may include:

- Footpath closure and disrupted pedestrian access issues

- Temporary property access and parking disruptions during property works at individual residences
- Minor increase in traffic numbers as a result of construction vehicles.

Property works would be undertaken progressively over the 18-24 month duration of the construction contract and any temporary impacts would be of short duration at any one location.

Several residents raised concerns regarding the removal of the service lane along sections of Prospect Highway. This was identified in the Approved Project REF and as such forms part of the Approved Project. It is required in order to accommodate the proposed widening of the highway. Property access adjustments are proposed in order to mitigate the potential safety aspects of this change.

Test excavations at former Great Western Road

Reservoir Road is a collector road, one lane in each direction, with moderate levels of traffic. The test excavations at Reservoir Road would require temporary lane closures in order to safely undertake the required work. Works are expected to take around two weeks, weather and conditions permitting. This would potentially result in traffic delays on Reservoir Road.

Operation

Kiss and ride facility

As stated in the Approved Project REF, once the project is completed, the informal service road on the highway would not be available for use as a pick-up and set down location for the school and the remaining two school accesses would need to be utilised. This would result in additional vehicles using the access points off Hadrian Avenue and Pelleas Street. As the majority of drop-offs and pickups currently occur at these two locations (40 per cent and 52 percent) (refer Section 6.1.2 of the Approved Project REF), the additional eight per cent is not expected to cause a large increase in the number of vehicles using these local streets.

The kiss and ride facility would provide safer school access for students and staff attending the school by allowing drop-offs and pickups to take place within the school grounds. The provision of parking spaces for staff would allow for additional school related parking to be undertaken within the school grounds.

There is currently restricted parking (No parking 8.30-9.30am, 2.30-3.30pm) on Hadrian Avenue immediately adjacent Shelley Public School (around three spaces). This restricted parking area would be removed by the proposed works to accommodate the new facility.

There would be no change in impact on bus stops during operation over what was identified in the Approved Project REF.

Local community members have raised concerns regarding ongoing on-street parking challenges in the area as a consequence of illegal and informal parking activities, particularly by drivers undertaking pick-up and drop-off activities. It is expected that the kiss and ride facility and additional staff parking would contribute to alleviating some of these issues. Ongoing management of parking and driver behaviour on local roads is the responsibility of Council and NSW Police.

Noise walls

Noise walls have generally been offset from property boundaries by 1.5 metres to facilitate access for maintenance as required (refer Table 3-1 for details of all offsets). Security fences and gates would be installed at each end of the noise walls, extending from the property boundaries to the noise walls, to prevent unwanted access. Keys will

be held by Roads and Maritime and Council for maintenance purposes. All walls would be accessible from the road verge side for maintenance during operation.

The driveways to the properties adjacent to the proposed noise walls are located away from Prospect Highway, and therefore the installation of noise walls would not have an impact on vehicular or pedestrian access to these properties.

Some properties have installed informal access points in the rear fences which open onto the road reserves adjacent to Prospect Highway. While understanding as to the legality of these access points may differ across property owners, both Roads and Maritime and Council have confirmed that all such access points are in fact not legal and consequently Roads and Maritime does not have an obligation to maintain these accesses. Access would be removed where enclosed by the proposed noise walls and security gates.

Pedestrian and cyclist access would be maintained along Prospect Highway. NW_NB04a and NW_NB04b and NW_SB04a and NW_SB04b have been designed to provide access to the existing footpath in the middle of the wall (refer Figure 3-2).

Powerline relocation

No traffic, transport or access impacts are anticipated after the relocation of the powerlines is completed. Maintenance would be undertaken by the energy authority in accordance with their policies and procedures.

Hadrian Avenue/Keyworth Drive roundabout

The proposal does not include any formal on-street parking allocation along Keyworth Drive, however the road is generally of sufficient width to accommodate parking. The equivalent of around 12 spaces would be lost in the vicinity of the roundabout due to the new works. This would not represent a major impact given the nature of Keyworth Drive as a local suburban street with off-street parking available to all residential properties.

In the long-term, the roundabout would improve traffic flows and the performance of the intersection.

Additional road works

Once operational, the proposed additional road works would have benefits similar to those described in the Approved Project REF.

Property access adjustments

Once operational, the amended property access arrangement would allow residents to exit their properties onto Prospect Highway in a forward facing direction, which would provide a safe outcome for both residents and other road users.

Speed limit

The proposed refinements would increase the sign posted speed limit between Reservoir Road and Blacktown Road signalised intersection to 70 km/h. There are no property accesses on the western or eastern side of the highway along this section of Prospect Highway. The speed limit between Blacktown Road and St Martins Crescent would remain at 60km/h as there are numerous property accesses directly on the highway through this section.

Test excavations at former Great Western Road

There would be no impact on traffic, transport and access as a result of the test excavations during operation.

6.2.3 Safeguards and management measures

In addition to the safeguards and management measures in the Approved Project REF, the following safeguards and management measures are proposed.

Table 6-2 Additional traffic, transport and access safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Traffic management – general	The construction traffic management plan (CTMP) would include the proposed refinements, including arrangements for all early works. The CTMP would enable the safe management of traffic and pedestrians, provide for the safety of construction personnel and minimise impacts on the local community.	Construction contractor	Pre-construction
Traffic management – construction at Shelley Public School	The CTMP for construction at Shelley Public School would include notification and safety requirements for the school community and be prepared in consultation with school authorities and/or Department of Education. No construction truck movements are to occur during school peak drop off times. These times are as follows: - Morning Peak - 8am to 9:15am, Monday to Friday - Afternoon Peak - 2:30pm to 3:15pm, Monday to Friday	Construction contractor	Pre-construction
Traffic management – test excavations	Temporary lane closures at Reservoir Road would be undertaken outside peak hours.	Construction contractor	Construction

6.3 Noise and vibration

An *Operational Traffic and Construction Noise and Vibration Assessment* report was prepared by SKM (2014) for the Approved Project REF. During detailed design, SLR prepared an Acoustic Assessment (2015) to assess the potential impacts of design changes made since the Approved Project REF was prepared (refer Appendix D).

Noise predictions were compared against applicable criteria contained in the NSW Road Noise Policy (DECCW, 2011) and the SKM assessment.

Noise from the operation of the project is required to be assessed in accordance with guidelines provided in the NSW *Road Noise Policy* (RNP) (DECCW, 2011). Roads and Maritime provide additional guidance for assessing operational road noise impacts in the *Environmental Noise Management Manual* (ENMM) (RTA, 2001) and in the recently released *Noise Criteria Guideline* (NCG) (RMS, 2015).

The NCG supersedes Practice Note (i) of the ENMM and provides a consistent approach to identifying road noise criteria for Roads and Maritime projects and meets the intention of the RNP.

Guidance for additional noise mitigation is taken from the Roads and Maritime *Noise Mitigation Guideline* (NMG) (RMS, 2015). The NMG supersedes Practice Note (iv), (iv-a) and (iv-c) of the ENMM.

Quantitative noise assessments were undertaken for the potential construction impacts of the proposed construction activities described in Section 3.3 in accordance with the *Interim Construction Noise Guideline* (DECC, 2009).

6.3.1 Existing environment

The existing environment of the proposal corridor and its surroundings are described in detail in Section 6.2 of the Approved Project REF. The noise assessment report prepared by SLR (2015) adapted the noise catchment areas (NCAs) from the SKM report to present a simplified nine NCAs and various sensitive receivers throughout the proposal area. The NCAs and their descriptions are provided in Table 6-3 below.

Table 6-3 Noise catchment areas and sensitive receivers across the proposal area (Adapted from Jacobs, 2014a and SKM, 2014)

NCA	Location	Description
1	West of Prospect Highway, south of Great Western Motorway	• Residential receivers bordering the southeast corner. Closest receiver is around 100 metres from the road corridor • Residential receiver bordering the western side, around 40 metres from the road corridor • 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 area.
2	East of Prospect Highway, south of Great Western Motorway	• Commercial receivers bordering the southeast corner, around 50 metres from the road corridor
3	South of Myrtle Street, north of Great Western Highway and west of Prospect Highway	• 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	South of Stoddart Street, north of Great Western Highway and east of Prospect Highway	• Commercial receivers border the eastern side of Prospect Highway. Typical setbacks are around 35 – 40 metres

NCA	Location	Description
		• Ponds Road graveyard is included in this catchment area.
5	North of Stoddart Street, south of Blacktown Road and east of Prospect Highway	• Large block of residential receivers, closest receiver is around 30 metres from the road corridor • Typical setbacks of 30-40 metres from dwellings to road edge • Cannon Street Pre-School and Child Care Centre is included in this catchment • Blacktown Church of Christ is included in this catchment area.
6	West of Prospect Highway, north of Harrod Street and south of Keyworth Drive	• 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	• Large block of residential receivers, closest receiver is around 30 metres away • Typical setbacks of 30-40 metres from dwellings to road edge • Blacktown Road Children's Centre is included in this catchment • Grace Baptist Church and Jehovah's Witness Kingdom Halls are included in this catchment
8	West of Prospect Highway	• Closest residential receiver is around 35-40 metres away • Typical setbacks are around 30 metres • St Martins Crescent Shopping Centre / Blacktown Mega Centre, around 30 metres from Prospect Highway. • Mitchell High School is included in this catchment area
9	East of Prospect Highway	• Closest residential receiver is approximately 20 metres from Prospect Highway • Leabons Lane Child Care Centre and Aftercare Association of NSW are located in this catchment area • Typical setbacks are 20 to 30 metres.

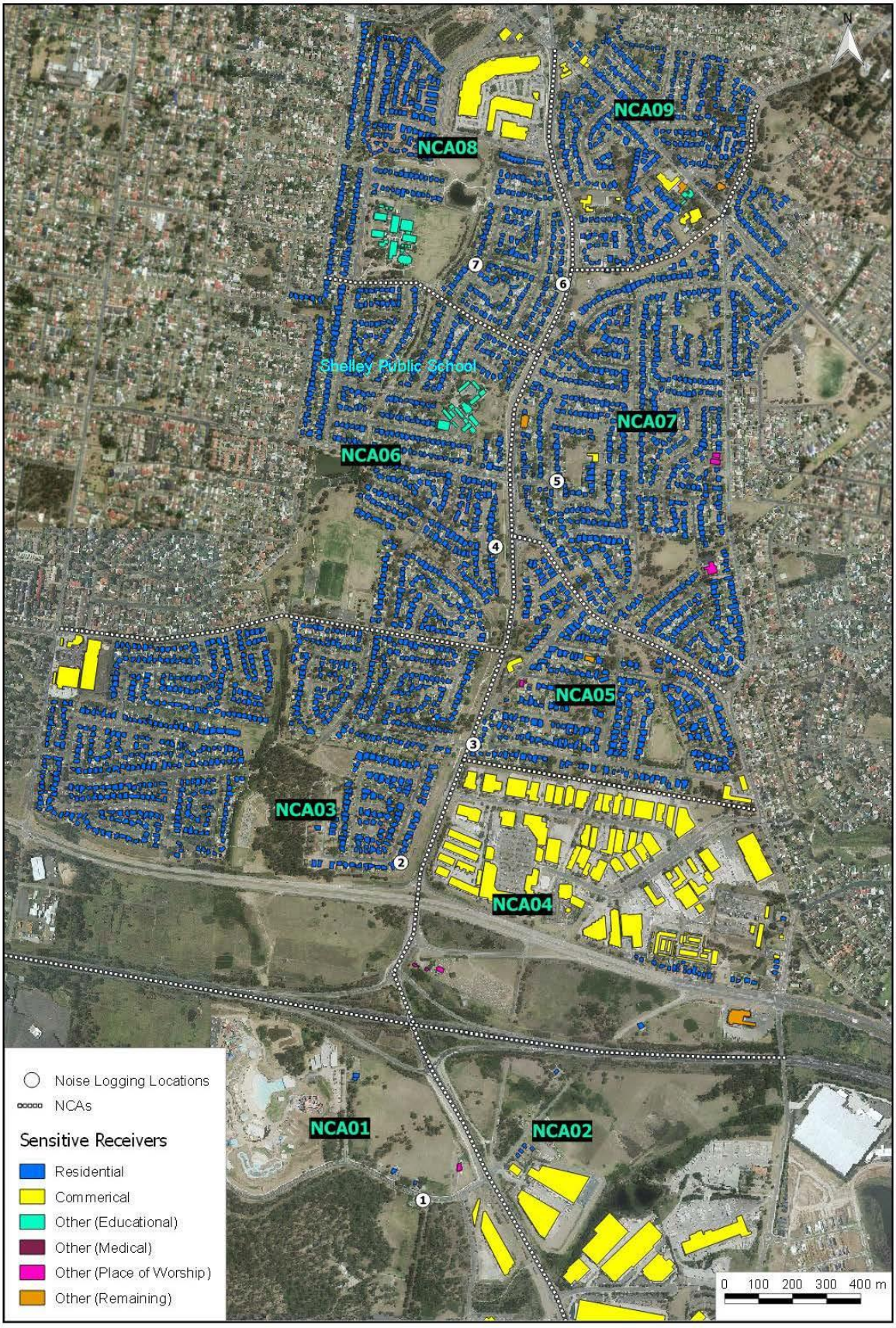

Figure 6-2 Noise catchment areas relevant to the proposal (SLR, 2015)

In order to characterise the existing ambeint noise environment across the study area, SKM undertook ambient noise surveys and monitoring at seven representative locations as shown in Figure 6-2. Representative rating background levels (RBLs) and LA_{eq} (energy averaged) noise levels during the *Industrial Noise Policy* (INP) defined daytime (7am to 6pm), evening (6pm to 10pm) and nighttime (10pm to 7am) hours are shown in Table 6-4, together with the RNP defined daytime (7am to 10pm) $LA_{eq(15\ hour)}$ and nighttime (10pm to 7am) $LA_{eq(9\ hour)}$ noise indices, as detailed in the Approved Project REF.

Table 6-4 Summary of noise monitoring results (dBA) (SKM, 2014)

	INP Periods						RNP Periods	
ID	Daytime		Evening		Nighttime		Daytime	Nighttime
	LA_{eq}	RBL	LA_{eq}	RBL	LA_{eq}	RBL	LA_{eq}	RBL
1	61	45	55	45	56	42	-	-
2	55	45	53	46	49	39	55	49
3	68	50	66	49	61	39	68	61
4	58	47	56	45	54	36	58	54
5	55	42	50	42	48	37	53	48
6	63	54	60	50	59	37	62	59
7	52	38	47	36	45	30	-	-

These measured noise levels were used to set construction noise management levels (NMLs) to assess potential construction noise impacts.

Kiss and ride facility

Acoustic environment

Noise levels at the proposed kiss and ride facility site are influenced by noise generated from the school and local traffic movements on surrounding streets, including Hadrian Avenue and Prospect Highway.

Shelley Public School is located within NCA06 (refer to Figure 6-2). The school is surrounded by residential properties to the north, south and west and the Prospect Highway to the east.

Noise-sensitive receivers

The proposed kiss and ride facility is located near the western boundary of the school grounds. In addition to the school itself, the nearest sensitive receivers are residential properties located on Hadrian Avenue and Tyrone Place:

- 7 Hadrian Avenue and 2 and 4 Tyrone Place are located immediately to the north of the proposed turning bay location and share a fence with the school
- 14, 16, 18 and 20 Hadrian Avenue face the proposed kiss and ride facility and are located immediately opposite the school ground, about 15 metres from the school boundary.

The nearest school buildings are located around 10 metres from the edge of the proposed works, however the majority of classrooms are located further to the south.

These sensitive receivers are subject to noise from the school and local roads. There are no hospitals, libraries or other noise sensitive receivers in close proximity to the site.

Hadrian Avenue/Keyworth Drive roundabout

Acoustic environment

Noise levels at the proposed Hadrian Avenue/Keyworth Drive roundabout site are influenced by noise generated from the nearby Shelley Public School and local traffic movements on surrounding streets, including Prospect Highway.

The proposed roundabout is located within NCA06 and NCA11 (refer to Figure 6-2). The school is surrounded by residential properties to the north, south and west and the Prospect Highway to the east.

Noise-sensitive receivers

The proposed roundabout is located within a residential area. The nearest sensitive receivers are residential properties located on Hadrian Avenue (1, 2, 4 and 5) and Keyworth Drive (10, 12, 14, 16, 18 and 20), and Shelley Public School 140 metres to the south. These sensitive receivers are subject to noise from the school and local roads.

6.3.2 Potential impacts

Construction

The construction plant and equipment required for the proposal and the associated sound power levels for the equipment during each of the main construction activities are outlined in Table 6-5 below

Table 6-5 Construction plant and equipment sound power level (dB(A))

Plant/ Equipment	Sound Power Levels at source dB(A)*
Concrete pump truck	103 - 113
Backhoe	100 - 108
Compactor	110 - 115
Hand tools (electric)	95 - 110
Vehicle (light commercial e.g. 4WD)	100 - 111
Jack hammers	121
Roller (vibratory)	103 - 112
Concrete saw	112 - 122
Excavator	97 - 117
Generator (diesel)	84 - 113
Hand tools (pneumatic)	114 - 117
Rock breaker	118
Truck (dump)	117
Asphalt paver	103 - 112
Concrete vibratory screed	115
Crane (mobile)	95 - 113
Front end loader	110 - 115
Piling (bored)	111
Cherry picker	105
Truck (>20 tonne)	107

Plant/ Equipment	Sound Power Levels at source dB(A)*
Concrete pump truck	103 - 113
Backhoe	100 - 108
Compactor	110 - 115
Hand tools (electric)	95 - 110
Vehicle (light commercial e.g. 4WD)	100 - 111

* Sound power levels for typical equipment have been sourced from *AS 2436 -2010 Guide to noise and vibration control on construction, demolition and maintenance sites*.

Based on the background noise levels at each NCA, noise management levels (NMLs) were determined for each of the key activities identified (Table 6-6). Predicted noise levels at the nearest sensitive receivers were calculated based on the plant and machinery identified for the typical construction activities identified for each activity.

It should be noted that predictions are the maximum noise levels, assuming that works occur at the closest point to each receiver; which would take place during construction works. The predicted noise levels are also based on all machinery operating concurrently, which is used as a conservative estimate for the worst-case scenario. The actual magnitude of predicted noise impacts would vary due to the duration of work at that location, the equipment used, operating methods, the type of construction activity and the actual distance to the nearest receiver.

Table 6-6 Construction noise impacts of proposed design refinements

Location	NCAs	Scenario	Plant used	NML			Predicted noise level dB(A) at nearest sensitive receiver^	Out of hours work likely*
				Day	Eve	Night		
Kiss and ride facility	6	Preparation works	Concrete saw, excavator, generator (diesel), hand tools (pneumatic), rock breaker, truck (dump), chainsaws, vehicle (light commercial)	57	50	41	104	No
	6	Construction works	Asphalt paver, compactor, concrete pump truck, hand tools (electric), roller (vibratory), concrete vibrator, vehicle (light commercial), crane.	57	50	41	98	No
Noise walls	3	Construction	Backhoe, crane (mobile), hand tools (electric), loader (wheeled), piles (bored), chainsaws, excavator, vehicle (light commercial).	55	51	44	97	No
	4			60	54	44	97	No
	5			60	54	44	97	No

Location	NCAs	Scenario	Plant used	NML			Predicted noise level dB(A) at nearest sensitive receiver^	Out of hours work likely*
				Day	Eve	Night		
	6			57	50	41	97	No
	7			52	47	42		No
Powerline relocation	6	Tree removal/pruning	Cherry picker, hand tools (electric), mulching equipment, chainsaw, vehicle (light commercial)	57	50	41	94	Yes
	7			52	47	42	94	Yes
	8			48	41	35	94	Yes
	9			64	55	42	94	Yes
	6	Relocation	Backhoe, crane (mobile), hand tools (electric), vehicle (light commercial), cherry picker, truck (>20 tonne)	57	50	41	96	Yes
	7			52	47	42	96	Yes
	8			48	41	35	96	Yes
	9			64	55	42	96	Yes

Location	NCAs	Scenario	Plant used	NML			Predicted noise level dB(A) at nearest sensitive receiver^	Out of hours work likely*
				Day	Eve	Night		
Hadrian Avenue/Keyworth Drive roundabout	6	Construction	Concrete pump truck, backhoe, compactor, hand tools (electric), jack hammer, vibratory roller, vehicle (light commercial), asphalt paver.	57	50	41	103	No

^ Based on the combined sound pressure level at receiver (assuming a distance of 4m).

* Consideration of out of hours work is indicative only and would be determined by contractor's program and the EPL.

Kiss and ride facility

Preparatory and construction works are planned to be carried out predominantly during recommended standard working hours but may require out of hours work for safety or traffic management reasons.

Noise predictions indicate the potential for both preparation and construction work noise levels at both the nearest classrooms and nearby residential receivers to exceed the identified NMLs. It is also noted that construction noise levels are predicted to be above the highly affected level of 75 dB(A).

The preparation and construction works would result in short-term noise impact exceedances, at both the nearest classrooms and the closest adjacent residences.

Noise walls, powerline relocation and Hadrian Avenue/Keyworth Drive roundabout

Installation works for the proposed modifications are planned to be carried out only during standard working hours, where possible.

Noise predictions indicate the potential for noise levels at nearby residential receivers to exceed the identified NMLs. Exceedances would typically be of short-term duration at any one location. Construction noise levels are predicted to be above the highly affected level of 75 dB(A).

Generally these exceedances would be consistent with the findings in the Approved Project REF.

Additional site compounds, property access adjustments, test excavations at former Great Western Road, operational on-site detention basins

Noise impacts associated with these activities during construction would typically be related to vehicle movements and the operation of plant and machinery commonly associated with construction compounds (generators, compressors, hand tools and dump trucks). Noise impacts associated with these activities would not be isolated and would occur in conjunction with construction noise generated activities associated with the Approved Project.

During construction, activities at the site compounds are planned to be carried out predominantly during standard working hours but may operate out of hours at certain times due to special requirements as outlined in Section 3.3.2.

The properties adjacent to these activities have already been assessed as being noise affected during construction of the Approved Project.

The proposed construction activities would not have any impacts inconsistent with the assessment documented in the Approved Project REF.

Operational impacts

The operational noise assessment in the Approved Project REF identified 231 sensitive receivers as being eligible for consideration of additional noise mitigation, as shown in Figure 2 in Appendix D.

The Approved Project REF identified a combination of noise walls (where possible) and at-property architectural treatments to mitigate operational noise impacts of the project.

The Approved Project REF concluded that noise walls were not a feasible mitigation option for many areas of the project due to many receivers having vehicle and pedestrian access from the front of the property via Prospect Highway or Blacktown Road. Four potential noise barrier locations with approximate lengths were identified

in the Approved Project REF, however only indicative heights were nominated, dependent on the final design location within the corridor.

The NMG provides three triggers where a receiver may quality for consideration of noise mitigation (beyond the adoption of road design and traffic management measures). These are:

Trigger 1

- The predicted Build noise level exceeds the NCG controlling criterion and the noise level increase due to the project (i.e. the noise predictions for the Build minus the No Build) is greater than 2 dBA.

Trigger 2

- The predicted Build noise level is 5 dB or more above the criteria (exceeds the cumulative limit) and the receiver is significantly influenced by project road noise, regardless of the incremental impact of the project.

Trigger 3

- The noise level contribution from the road project is acute (daytime $L_{Aeq(15hour)}$ 65 dBA or higher, or night-time $L_{Aeq(9hour)}$ 60 dBA or higher) then it qualifies for consideration of noise mitigation even if noise levels are dominated by another road.

The eligibility of receivers for consideration of additional noise mitigation is determined before the benefit of additional noise mitigation (low noise pavement and noise barriers) is included. The requirement for the project is to provide feasible and reasonable additional mitigation for these eligible receivers to meet the NCG controlling criterion. If the NCG criterion cannot be satisfied with low noise pavement and noise barriers, then the receiver is eligible for consideration of at-property treatment. However, the underlying principle in the NMG is to give preference to at-road noise mitigation measures over at-property measures.

The NMG approach identifies the number of receivers (noting that a two storey residence is counted as two receivers) that could receive at-property treatment versus barrier height to establish an initial design height and then conducts a weighted analysis to find the optimal mix of barrier height and at-property treatments. This prioritises at-road mitigation and minimises the use of at-property treatments, as per the intent of the RNP.

As a guide, noise barriers are considered to be a reasonable noise mitigation option where they are capable of providing an insertion loss of:

- 5 dB at representative receivers for barrier heights of up to five metres.
- 10 dB at representative receivers for barrier heights above five metres high and up to eight metres high.

Noise predictions throughout the study area indicate that receivers adjacent to the project are subject to significant existing noise impacts from existing road traffic and in many cases exceed the NCG controlling criterion due to noise from existing road traffic. The acoustic review of the detailed design, and the comparison of the noise predictions against applicable criteria and the findings of the noise assessment undertaken during concept design, identified that additional noise mitigation measures would be required for the project. Further detail on the process of identifying potential noise walls is provided in the Detailed Design Acoustic Assessment in Appendix D.

Analysis of the operational noise impacts for the project identified a total of 12 noise barriers that would be considered reasonable under the NMG, comprising an additional six walls over those identified in the Approved Project REF. Following community

consultation regarding the proposed changes (refer Chapter 5), this was reduced to an additional four walls, and a total of 10 noise walls, for the project (refer Table 2-2 and Figure 3-2).

Optimisation of noise wall heights was also undertaken in accordance with the NMG in order to reduce traffic noise levels to acceptable noise goals at three new noise wall locations as follows:

- NW_NB02b – 3.0 metres
- NW_NB03b – 2.5 metres
- NW_NB04a/b – 3.5 metres.

Following community consultation NW_SB03b was reduced from 4.0 metres to 3.5 metres due to concerns regarding the visual and amenity impacts of the original proposed height.

Installation of the proposed noise walls is predicted to reduce noise such that 56 receivers (total floors) are no longer eligible for consideration of further additional noise mitigation (at-property treatment) which

Acoustic architectural treatments

The detailed design acoustic assessment (Appendix D) found that a total of 194 receivers are predicted to be eligible for consideration of at-property treatments. These comprise:

- 163 residential receivers on a ground or first floor (142 individual lots)
- 31 other sensitive receivers on a ground or first floor (23 individual lots).

These are properties where residual impacts remain after all reasonable and reasonable approaches have been exhausted. At-property treatment is only considered in the following circumstances:

- Isolated single residences or isolated groups of closely spaced residences
- Where the affected community expresses a preference for at-property treatment and the cost is less than a combination of a barrier and at-property treatment
- Where noise barriers cannot achieve the level of noise mitigation (insertion loss) required
- Where the only applicable noise criteria are internal (e.g. places of worship, hospitals or schools and childcare facilities where play areas meet external criteria)
- Where other noise mitigation measures have been shown not to be feasible or reasonable.

At-property architectural acoustic treatments should aim to achieve internal noise levels in habitable rooms 10 dB below the external noise level criteria. In some cases this will be limited by the existing construction and condition of the residence.

During the construction period, consultation would be undertaken with the individual eligible properties to determine whether the properties would be physically suitable to receive treatments. Building element treatments are more effective when they are applied to masonry structures than lightly clad timber frame structures. State of repair and other issues such as heritage significance may also affect the final decision on whether to proceed or not.

The at-property treatments provided by Roads and Maritime are typically limited to:

- Fresh air ventilation systems that meet the Building Code of Australia requirements with the windows and doors closed

- Upgraded windows and glazing and solid core doors on the exposed facades of the substantial structures only (e.g. masonry or insulated weather board cladding with sealed underfloor). These techniques would be unlikely to produce any noticeable benefit for light frame structures with no acoustic insulation in the walls
- Upgrading window or door seals and appropriately treating sub-floor ventilation
- The sealing of wall vents
- The sealing of the underfloor below the bearers
- The sealing of eaves.

A full schedule of the properties identified as eligible for consideration for at-property treatments is provided as an attachment (Appendix I) to the Noise Assessment in Appendix D of this Addendum REF. Roads and Maritime, and the construction contractor, would negotiate agreements on an individual basis.

Kiss and ride facility

The residents near the school already experience traffic noise associated with school drop-offs and pick-ups. The operation of the kiss and ride facility would move the drop-offs and pick-ups into the school grounds and is not expected to increase noise levels.

Powerline relocation

No noise impacts are expected once the powerlines are operational, apart from periodic maintenance activities required to clear/prune vegetation encroaching on the powerline clearance zone.

Concern was raised during community consultation regarding loss of acoustic screening associated with hedges and vegetation. It has been well established that vegetation does not provide practical acoustic screening, only a perceived one. The noise modelling undertaken for the Approved Project and for the proposal, and associated mitigation measures such as the noise walls and at-property architectural treatments discussed elsewhere in this section, have taken into account the full effects of the changed noise environment over the length of the overall project.

Hadrian Avenue/Keyworth Drive roundabout

Operational noise conditions are expected to be the same as current conditions.

6.3.3 Safeguards and management measures

In addition to the safeguards and management measures in the Approved REF, the following safeguards and management measures are proposed.

Table 6-7 Additional noise and vibration safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Construction noise – kiss and ride facility	Where possible, preparation and construction activities would be undertaken during school holidays or out of school hours. Where this is not possible, the timing and operation of construction activities would be coordinated to limit the noise impacts to the school	Construction contractor	Pre-construction, construction

Impact	Environmental safeguards	Responsibility	Timing
	and local residents. Construction and preparation activities would not be undertaken during exam periods.		
Construction noise – test excavation works	Construction work would not take place on Sundays to limit the disturbance to people attending Saint Marks Coptic Church.	Construction contractor	Construction
Architectural acoustic treatments	Consultation with eligible properties would be undertaken during the construction period to determine the suitability of properties for treatment and the agreement of the proposed measures.	Roads and Maritime, construction contractor	Construction

6.4 Biodiversity

6.4.1 Existing environment

A Biodiversity Impact Assessment was prepared by Sinclair Knight Merz (2014) for the Approved Project REF which identified the vegetation within the REF boundary and the potential impacts of the Approved Project on flora and fauna. The existing environment for the majority of the proposed refinements would be consistent with the description provided in Section 6.3 of the Approved Project REF.

The proposed kiss and ride facility and roundabout at Hadrian Avenue/Keyworth Drive are located outside the Approved Project boundary and were not included in the previous assessment. An Arboricultural Impact Assessment was undertaken by ArborSkills in October 2015 for the kiss and ride facility and roundabout (Appendix F) and powerline relocation (Appendix E).

Cumberland Plain Woodland TECs

The Approved Project REF identified the presence of Cumberland Plain Woodland Threatened Ecological Communities (TECs) throughout the study area. This is listed as Critically Endangered under the TSC Act, with some high condition pockets of vegetation also listed as critically endangered under the EPBC Act. Figure 6-3 -Figure 6-5 show the location of Cumberland Plain Woodland TECs across the study area.

The Biodiversity Assessment prepared for the Approved Project REF notes that 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.

Threatened species

A threatened species assessment was undertaken as part of the Approved Project REF. Due to the largely cleared and degraded condition of the proposal area, it is considered unlikely that threatened fauna would regularly utilise the site. The site is also influenced by disturbance associated with nearby residential development, nearby roads and school activities. The majority of scattered trees on the site are unhealthy

and are unlikely to provide habitat for threatened fauna species except on an occasional basis.

Kiss and ride facility

The proposed kiss and ride facility site would be located in the north western part of the Shelley Public School grounds. This area of the school grounds is largely cleared and comprises an open grassed area with scattered mature and semi-mature trees (refer Figure 3-1).

A total of 16 trees on the site and seven trees within the Hadrian Avenue road reserve were inspected by ArborSkills and assessed in the Aboricultural Impact Assessment. None of the species identified are listed as endangered under the TSC or EPBC Acts. Of the assessed trees, the majority were found to have structural defects and/or were in poor health. Five trees were considered either good specimens or important[2] and therefore appropriate for retention (refer Table 6-8). The locations of these trees are shown in Figure 6-6.

Table 6-8 Important trees identified at Shelley Public School

Tree	Description
Tree 111 English Oak (*Quercus robur*)	Good example of the species and is of a significant size and in relatively good overall health. It is normally considered a slow growing species. It is estimated to be 60 years of age. The soil surrounding the tree is extremely compacted, most likely as a result of pedestrian traffic. This can be easily improved with soil remediation which would improve the overall condition of the tree.
Tree 112 Lemon Scented Gum (*Corymbia citriodora*)	This mature tree has good health, is in good structural condition and has good form. Its placement near the front boundary of the property makes it highly visible and adds value to the streetscape. This species is generally considered tolerant of disturbance as compared to other native Australian species.
Tree 116 Aleppo Pine (*Pinus halepensis*)	This tree has been identified as an Aleppo Pine, also known as the 'Lone Pine'. It is connected to the Lone Pine battle at Gallipoli in 1915. Specimens of this species and a second species can be traced back to two individual pine cones collected by serving Australian soldiers during the battle, propagated in Australia and then planted for commemorative purposes. At the time of preparing the arborists report, it was unclear when the tree was planted, by whom and what pre-empted the planting. However, given the nature of the tree and its symbolism, it is recommended that all efforts be made to retain and protect the tree.

[2] An important tree is considered to be a mature and healthy tree of significance in the local area from an aesthetic perspective.

Tree	Description
Tree 127 Lilly Pilly (*Syzygium smithii*)	This mature tree is in good health with no significant structural or formative defects visible. The canopy of the tree intersects with those of trees to the south forming an informal hedge across the school building, and consequently providing some privacy to classroom windows and potentially blocking some traffic noise from the street. This species is not locally indigenous but does support local fauna and provides amenity and environmental value to the property.
Tree 128 Lemon Scented Gum (*Corymbia citriodora*)	This semi-mature specimen has the potential to provide a high level of amenity to the school. The placement of the tree is such that as it grows, it would shade the school building from the western sun. This would assist in cooling the building, reducing electricity costs and making it more comfortable for staff and students.

An additional seven trees within the road reserve of Hadrian Avenue were inspected and assessed. Five were identified as Weeping Bottlebrush (*Callistemon viminalis*), which is a common street planting and two were identified as Flax Leaf Paperbark (*Melaleuca linariifolia*). All the street trees were found to have structural defects. The trees were considered to be typical of street tree plantings in the area.

The proposal area does not constitute significant habitat for any native fauna due to the highly disturbed nature of the site and lack of native vegetation in and adjacent to the proposal area.

Hadrian Avenue/Keyworth Drive roundabout

The site is the intersection of Hadrian Avenue and Keyworth Drive located within the road corridor. There are seven scattered planted trees comprising Weeping Bottlebrush (*Callistemon viminialis*) and Water Gum (*Tristaniopis laurina*) near the intersection (refer to Appendix 2 of the arboricultural report in Appendix F for further detail). Neither species is listed as endangered.

Table 6-9 Trees identified near Hadrian Avenue/Keyworth Drive

Tree	Description
Tree 122 Weeping Bottlebrush (*Callistemon viminalis*)	This mature tree is located on Hadrian Avenue near the T-intersection with Keyworth Drive. It has some health issues and has major visible structural defects.
Tree 129 Weeping Bottlebrush (*Callistemon viminalis*)	This mature tree is situated next to Tree 130 on Keyworth Drive. It has significant health issues and has major visible defects within the structure of the tree. It is in decline.
Tree 130 Weeping Bottlebrush (*Callistemon viminalis*)	This mature tree is situated next to Tree 129 on Keyworth Drive. It has poor structure and form and has some health issues which could be addressed by intervention.

Tree	Description
Tree 131 Water Gum (*Tristaniopsis laurina*)	This mature tree is situated next to Tree 132 on the northern side of Keyworth Drive. It has poor health with minor visible structural defects and has some minor physical or environmental impediments to growth.
Tree 132 Water Gum (*Tristaniopsis laurina*)	This mature tree is situated next to Tree 131 on the northern side of Keyworth Drive. It has poor health with minor visible structural defects and has some minor physical or environmental impediments to growth.
Tree 133 Water Gum (*Tristaniopsis laurina*)	This mature tree is located to the west of the intersection on Keyworth Drive. It is structurally sound and has some health issues which could be addressed by intervention and has some minor physical or environmental impediments to growth.
Tree 135 Water Gum (*Tristaniopsis laurina*)	This mature tree is located to the east of the intersection on Keyworth Drive. It is structurally sound.
Tree 136 and 137 Water Gum (*Tristaniopsis laurina*)	These two mature trees are located to the west of the intersection with Hadrian Avenue. They are both structurally sound.

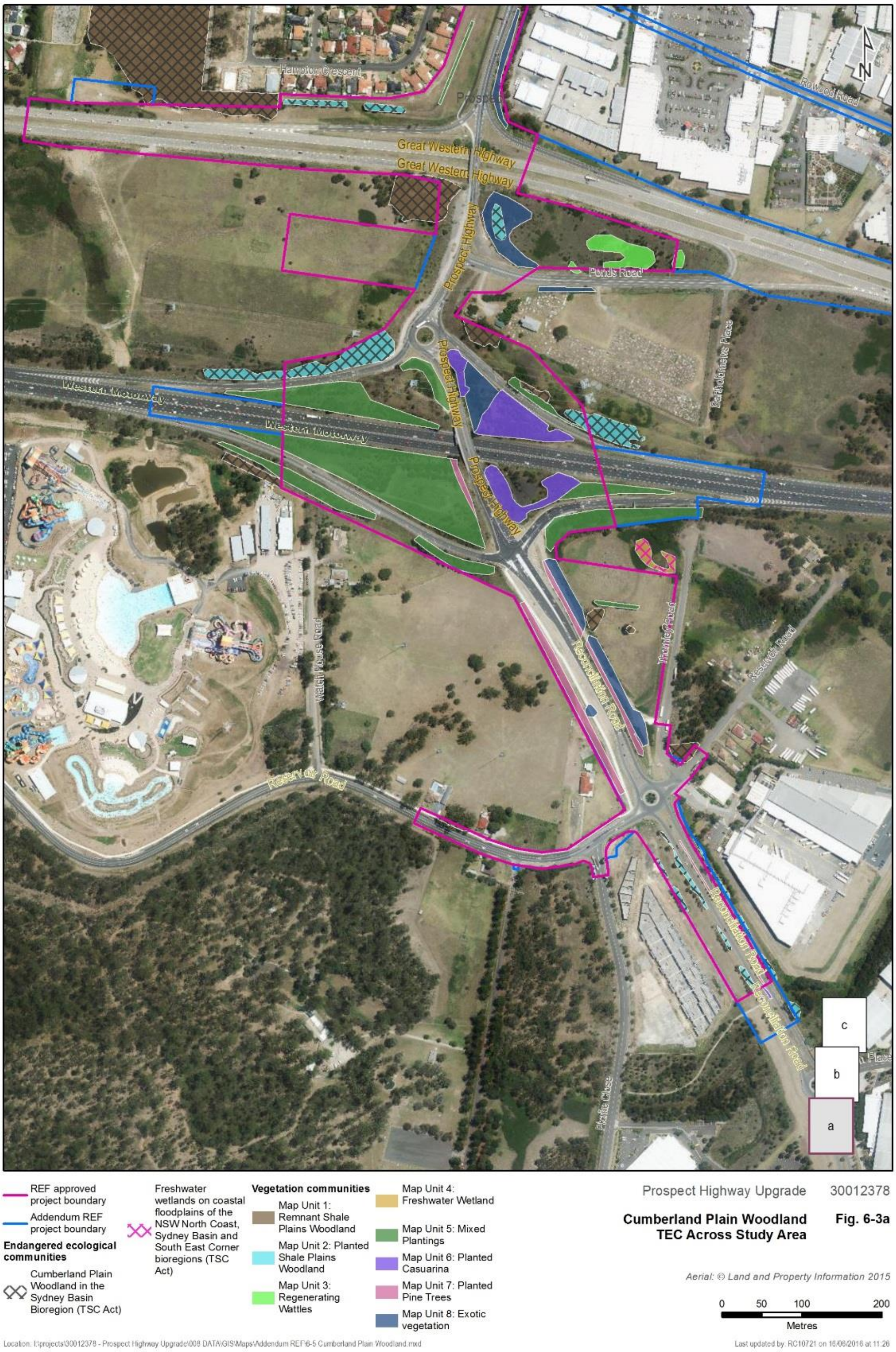

Figure 6-3 Cumberland Plain Woodland TEC across the study area

Figure 6-4 Cumberland Plain Woodland TEC across the study area

Figure 6-5 Cumberland Plain Woodland TEC across the study area

6.4.2 Potential impacts

As shown in Table 6-1, only those design refinements that have an impact not covered by the Approved Project REF are discussed below. The design refinements that are located within the approved clearing boundary, would not impact on fauna connectivity or increase the incidence of fauna mortality are not discussed.

Construction

Kiss and ride facility

Activities associated with the construction of the proposed kiss and ride facility are likely to impact on 17 trees on the site and the road reserve (refer to Table 6-10 and Figure 6-6).

The proposed kiss and ride facility would require the removal of 12 trees from the site and the Hadrian Avenue road reserve. The majority of these trees have been identified by the arborist as being in poor health. The proposal would directly impact on two of the five trees (Tree 112 and 127) which were recommended by the arborists for retention. The proposal would not impact on the Aleppo Pine (Tree 116).

Table 6-10 Trees likely to be impacted for the construction of the kiss and ride facility

Tree ID No.	Common Name	Species Name
Trees to be removed		
106	Lemon Scented Gum	*Corymbia citriodora*
107	Prickly Paperbark	*Melaleuca stypheliodes*
108	Black She-oak	*Allocasuarina littoralis*
109	Prickly Paperbark	*Melaleuca stypheliodes*
112*	Tallowwood	*Eucalyptus microcorys*
113	Lemon Scented Gum	*Corymbia citriodora*
114	Grey Gum	*Eucalyptus punctate*
115	Narrow-leaf Peppermint	*Eucalyptus crebra*
117	Tallowwood	*Eucalyptus microcorys*
118	Prickly Paperbark	*Melaleuca stypheliodes*
120	Weeping Bottlebrush	*Callistemon viminalis*
127*	Lilly Pilly	*Syzygium smithii*
Trees likely to be impacted as a result of impacts to the root system (may die)		
119	Weeping Bottlebrush	*Callistemon viminalis*
128*	Lemon Scented Gum	*Corymbia citriodora*

Tree ID No.	Common Name	Species Name
Trees likely to be impacted by the concrete slab (unlikely to die)		
134	White Cedar	*Melia azedarach*
Trees likely to be impacted if inadequate controls are in place		
110	Crepe Myrtle	*Lagerstroemia indica*
111*	English Oak	*Quercus robur*

* Recommended for retention by the arborist

Excavation would potentially affect the structural roots within the tree protection zone of Trees 119 and 128, which may lead to the eventual death of these individual trees.

Trees 110 and 111 are likely to be impacted by the construction activities, but with adequate controls the structure, health and survival of these trees would not be impacted.

The proposed concrete slab to be used at the top of a ramp from the kiss and ride facility to the school buildings would be located at the convergence of two of the school buildings and at the base of Tree 134, a tree previously not indicated as being impacted by these works. It is most likely that with the existing ramp design there would be some impact on the health and structure of this tree.

The proposal area is highly modified and has been impacted by vegetation clearing in the past and by disturbances associated with residential and urban development nearby and school activities. The construction of the proposed kiss and ride facility is not expected to have an impact on threatened species, populations or ecological communities.

Figure 6-6 Tree clearing required along Hadrian Avenue and Keyworth Drive

Noise walls

The location of the proposed noise walls in relation to vegetation is discussed generally in Table 6-11. An assessment of the collective impacts of the proposed refinements on Cumberland Plain Woodland (CPW) is provided at the end of this section.

Table 6-11 Proposed noise walls located near native vegetation

No.	Noise wall reference	Impact on biodiversity
1	NW_NB01	Located identified in Approved Project REF. Mostly located in a cleared road verge, cuts through CPW at the western end. Two stands of CPW located to the north. No changes to the impacts identified in the Approved Project REF.
2	NW_NB02b	Located along Approved Project boundary and edge of largely cleared road reserve. Planted pine trees identified along the reserve boundary. Road reserve area identified in Approved Project REF for site compound. Clearing of all vegetation was assessed under the Approved Project REF. No additional impacts identified.
3	NW_NB03b	North of the pedestrian underpass (Ch1980) the wall cuts through a mapped stand of CPW. This area is within the Approved Project boundary and clearing of vegetation was assessed under the Approved Project REF. No additional impacts identified
4	NW_NB04a	Located along Approved Project boundary. Scattered trees within largely cleared road reserve are identified as CPW. Road reserve would also become location of OSD4. Clearing of all vegetation was assessed under the Approved Project REF. No additional impacts identified.
	NW_NB04b	Generally located outside the Approved Project boundary. Scattered trees within largely cleared road reserve are identified as CPW as well as a large stand between Ch2310 and 2370. Clearing of vegetation between Ch2280 and 2310 was assessed under the Approved Project REF. Additional area to be impacted between Ch2310 and 2460 includes a large stand of CPW. In total, around 136 m^2 would be cleared. Area would also require clearing for additional drainage works, identified in Section 6.6.
5	NW_SB01	Located along Approved Project boundary. CPW not identified. Clearing of all vegetation was assessed under the Approved Project REF. No additional impacts identified.
6	NW_SB02a	Location identified in Approved Project REF. Located in the road reserve, some trees would be impacted, including CPW. Clearing of all vegetation was assessed under the Approved Project REF. No additional impacts identified.
7	NW_SB02b	Location identified in Approved Project REF. Located in the largely cleared road reserve with some scattered trees.

No.	Noise wall reference	Impact on biodiversity
		No CPW identified. Clearing of all vegetation was assessed under the Approved Project REF. No additional impacts identified.
8	NW_SB03a	Location identified in the Approved Project REF. CPW identified. Clearing of all vegetation was assessed under the Approved Project REF. No additional impacts identified.
	NW_SB03b	Location identified in the Approved Project REF. CPW identified. Clearing of all vegetation was assessed under the Approved Project REF. No additional impacts identified.

Installation of the noise walls would require around 330 square metres of additional clearing of CPW. Vegetation within the study area is already highly fragmented due to roads and urban development. The vegetation to be removed is highly disturbed and is considered to be of limited value as habitat for fauna species.

The installation of the noise walls is not expected to have an impact on fauna species.

Powerline relocation

Based on the Arboricultural Impact Assessment Report prepared by ArborSkills (2015) (Appendix E), 50 tree species would require removal and 20 would require pruning. The assessment for the requirement for pruning as opposed to full removal was undertaken in accordance with *Australian Standard 4373-Pruning of amenity trees 2007* to determine the clearance requirements, and the suitability of each species to withstand the estimated canopy.

The Canary Island Date Palm at 205 Blacktown Road intrudes into the clearance zone for the relocated powerline, and it is likely that it would need to be removed as pruning would not be a viable option.

The vast majority of vegetation species identified in the assessment do not have the potential to attain heights whereby they are likely to encroach on required clearance distances. However, a group of mature Golden Cypress (*Cupressus macrocarpa*) at 239 Blacktown Road are likely to encroach into the clearance zone and would require appropriate pruning.

The removal and pruning of vegetation required to facilitate the powerline relocation is unlikely to impact fauna species as a consequence of reducing the extent of available habitat and potential roosting areas. The vegetation identified for removal is adjacent to a busy highway in a built-up urban area, and is unlikely to provide habitat for any threatened species.

No species forming part of the threatened Cumberland Plain Woodland community are likely to be impacted by the tree removal/pruning for the powerline relocation.

Hadrian Avenue/Keyworth Drive roundabout

Three Weeping Bottlebrush trees (*Callistemon viminalis*) and six Water Gum (*Tristaniopsis laurina*) trees are likely to be impacted by the proposed works (refer Figure 6-6). The realignment of the kerb and guttering would require demolition and excavation works to be carried out. This may impact on the root systems of two trees (Trees 131 and 132), potentially causing the trees to become unstable, which would

warrant removal of some or all five trees. However it is not possible to determine the extent of the root systems until excavation commences. The works are also expected to impact on the health and vigour of the trees. Tree 122, a Weeping Bottlebrush, is likely to require removal. Trees 129, 130, 133, 135, 136, 137 would require removal due to trenching required for the relocation of utilities (NBN).

No threatened species or communities would be impacted by the proposed modification.

Additional road and drainage works

The majority of the additional road and drainage works which extend beyond the Approved Project boundary are generally located in highly disturbed areas immediately adjacent to or within the existing road reserve, and no additional impacts are likely to occur.

There are two locations (Items 2 (Chainage 1625) and 5 (Chainage 2310 to 2385) where the drainage works may impact upon Cumberland Plain Woodland TECs.

Item 2 of the proposed additional drainage works involves a five metre extension of pipe and headwall infrastructure beyond the Approved Project boundary. Up to 15 square metres of moderate condition CPW may be impacted by the proposed works. The current pipe and headwall are located directly adjacent to the mapped area of Cumberland Plain Woodland.

Item 5 of the proposed additional drainage works involves a four metre wide swale drain which extends about 70 metres beyond the Approved Project boundary. Up to 470 square metres of low condition CPW may be impacted by the proposed works. This area comprises only canopy species with an exotic dominated understorey, no ground habitats and no natural regeneration.

The removal and pruning of vegetation required to facilitate the additional road works may have a minor impact upon fauna as a consequence of reducing the extent of available habitat and potential roosting areas. However, it should be noted that the existing vegetation earmarked for removal is adjacent to a busy highway in a built-up urban area, and is unlikely to provide habitat for any threatened species.

No threatened species or communities would be impacted by the proposed additional road works.

Property access adjustments

The majority of the property works would involve the removal of lawn, garden beds and planted tree species. Table 6-12 provides a summary of the properties which would require tree removal to enable construction of the turn areas. No threatened tree species would be removed during the property works, and where possible trees would be avoided or relocated.

Table 6-12 Properties requiring tree removal for property access works

Address	Lot	DP	Number of trees to be removed	Number of trees to be relocated
111 Blacktown Road	23	243340	4	1
129 Blacktown Road	14	243340	3	Nil
135 Blacktown Road	11	243340	1	Nil
144 Blacktown Road	13	242289	1	Nil

Address	Lot	DP	Number of trees to be removed	Number of trees to be relocated
198 Blacktown Road	354	236429	1	Nil
202 Blacktown Road	352	236429	2	Nil
205 Blacktown Road	2	567858	1	1
215 Blacktown Road	3	589737	1	Nil
225 Blacktown Road	4	237392	5	Nil
226 Blacktown Road	1	231212	2	Nil

The removal and pruning of vegetation required to facilitate the property works may have a minor impact upon fauna as a consequence of reducing the extent of available habitat and potential roosting areas. However, it should be noted that the existing vegetation earmarked for removal is adjacent to a busy highway in a built-up urban area, and is unlikely to provide suitable habitat for any threatened species.

No threatened species or communities would be impacted by the proposed property works.

On-site detention basins

The new on-site detention basins would be constructed in largely cleared areas immediately adjacent to the upgraded road corridor. Basin 6 would be located outside the Approved Project REF boundary immediately to the south of Timbertop Reserve, where high condition Cumberland Plain Woodland is located. Field verification undertaken on 24 March 2016 confirmed that there were no threatened species present and the cleared area where the basin would be located is not considered to meet the requirement of the listed EEC Cumberland Plain Woodland.

One tree (not identified as Cumberland Plain Woodland), located in the road reserve, would be required to be removed to construct Basin 4.

Cumberland Plain Woodland

The Approved Project REF noted that the Approved Project would result in the direct and indirect impact of about 0.69 hectares of Cumberland Plain Woodland which occurs as a planted and remnant community within the study area. Assessments of significance under the TSC Act found that the Approved Project would be unlikely to result in significant impacts to the TEC.

The proposed refinements detailed in this Addendum REF would result in an additional 0.64 hectares of Cumberland Plain Woodland being cleared as shown in Table 6-13, representing a combined total of 1.33 hectares to be cleared for the project overall. This additional 0.64 hectares consists of 0.14 hectares of high condition Cumberland Plain Woodland listed under the EPBC Act and the TSC Act, an increase of 0.02 hectares compared to the Approved Project.

The Approved Project REF identified areas of high condition remnant in the location of the proposed widening of the two way link road between Prospect Highway and the Great Western Highway. During detailed design Roads and Maritime has sought to avoid and minimise further impact on this remnant woodland as much as possible.

This additional 0.64 hectares of Cumberland Plain Woodland to be cleared would represent a small proportion of 1616 hectares of the overall distribution of the Cumberland Plain Woodland community mapped within a 10 kilometre radius of the proposal by National Parks and Wildlife Service (NPWS, 2002, in SKM, 2014). The Approved Project REF identified that the impact on local distribution would be 0.007 per cent, and the additional 0.64 hectares would represent a relatively small increase. The additional clearing would represent a negligible impact on the local distribution and is unlikely to result in the local occurrence being placed at risk of extinction. These findings are consistent with the Approved Project REF.

Low condition areas that would be cleared comprise isolated trees and planted vegetation with affinities to the TEC community along the road corridor.

As stated in the Approved Project REF, the loss of 0.69 hectares of Cumberland Plain Woodland does not trigger biodiversity offsetting requirements in accordance with Roads and Maritime's offset policy (2011). The additional 0.64 hectares to be removed as part of the proposed does not result in a significant impact, and similarly does not require biodiversity offsets to be secured in accordance with the offset policy.

Relevant safeguards and management measures that would be implemented to control the proposal's potential impacts on biodiversity are summarised in Section 6.2.4 of the Approved Project REF. As detailed in the Approved Project REF, areas containing Cumberland Plain Woodland would be clearly delineated and access prohibited during the proposed works.

Threatened species

None of the proposed refinements would impact on the *Grevillia juniperina subsp. Juniperina* located to the south of the pedestrian underpass (Ch 1960). The Approved Project REF noted that it would be unlikely to be present in other areas of the footprint.

The Approved Project REF identified the potential for Cumberland Plain Land Snails to be present in the study area as well as several highly mobile species which may forage in habitats of the study area, such as microbats, woodland birds and nectar-feeding bats and birds. The proposed refinements would have impacts consistent with those assessed in the Biodiversity Impact Assessment (SKM 2014) and the Approved Project REF and would not represent a significant impact.

Table 6-13 Additional vegetation clearing required by the proposal

Vegetation community type	Fauna habitat type	Biometric vegetation type	Conservation status	Condition	Approved Project REF		Proposed refinements (Addendum REF)	*Increase from Approved Project REF*
					Area of indirect impact (ha)	Area of direct impact (ha)	Total area of direct impact (ha)	*(ha)*
Map Unit 1: Remnant Shale Plains Woodland (Cumberland Plain Shale Woodlands and Cumberland Plain Woodland TEC)	Grassy woodland	*Grey Box –Melaleuca decora* 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	0.14	*0.02*
				Moderate	0.03	0.08	0.10	*-0.01*
				Low	N/A	0.32	0.82	*0.50*
Map Unit 2: Planted Shale Plains Woodland (Cumberland Plain Woodland TEC)	Grassy woodland	Grey Box -*Melaleuca decora* grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin	Critically endangered, TSC Act	Low	N/A	0.14	0.27	*0.13*
Map Unit 5: Mixed Plantings	Planted vegetation	N/A	N/A	Low	N/A	0.47	1.05	*0.58*
Map Unit 6: Planted Casuarina	Planted vegetation	N/A	N/A	Low	N/A	0.06	0.21	*0.15*

Vegetation community type	Fauna habitat type	Biometric vegetation type	Conservation status	Condition	Approved Project REF		Proposed refinements (Addendum REF)	*Increase from Approved Project REF*
					Area of indirect impact (ha)	Area of direct impact (ha)	Total area of direct impact (ha)	*(ha)*
Map Unit 7: Planted Pine trees	Cleared and modified habitats	N/A	N/A	Very low	N/A	0.13	0.46	*0.33*
Map Unit 8: Exotic vegetation	Cleared and modified habitats	N/A	N/A	Very low	N/A	0.14	0.33	*0.19*
Total					0.07	1.42	3.38	*1.89*

Source: Prospect Highway Upgrade Biodiversity Impact Assessment (SKM February 2014)

Note: Addendum REF refinements based on 100% detailed design February 2016.

Operation

Kiss and ride facility

The operation of the proposed kiss and ride facility is not expected to have an impact on threatened species, populations or ecological communities.

Noise walls

Once operational, the noise walls are not expected to adversely impact on biodiversity. Occasional vegetation clearing for maintenance purposes may be required.

Powerline relocation

Ongoing maintenance of the appropriate clearances would be required. This would be the responsibility of the utility authority, not Roads and Maritime.

Hadrian Avenue/Keyworth Drive roundabout, additional road and drainage works, property access adjustments and on-site detention basins

Once operational, it is not expected that these design refinements would have an impact on threatened species, populations or ecological communities.

6.4.3 Safeguards and management measures

In addition to the safeguards and management measures in the Approved Project REF, the following safeguards and management measures are proposed.

Table 6-14 Additional biodiversity safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Tree removal at Shelley Public School	A Tree Protection Plan would be prepared by a qualified arborist as part of the CEMP in accordance with AS4970-2009 to protect all trees within the construction zone which are to be retained. Tree numbers 111 (English Oak) and 116 (Aleppo Pine) would be retained and protected. At a minimum, tree protection fencing would be applied to mark and exclusion zone around these trees. All personnel working on the site would be made aware of the location of the Aleppo Pine tree.	Construction contractor	Pre-construction
Removal of native vegetation	The construction footprint for all activities would be identified and marked before construction. Trees to be removed/ retained	Construction contractor	Pre-construction

Impact	Environmental safeguards	Responsibility	Timing
	would be clearly identified prior to clearing. Tree clearing would be undertaken in accordance with AS 4373-2007.		
Impacts on trees at the proposed roundabout location	An arborist would inspect and assess Trees 131-132 at the intersection of Hadrian Avenue and Keyworth Drive to determine which trees can be retained and which would require removal. This would be undertaken once the existing guttering has been removed, so that the roots are visible.	Construction contractor	Construction
Removal of vegetation – powerline relocation	A landscape plan would be prepared as part of the CEMP in consultation with landowners and Endeavour Energy to inform the appropriate planting of new vegetation in disturbed areas. The landscape plan would: - Establish suitable low height trees and shrubs under electrical powerlines - Provide taller trees where there are no powerlines, taking into consideration clearance zone requirements. A qualified arborist would be consulted regarding the trimming of the Golden Cypress (*Cupressus macrocarpa*) at 239 Blacktown Road to ensure an appropriate treatment is implemented.	Construction contractor	Construction

6.5 Landscape, visual amenity and urban design

A Landscape Character and Visual Impact Assessment report was prepared by HBO + EMTB (2014) for the Approved Project REF. An additional Landscape Character and Visual Amenity assessment of the proposed noise walls was undertaken by Spackman Mossop Michaels (SMM) in March 2016 (refer Appendix G). The assessment was

undertaken in accordance with the *Guideline for Landscape Character and Visual Impact Assessment* (Roads and Maritime, 2013).

6.5.1 Existing environment

Overall project corridor

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.

The existing environment of the proposal corridor and its surroundings are described in detail in Chapter 6.4 of the Approved Project REF. Nine landscape character zones (LCZ) were identified along the Prospect Highway Upgrade corridor and are shown in Figure 6-7 and described in Table 6-15 below.

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 site. Based on existing landforms, the visual catchment also takes into account vegetation, land uses and structures.

Twenty-seven key viewpoints from which potential visual impacts were assessed are located on the Visual Envelope Map (refer Figure 6-8).

Table 6-15 Project landscape character zones

LCZ	Description	Proposed design refinements
LCZ 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.	-
LCZ 2 (Wet 'n Wild Sydney)	LCZ 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.	-
LCZ 3 (Greystanes industrial estate)	LCZ3 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	-

LCZ	Description	Proposed design refinements
	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.	
LCZ 4 (M4 Western Motorway and Great Western Highway Corridor)	LCZ 4 is a flat to gently undulating area of generally open pasture with scattered remnant trees and shrubs, located between Reservoir Road and the Great Western Highway. This area excludes Prospect Hill Heritage Church and Cemetery zone. A few scattered, low density rural residential dwellings are located within the zone.	Noise walls
LCZ 5 (Prospect Hill Heritage Church and Cemetery)	LCZ 5 comprises the heritage listed St Bartholomew's Anglican Church and Cemetery situated on the summit of Prospect Hill. The landform consists of grassed embankments with a number of established cultural tree plantings around the church.	Noise walls
LCZ 6 (Prospect Industrial / Commercial / Retail Centre	This zone is generally flat, located between Prospect Highway and Blacktown Road, with the Great Western Highway forming its southern boundary. It is made up of commercial, light-industrial and retail buildings.	Noise walls
LCZ 7 (Prospect West / East Residential Areas)	LCZ 7 is a large, gently undulating zone, encompassing the suburb of Prospect on both sides of Prospect Highway, and consists of single and double storey residential dwellings on generally tree-lined streets. A wide, grassed drainage corridor runs parallel to the western side of Prospect Highway with two distinctly different sections – a generally regular profile with a steep grassed embankment between the Great Western Highway and Harrod Street, progressing to a narrow and gently sloping grassed area north to Lancelot Street.	Noise walls, powerline relocation, additional site compounds, property access adjustments
LCZ 8 (Blacktown / Seven Hills Residential Areas)	This zone covers the Blacktown and Seven Hills residential areas, on gently undulating land, consisting of one and two storey residences and other mixed land uses including a public school. Properties on the eastern side of Prospect Highway generally address the highway directly, while those to the west are accessed by a service road.	Kiss and ride facility, noise walls, powerline relocations, Hadrian Avenue/Keyworth Drive roundabout, property access adjustments
LCZ 9	This landscape zone is defined by large footprint commercial buildings with extensive	

LCZ	Description	Proposed design refinements
(St Martins Village Shopping Centre / Blacktown Mega Centre)	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.	

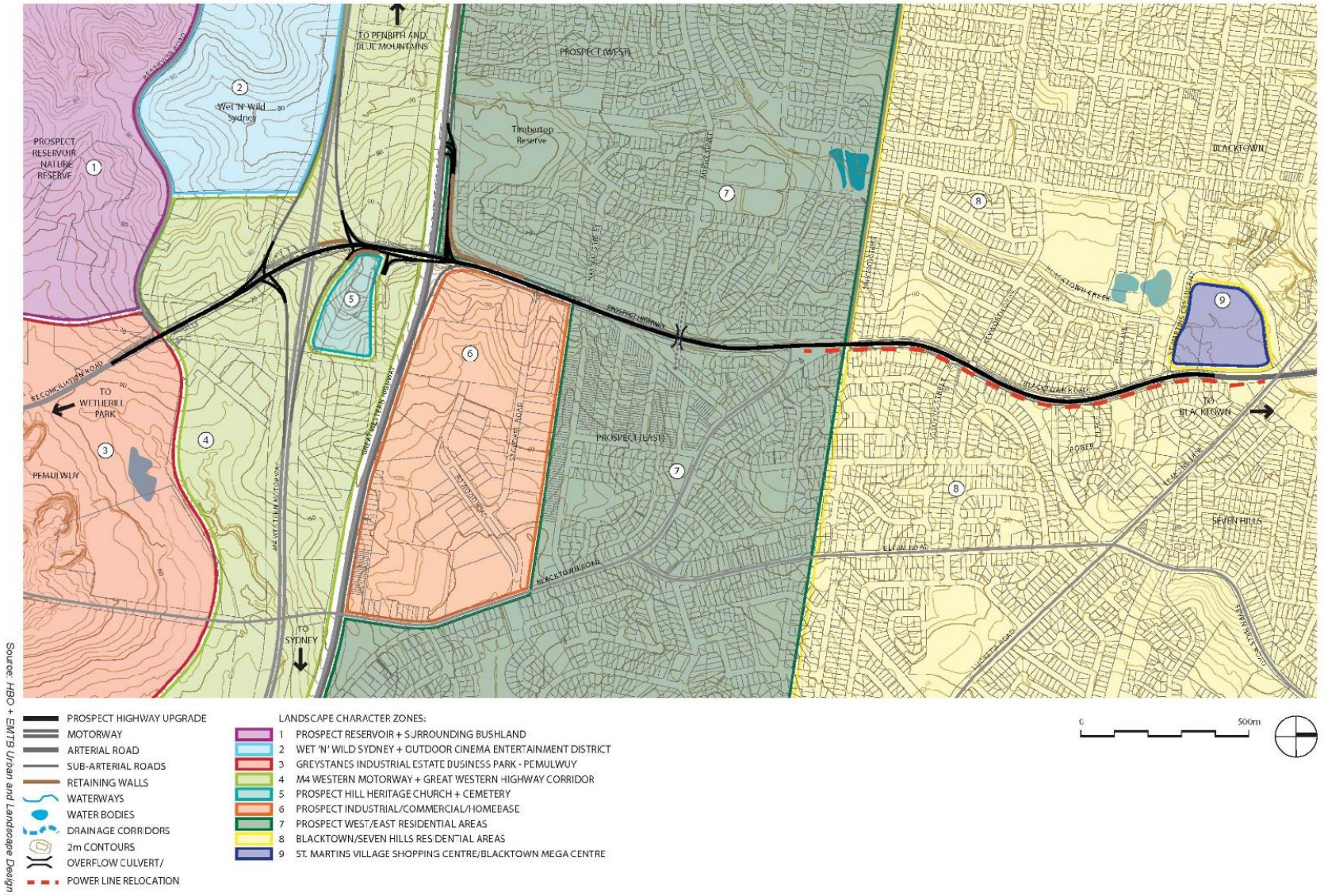

Figure 6-7 Landscape character zones (SMM, 2015)

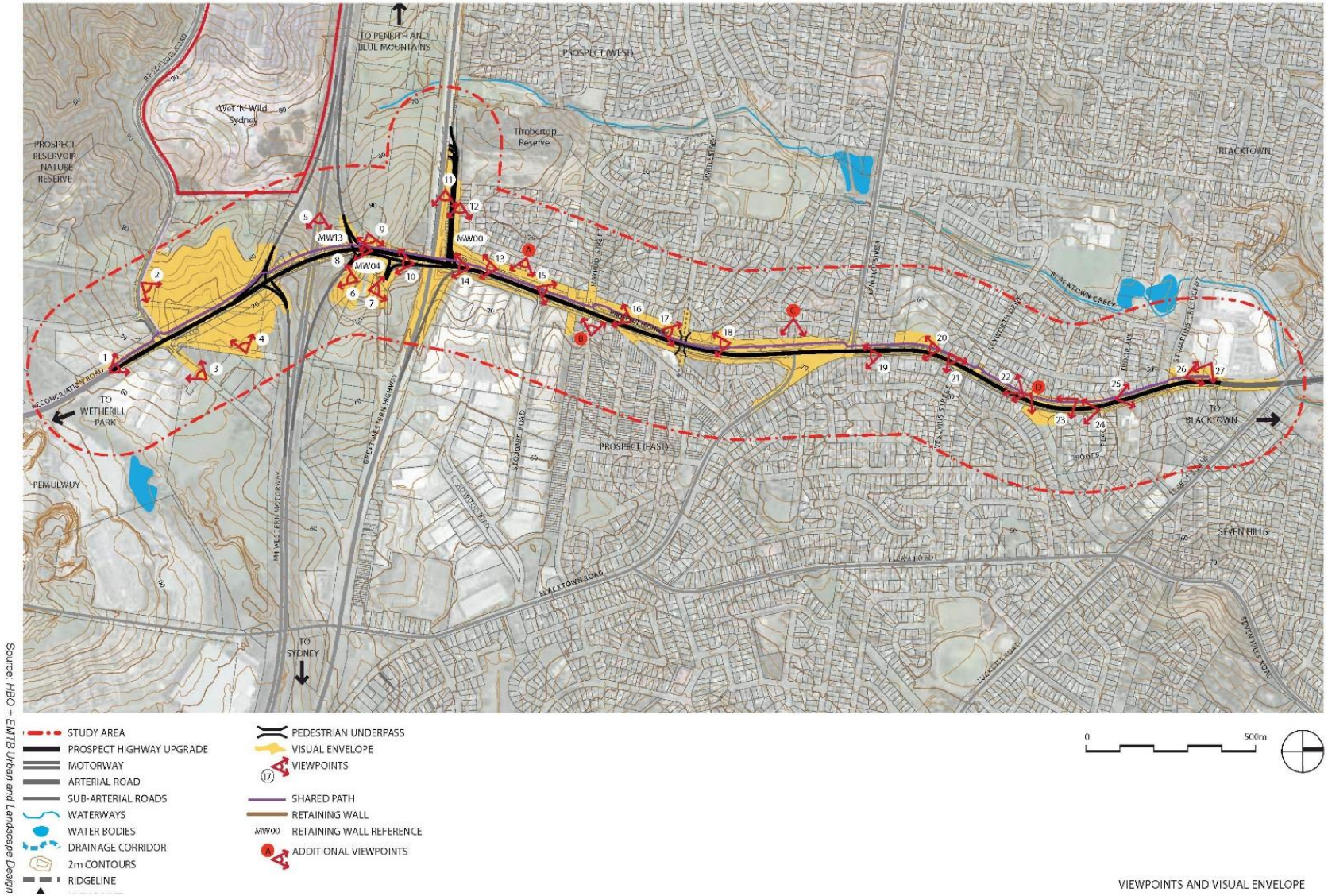

Figure 6-8 Viewpoints and visual envelope (SMM, 2015)

Kiss and ride facility

Landscape character zone

Shelley Public School is located within LCZ 8 (refer to Table 6-15).

Viewpoints

Viewpoint 20 looks into the eastern edge of the Shelley Public School grounds, however it does not provide a view of the proposed kiss and ride facility, which is visible from Hadrian Avenue.

The residential properties of 7 Hadrian Avenue, and 2 and 4 Tyrone Place are located immediately to the north of the school site but are screened by the school fence line and trees located within the school property.

Noise walls

Landscape character zones

The proposed additional noise walls are located across five LCZs (LCZs 4, 5, 6, 7 and 8) which are detailed in Table 6-15).

Viewpoints

The proposed additional noise walls would affect 17 of the 27 viewpoints assessed in Section 6.4 of the Approved Project REF. Additional viewpoints A, B, C and D identified in the SMM Landscape Character and Visual Amenity assessment were used to assess the impact of noise walls from the perspective of residential properties.

Residences along and motorists using Prospect Highway would have direct views of the proposed noise walls.

Powerline relocation

Landscape character zones

The proposed powerline relocation would affect two LCZs (LCZs 7 and 8) which are detailed in Table 6-15).

Viewpoints

The proposed powerline relocation would affect eight of the 27 viewpoints assessed in Section 6.4 of the Approved Project REF.

The eastern side of Prospect Highway (where overhead powerlines are proposed to be installed) currently provides vegetation screening to the residences from Prospect Highway.

Hadrian Avenue/Keyworth Drive roundabout

Landscape character zones

The roundabout is located within LCZ 8 refer to Table 6-15.

Viewpoints

The proposed roundabout is located within a residential area. The nearest sensitive receivers are residential properties located on Hadrian Avenue (1, 2, 4 and 5) and Keyworth Drive (10, 12, 14, 16, 18 and 20), and Shelley Public School 140 metres to the south. No viewpoints assessed in the Approved Project REF currently face towards the proposed roundabout location. Residential properties at the intersection of Hadrian Avenue, and Keyworth Drive have direct views of the roundabout. Minor screening of the roundabout is provided by street vegetation for the nearest residential properties.

Additional site compounds

Landscape character zones

Extension of construction compound 4

Construction compound 4 is located within LCZ 7 refer to Table 6-15.

New construction compound 6

Construction compound 6 is located within LCZ 7 refer to Table 6-15.

Viewpoints

Extension of construction compound 4

The proposed extension of compound 4 would affect five of the 27 viewpoints assessed in Section 6.4 of the Approved Project REF. Construction compound 4 borders residences along Hampton Crescent to the east and north, Prospect Highway and industrial estates to the east, and the Great Western Highway to the south. The site is located within the Approved Project boundary however it was not assessed for use as a construction site compound in the Approved Project REF.

New construction compound 6

The proposed construction compound 6 would affect four of the 27 viewpoints assessed in Section 6.4 of the Approved Project REF. Construction compound 6 borders residences along Keyne Street to the east and Sher Place to the north, Prospect Highway to the east, and residences along Harrod Street to the south.

Residences and motorists would have direct views of the construction compounds.

Property access adjustments

Landscape character zones

Property access adjustments are located between 501 Prospect Highway and 111 Blacktown Road within LCZs 7 and 8 (refer to Table 6-15).

Viewpoints

The proposed property access adjustments would affect 12 of the 27 viewpoints assessed in Section 6.4 of the Approved Project REF. Residential properties requiring property access adjustments would have direct views (some screened by planted vegetation) of Prospect Highway. The need for property access adjustments was identified in the Approved Project REF, however the extent of works at each location was not specifically considered.

6.5.2 Potential impacts

Landscape character

The proposed design modifications fall into five of the eight identified landscape character zones along the length of the project. A summary of the impacts at each of the character zones is provided in Table 6-16. This table outlines the differing sensitivities in each character zone and examines the magnitude of the changes.

Table 6-16 Landscape character impacts – all proposed design refinements

LCZ	Description
LCZ 4 (M4 Western Motorway and Great Western Highway Corridor)	The proposed noise walls would not change the sensitivity rating assessed in the Approved Project REF, which would remain Moderate. The proposal adds a noise wall (NW_NB01) next to the two-way link road that would be visible to motorists on the Great Western Highway within this LCZ. However, the change would not be sufficient to increase the assessed magnitude rating, which would remain

LCZ	Description
	Moderate. Therefore, the overall landscape character impact rating would remain **Moderate**.
LCZ 5 (Prospect Hill Heritage Church and Cemetery)	The proposed noise walls would not change the sensitivity rating assessed in the REF, which would remain High. The noise wall next to the two-way link road (NW_NB01) would be visible from this LCZ, however, due to the distance of the noise wall, this would not change the magnitude rating, which would remain Moderate. Therefore, the overall landscape character impact would remain **Moderate to High**.
LCZ 6 (Prospect Industrial / Commercial / Retail Centre	The proposed noise walls would not change the sensitivity rating assessed in the Approved Project REF, which would remain Low. The noise walls next to the two-way link road (NW_NB01), and along the back fences of residents on Hampton Crescent (NW_NB02b) would be visible from this LCZ, however, due to the commercial nature of this LCZ, they would not be sufficient to change the magnitude rating, which would remain Low. Therefore, the overall landscape character impact would remain **Low**.
LCZ 7 (Prospect West / East Residential Areas)	The proposal would not change the sensitivity rating assessed in the REF, which would remain Moderate. The proposal adds a number of noise walls to the zone including: • Next to the two-way link road (NW_NB01) • Along the back fences of residents on Hampton Crescent (NW_NB02b) • Along the back fences on Aldgate Street (NW_SB01) • Next to Prospect Highway near the underpass (NW_NB03b and NW_SB02a) • Along the back fences of residents on Hollydale Place (NW_SB02b) • Along the back fences of residents on Fife Street (NW_NB04a and NW_NB04b). The proposal would involve the relocation of powerlines and the subsequent removal/pruning of vegetation which would be visible along Prospect Highway in this LCZ. Two additional site compound areas would be constructed which would be visible along Prospect Highway would also occur in this LCZ. The provision of new, and in some cases modified, driveways and in some cases the removal/pruning of vegetation within property boundaries, some of which may be visible along Prospect Highway would also occur in this LCZ. The proposal would increase the magnitude of work in the LCZ, however, it was assessed as High in the Approved Project REF, the highest rating available in the Guideline. Therefore, the overall landscape character impact would remain **Moderate to High**.

LCZ	Description
LCZ 8 (Blacktown / Seven Hills Residential Areas)	The proposal would not change the sensitivity rating assessed in the Approved Project REF, which would remain Moderate. The proposal would involve the addition of a kiss and ride facility at the Shelley Public School in this LCZ. Construction activities would be visible to residents on Hadrian Avenue near the school and for motorists and pedestrians using Hadrian Avenue. Once complete the school buildings would be more visible when viewed from Hadrian Avenue as the existing screening trees would be removed. The proposal would introduce a noise wall to the zone, next to the back fences of residents on Topaz Crescent (NW_SB03b). The proposal would involve the relocation of powerlines and the subsequent removal/pruning of vegetation, which would be visible along the Prospect Highway. The proposal would modify an existing road junction into a roundabout. This would marginally increase the magnitude of work in the LCZ, however, this would not be sufficient to increase the magnitude rating that was assessed to be Moderate in the Approved Project REF. A small number of trees and vegetation may be removed in order to modify the roundabout, however the removal of this vegetation is considered minor in the context of the tree lined street which characterise most of LCZ 8. The proposal would involve the provision of new and in some cases modified driveways and in some cases the removal/pruning of vegetation within property boundaries, some of which may be visible along Prospect Highway/Blacktown Road. However, when considering the additional overall impact of additional works and vegetation removal required for proposed design refinements, the overall landscape character impact would increase to **Moderate to High.**

Visual impacts

Table 6-17 provides a summary of the predicted visual impacts that would result from the proposed design refinements at each of the key viewpoints.

Two of the proposed design refinements are located outside the visual envelope map identified in the Approved Project REF and have been assessed separately.

Table 6-17 Visual impact assessment of the proposed design refinements

Viewpoint	Location	Description	Visual Impact Assessment
7	Prospect Hill Cemetery, looking north-west	This viewpoint looks over the Ponds Road and Prospect Highway intersection	The proposed noise walls would not change the sensitivity rating assessed in the Approved Project REF, which would remain High. Due to distance from the viewpoint, and screening from existing vegetation, the noise wall NW_NB01) would only be marginally visible, therefore the magnitude rating would remain Moderate. Accordingly, the overall visual impact rating would remain **Moderate to High**.
11	Great Western Highway eastbound exit ramp, looking east.	This viewpoint looks over the Prospect Highway bridge, eastbound exit ramp, and the drainage corridor between the exit ramp and residential properties to the north.	The proposed noise walls would not change the sensitivity rating assessed in the Approved Project REF, which would remain Low. The proposal would add a highly visible noise wall (NW_NB01) next to the two-way link road, which would increase the cumulative visual impact of the project, however, this would not be sufficient to increase the High magnitude assessed in the Approved Project REF. Therefore, the visual impact would remain **Moderate**.
12	Drainage corridor between the residences in Hampton Crescent and the Great Western Highway eastbound exit ramp, looking east.	This viewpoint looks along the drainage corridor that includes a generally flat grassed area next to the back fences of the residential properties in Hampton Crescent, to the vegetated embankment leading to the eastbound exit ramp.	The proposed noise walls would not change the sensitivity rating assessed in the Approved Project REF, which would remain High. The proposal would slightly increase the magnitude by adding a highly visible noise wall (NW_NB01) next to the two-way link road. However, the magnitude would still be rated Moderate, as assessed in the Approved Project REF, once the replacement screen planting within the drainage corridor establishes. Therefore, the visual impact would remain **Moderate to High**.
13	Drainage corridor between the residences in Hampton Crescent and Prospect Highway, looking south.	This viewpoint looks along the grassed drainage corridor that consists of a generally flat area next to the back fences of the residential properties in Hampton Crescent, sloping up to Prospect Highway.	The proposal would not change the sensitivity rating assessed in the Approved Project REF, which would remain High. The noise wall next to the two-way link road (NW_NB01) would be visible in the background of the view, and the extension to site compound 4 would be visible during construction, however the magnitude would not be sufficient to increase the magnitude rating from Moderate. Screen tree planting within the

Viewpoint	Location	Description	Visual Impact Assessment
		There is a line of small trees at the bottom of the embankment.	drainage corridor would reduce the visual impact once established. Therefore the visual impact would remain **Moderate to High.**
14	Footpath on the western side of Prospect Highway, looking south.	This viewpoint looks south over the drainage corridor from the temporary shared path on the western side of Prospect Highway. The residential properties on Hampton Crescent to the right of the view adjoin the drainage corridor.	The proposal would not change the sensitivity rating assessed in the Approved Project REF, which would remain Moderate. The noise wall (NW_NB01) next to the two-way link road would be visible, as would the extension to site compound 4 (during construction only) therefore, the magnitude would remain High and the visual impact would also remain to **Moderate to High**.
15	Footpath on the western side of Prospect Highway, looking north.	Viewpoint 15 looks north from the temporary shared path on the western side of Prospect Highway.	The proposal would not change the sensitivity rating assessed in the Approved Project REF, which would remain Moderate. The noise wall next to the back fences of residents on Aldgate Street (NW_SB01) would be visible to the left of the view, and the temporary site compounds (4 and 6) would be visible during construction; however the magnitude would not be sufficient to increase the magnitude rating from Moderate. Therefore, the visual impact would remain **Moderate**.
16	Footpath on the western side of Prospect Highway, looking south.	This view looks south along Prospect Highway toward the Harrod Street intersection. The area is slightly higher than Prospect Highway and consists of a grassed area with a stand of Eucalypts in the foreground.	The proposal would not change the sensitivity rating assessed in the Approved Project REF, which would remain Moderate. The noise wall next to the back fences of residents on Aldgate Street (NW_SB01) would be visible to the right of the view, as would the temporary site compound 6 during construction, and property access works along Prospect Highway; however the magnitude would not be sufficient to increase the magnitude rating from Moderate. Therefore, the visual impact would remain **Moderate**.
17	Footpath on the western side of Prospect Highway, looking north	Viewpoint 17 looks north along the drainage corridor from the shared path on the western side of Prospect Highway. The grassed corridor sits	The proposal would not change the sensitivity rating assessed in the Approved Project REF, which would remain Moderate. The noise wall on the western side of Prospect Highway (NW_NB03b) would be highly visible at the top of the embankment to the right of the view. The

Viewpoint	Location	Description	Visual Impact Assessment
		below Prospect Highway with a number of Eucalypts both on the embankment and the floor of the corridor, north of the pedestrian underpass.	temporary site compound 6 would be visible during construction, and the property access works would also be visible. This has the potential to increase the magnitude rating to High, however, screen tree planting, once established, would retain the Moderate rating. Therefore, the visual impact would remain **Moderate**.
18	Footpath on the western side of Prospect Highway, south of Blacktown Road intersection, looking south-west.	Viewpoint 18 looks south-west from the shared path on the western side of Prospect Highway. It looks over a grassed area that forms a shallow detention basin, towards the Prospect residential area.	The proposal would not change the sensitivity rating assessed in the Approved Project REF, which would remain Moderate. The noise wall on the western side of Prospect Highway (NW_NB03b) would be highly visible at the top of the embankment to the left of the view. The temporary site compound 6 would be visible during construction, and the property access works would also be visible. Despite new tree planting, once established, providing screening to the wall, the magnitude rating would increase from Low to Moderate. Therefore, the visual impact rating would increase to **Moderate**.
19	Footpath on the eastern side of Prospect Highway, north of Lancelot Street intersection, looking south.	This viewpoint adjoins a number of single storey residential properties that face Prospect Highway and includes a number of exotic and native trees along the property boundary.	The proposal would not change the sensitivity rating assessed in the Approved Project REF, which would remain Moderate. The magnitude of the proposed noise wall along the back fences of residents on Fife Street (NW_NB04b), the removal of vegetation and trees for the proposed relocation of utility powerlines, and the proposed property access adjustments would be visible from this viewpoint. The proposal would be sufficient in magnitude to increase the rating from Moderate to High. Therefore the visual impact would increase to **Moderate to High**.
20	Informal service road on the western side of Prospect Highway north of Keyworth Drive intersection, looking south.	This viewpoint looks south over the service road on the western side of Prospect Highway, towards adjacent Shelley Public School. The right side of the view consists of a shared path and Shelley Public School grounds. Prospect Highway is seen on the left of the view.	The sensitivity rating assessed in the Approved Project REF is Moderate, which would remain at Moderate. The noise wall on the eastern side of Prospect Highway, along the back fences of residents on Topaz Crescent (NW_SB03a and NW_SB03b) would be visible from this viewpoint. In addition, the removal of mature tree species for the relocation of utility powerlines on the eastern side of Prospect Highway would be visible, as would the property access adjustments. These changes culminate in the

Viewpoint	Location	Description	Visual Impact Assessment
			magnitude rating increasing from Moderate to High. Therefore, the visual impact would increase to **Moderate to High**.
21	Informal service road on the western side of Prospect Highway south of Vesuvius Street intersection, looking north.	This viewpoint is looks over the informal gravel service road that is separated from Prospect Highway by a narrow grassed verge. The left side of the view consists of a shared path and single storey residential dwellings with exotic and native trees along the property boundary. Shelley Public School is located behind the viewer.	The proposal would not change the sensitivity rating assessed in the Approved Project REF, which would remain Moderate. The relocation of powerlines and proposed noise walls on the eastern side of Prospect Highway, along the back fences of residents on Topaz Crescent (NW_SB03a and NW_SB03b), and the subsequent removal of mature trees and vegetation would be visible from this viewpoint, as would the property access adjustments. However, despite the distance from the viewer, magnitude would increase from Moderate to High. Therefore the visual impact would increase to **Moderate to High**.
22	Service road on the western side of Prospect Highway north of Keyworth Drive intersection, looking south.	Viewpoint 22 looks south over the service road on the western side of Prospect Highway, towards the Keyworth Drive intersection. The right side of the view consists of a shared path and single storey residential dwellings with exotic and native trees along the property boundary. The back fences of residents of Topaz Crescent are seen to the left of the view.	The proposal would not change the sensitivity rating assessed in the Approved Project REF, which would remain Moderate. The noise wall on the eastern side of Prospect Highway, along the back fences of residents on Topaz Crescent (NW_SB03a and NW_SB03b), and the relocation of powerlines and associated tree removal would be visible from this viewpoint, as would the property access adjustments. This would slightly increase the magnitude rating, however, new tree planting, once established, would provide screening to the wall, maintaining the Moderate magnitude rating. Therefore, the visual impact would remain **Moderate**.
23	Service road on the western side of Prospect Highway south of Tudor Avenue intersection, looking south	This view is similar to Viewpoint 22 and is overlooks the future Seven Hills Road Corridor Link. A number of large Eucalypts are located on the western side of Prospect Highway, dominating the view.	The proposal would not change the sensitivity rating assessed in the Approved Project REF, which would remain Moderate. The noise wall on the eastern side of Prospect Highway, along the back fences of residents on Topaz Crescent (NW_SB03a and NW_ SB03b) and the relocation of powerlines from the western side to the eastern side of Prospect Highway would be visible from this viewpoint, as would the property access adjustments. The visual impact would also increase by the removal of

Viewpoint	Location	Description	Visual Impact Assessment
			native vegetation. Despite the distance of the viewer, the Moderate magnitude rating would increase to High. Therefore, the visual impact would increase to **Moderate to High**.
24	Footpath on the eastern side of Prospect Highway south of Roger Place intersection, looking south.	Viewpoint 24 looks south from the footpath on the eastern side of Prospect Highway towards the future Seven Hills Road Corridor Link. To the left of the view are the back fences of the residential properties in Roger Place. Dwellings adjoining the service road on the western side of Prospect Highway are to the right. Large Eucalypts on the western side of Prospect Highway, dominate the centre of the view.	The proposal would not change the sensitivity rating assessed in the Approved Project REF, which would remain Moderate. The noise wall on the eastern side of Prospect Highway, along the back fences of residents on Topaz Crescent (NW_SB03a and NW_ SB03b) and the relocation of powerlines from the western side to the eastern side of Prospect Highway would be visible from this viewpoint, as would the property access adjustments. Despite the distance of the viewer and new tree planting, once established, providing screening to the wall, the Moderate magnitude rating would increase to High, due to the removal of existing native vegetation for the utility relocation. Therefore, the visual impact would increase to **Moderate to High**.
25	Informal service road on the western side of Prospect Highway south of Tudor Avenue, looking north.	Viewpoint 25 looks north along Prospect Highway towards Tudor Avenue intersection and the Army Reserve Depot to the east across Prospect Highway. The residential areas of Tudor Avenue (west) and Blacktown (east) are visible in the distance. A number of large mature Eucalypts are seen in the distance that screen the residence on the eastern side of Prospect Highway.	The proposal would not change the sensitivity rating assessed in the Approved Project REF, which would remain Moderate. The relocation of utility powerlines from the western side of Prospect Highway to the eastern side between Leabons Lane and Blacktown Road would require the removal of existing vegetation. New tree planting, would be provided, however, they would be a smaller species, due to height restrictions and therefore would provide less screening potential. The property access adjustments would also be visible. This would result in the Moderate magnitude rating increasing to High. Therefore, the visual impact would increase to **Moderate to High**.
27	Footpath on the eastern side of Prospect Highway south of Roger Place intersection, looking south.	Viewpoint 24 looks south from the footpath on the eastern side of Prospect Highway towards the future Seven Hills Road Corridor Link. To the left of the view are the back fences of the residential properties in	The proposal would not change the sensitivity rating assessed in the Approved Project REF, which would remain Low. The main receptors of the changes to Prospect Highway will be shoppers, and therefore transient viewers. Vegetation removed for powerline relocations on the eastern side of Prospect Highway may be visible from this area, as would property access adjustments. However, visibility would significantly be reduced due

Viewpoint	Location	Description	Visual Impact Assessment
		Roger Place. Dwellings adjoining the service road on the western side of Prospect Highway are to the right. Large Eucalypts on the western side of Prospect Highway, dominate the centre of the view.	to the current presence of low shrubs and vegetation in the carpark. In addition, low shrubs and native grass planting in the central median, once established, would provide additional screening. However, the viewpoint would have an increase magnitude rating from Low in the Approved Project REF to Moderate. Therefore the visual impact would increase from Low in the Approved Project REF to **Moderate to Low**.
A	View looking east towards Prospect Highway from Hampton Crescent towards Prospect industrial and commercial estate.	Hampton Crescent is a residential road located to the western side of Prospect Highway. The residential estate is a mix of one and two storey dwellings with large front and back gardens. The gardens are mostly planted with a mix of palm and multi-stemmed trees.	The sensitivity of residents would be High due to the current buffer provided by the grassed reserve to the residential backyards from Prospect Highway and the pedestrian access connection to Hampton Crescent. The proposed widening of Prospect Highway and the construction of noise walls (NW_NB02b) next to the back fences of residents would be highly visible. The magnitude of change for residents north of the pedestrian access on Hampton Crescent would be Moderate. Screen tree planting within the reserve would provide a backdrop once established, and the upper transparent panel would allow more light into backyards, however, the visual impact would be **Moderate to High**.
B	View looking west towards the intersection of Harrod Street and Prospect Highway from Prospect East from Aldgate Street.	Aldgate Street is a residential cul-de-sac at the eastern edge of Prospect Highway, with mainly one storey dwellings. Gardens are informal with low planting and medium sized grassed front areas. The back gardens border the existing alignment of Prospect Highway.	The sensitivity of residents would be Moderate as the current back gardens are bordering the existing alignment of Prospect Highway. The proposed widening of Prospect Highway and the construction of noise wall (NW_SB01) to the back fences of residents would be highly visible. The magnitude of change for residents of Aldgate Street would be Moderate. Screen tree planting would not be possible due to the proximity of the proposed road alignment to the backyard fences, therefore the visual impact would remain **Moderate**.
C	View looking east towards Prospect Highway from Fife Street towards the intersection of Blacktown Road and Prospect Highway.	Fife Street is a residential street to the western edge of Prospect Highway, with one and two storey dwellings. The tree-lined street has informal front gardens with very few fences delineating space; backyards are mostly taken up by the footprint of the dwelling and are narrow. The	The sensitivity of residents would be High due to the current buffer provided by the grassed reserve to the residential backyards from Prospect Highway. The construction of noise walls (NW_NB04a and NW_NB04b) next to the back fences of residences would be highly visible. The magnitude of change for residents of Fife Street would be Moderate. Screen tree planting within the reserve would provide a backdrop once established, and the upper transparent panel would allow more light into backyards and the visual impact would remain **Moderate to High**.

Viewpoint	Location	Description	Visual Impact Assessment
		backyards are separated by two meter tall fences that face onto the Prospect Highway.	
D	View looking east towards Prospect Highway from the informal service road of Blacktown Road.	Viewpoint D looks east over the service road on the western side of Prospect Highway, towards Blacktown Road. The residential dwellings of Blacktown Road have front gardens that are embanked below the current road alignment of Blacktown Road and Prospect Highway. Front gardens are informal in style, with no fencing or walls and have grassed lawns with a mixture of exotic and native trees, dispersed inconsistently along the roadside.	The residents would have a Moderate sensitivity as their properties adjoin Prospect Highway via a service road and have a direct view onto Prospect Highway. The noise wall on the eastern side of Prospect Highway, along the rear boundaries of Topaz Crescent (NW_SB03a and NW_ SB03b) and the relocation of power lines from the western side to the eastern side of Prospect Highway would be visible from this viewpoint. The visual impact would also increase by the removal of native vegetation. Despite the distance of the viewer there would be a magnitude rating of Moderate. Therefore, the visual impact would be **Moderate**.

Kiss and ride facility

The desktop assessment found that the proposed kiss and ride facility would not affect any viewpoints identified in the Approved Project REF, as there is no direct view of the proposed facility from Prospect Highway, and is visible only from Hadrian Avenue.

Up to 12 tree and shrub species may need to be removed in order to construct the kiss and ride facility (ArborSkills, 2015). Three of the trees providing screening to the properties at 7 Hadrian Avenue and 2 Tyrone Place would be removed as a result of the proposed kiss and ride facility. The removal of tree and shrub species is likely to have a **Moderate** impact on the visual environment.

Overshadowing impacts of proposed noise walls

The proposed noise walls are likely to visually impact both road users and adjacent residences, which is discussed in Table 6-17. Generally there is typically a potential concern with regard to graffiti on built infrastructure such as noise walls.

Potential overshadowing impacts of the proposed noise walls on the public domain and private residences along the eastern and western sides of Prospect Highway, have been assessed and are relevant to the following noise wall locations:

- NW_NB02b
- NW_SB01
- NW_NB03b
- NW_SB02a and NW_SB02b
- NW_NB04a and NW_NB04b
- NSW_SB03a and NW_SB03b

The noise walls vary in height from 2.5 to 4.5 metres and would require some existing vegetation to be removed either side of Prospect Highway for their construction. They are typically comprised of three precast panels, with the lower 2/3 being a precast concrete panel and the top 1/3 being a transparent material.

Overshadowing impacts of the walls are discussed below relevant to their discreet public and private domains.

Hampton Crescent south west of Prospect Highway

The residences of Hampton Crescent back onto the western side of Prospect Highway, and the Great Western Highway exit ramp. The verge in this location currently consists of semi-mature trees screening Prospect Highway and the Great Western Highway from adjacent properties. Two noise walls are proposed in this area; one (NW_NB02b) is offset by about 1.5 metres from property boundaries and the other (NW_NB01) is aligned with the roadside of the Great Western Highway exit ramp. The proposed construction works for Prospect Highway would require removal of a small number of trees where noise walls are proposed and in the adjoining areas where earthworks and construction zones are required.

The current overshadowing of Hampton Crescent is caused by a small number of trees on the western side of Prospect Highway, located near the intersection with the Great Western Highway. The remainder of Hampton Crescent residences are not overshadowed by the adjacent trees. The longest shadow would occur in winter during the early morning when the noise walls lower solid panels would obscure the low winter sun rise. Overshadowing would be less in summer mornings and would diminish by later in the morning. However, much of the overshadowing in late morning and afternoon would be reduced by the noise walls upper transparent panel.

Aldgate Street south east of Prospect Highway

Several residences on Aldgate Street back onto the eastern side of Prospect Highway. Noise wall NW_SB01 would cast a direct shadow onto the properties in the afternoon. Most of the overshadowing would be mitigated by the clear upper panels of the noise wall. However, properties would be overshadowed to a greater extent in the late afternoon as the sun tracks to the west. The shadow would continue moving east becoming increasingly concentrated as the sun sets.

Keyne Street south west of Prospect Highway

Noise wall NW_NB03b is located next to the shared path to the east of Prospect Highway approximately 35 metres from the rear fence of the residential properties along Keyne Street, Sher Place and the southern end of Fife Street. Overshadowing from this noise wall would be minimal due to the distance the wall is from these properties and the clear transparent material used for the full height of the wall.

Hollydale Place centre east of Prospect Highway

Hollydale Place is located south of Blacktown Road and to the east of Prospect Highway. Two noise walls are proposed (NW_SB02a and NW_SB02b) to the rear of the properties. The overshadowing of properties would be directly affected by NW_SB02b that is located 1.5 metres west of the boundary fence. A small proportion of semi-mature trees are growing along the rear of the properties currently, which result in a minor amount of overshadowing. The proposed noise wall would replace this overshadowing with an increased and constant level of shadowing in from mid-afternoon year round, however, it will be more prominent in winter during periods of low sun.

Fife Street central west of Prospect Highway

Fife Street is located to the south of Lancelot Street on the western side of Prospect Highway. To the rear of Fife Street, the proposed NW_NB04a and NW_ NB04b would have a direct overshadowing impact.

There are a number of existing trees on the land between Prospect Highway and the Fife Street boundary, and provide the properties with dappled overshadowing from early morning until the afternoon. Overshadowing would occur from noise walls in areas without mature trees to the rear of the properties; however, this would be less in areas with mature trees.

The overshadowing caused by the noise walls would gradually decrease from early morning until mid-afternoon. Most of the overshadowing in late morning and afternoon would be mitigated by the noise walls upper clear transparent panel. The longest shadow would occur in winter during the early morning.

Topaz Crescent north east of Prospect Highway

Much of the overshadowing from the noise walls (NW_SB03a and NW_SB03b) would occur on the eastern side of Prospect Highway at the rear of the Topaz Crescent residences. The area is currently overshadowed by a scattering of mature trees. However, these trees would be removed due to powerline relocation; therefore the dappled shadow would be replaced with a smaller solid shadow from the noise wall, which would become longer as the sun sets and lower panels are exposed.

Generally, overshadowing would occur at all residences adjoining the proposed noise walls, however, its impact would vary depending on the existing vegetation within the road reserve. The impact on the western side of Prospect Highway would occur in the morning, while on the eastern side it would occur in the afternoon. In both cases, the impact would be greatest in winter. The transparent upper panel of the noise walls

would help to reduce the impact of overshadowing on properties where the noise walls are located in proximity to rear boundary fences.

Powerline relocation

The desktop assessment found that the powerline relocations and associated vegetation removal/pruning would affect eight of the 27 viewpoints identified in the Approved Project REF, as discussed in Table 6-17.

The relocation of powerlines from the western side of Prospect Highway to the east would result in moderate negative visual impacts to residences which previously had no direct view of power poles. This visual impact should be considered in the context of an already established urbanised area, where most residences are located directly adjacent to the Prospect Highway. Over time, residents are likely to become used to the presence of overhead powerlines, which would not appear out of place in the context of the surrounding developed nature of the road corridor.

Up to 50 trees and shrubs may need to be removed, and 20 trees and shrubs may require pruning in order to make allowance for the asset protection zone of the relocated powerlines (ArborSkills, 2015). The biodiversity impacts associated with this are discussed in Section 6.4 and Appendix D. All pruning and vegetation removal would be undertaken in accordance with Endeavour Energy's clearance standards and *Australian Standard 4970-Pruning amenity trees 2007* and would prevent harm and destabilisation of trees and vegetation that could lead to a reduction in visual amenity.

The removal of tree and shrub species is likely to have a moderate impact on the visual environment. Residences impacted by tree and shrub removal may suffer privacy loss, as a result of screening vegetation removal, along the eastern side of Prospect Highway. However, tree and shrub species would be replaced over time with suitable native species. The clearance zone requirements are likely to persist in the long-term to ensure the safe operation of the asset. Over time the vegetation would mature, and visual impacts to motorists, pedestrians and local residences would be softened.

Hadrian Avenue/Keyworth Drive roundabout

The proposed roundabout is located within a residential area, which is not visible from any of the viewpoints assessed in the Approved Project REF. The nearest sensitive receivers are residential properties located on Hadrian Avenue (1, 2, 4 and 5) and Keyworth Drive (10, 12, 14, 16, 18 and 20), and Shelley Public School 140 metres to the south. Residential properties at the intersection of Hadrian Avenue, and Keyworth Drive have direct views of the roundabout, and would lose minor screening from planted vegetation. The modification of the current junction to a roundabout is also considered to have a low overall impact for adjacent residences. The overall visual impact of the proposed roundabout and removal of street tree species is considered **Low**.

6.5.3 Safeguards and management measures

In addition to the safeguards and management measures in the Approved Project REF, the following safeguards and management measures are proposed.

Table 6-18 Additional landscape and visual amenity safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Potential for graffiti on noise walls	The noise wall panels would have a sand blasted or bead blasted finish to discourage graffiti on both sides of the panels	Roads and Maritime and construction contractor	Construction
Visual impact of introduced noise walls	The landscape plan would include a planting strategy to soften the visual impact of the noise walls. The planting strategy would: • Provide frangible shrub and ground cover planting between the road and the wall where possible. If space is limited, climbers are to be considered as an alternative • Plant mature tree stock in groupings at targeted locations	Construction contractor	Construction

6.6 Water quality and hydrology

6.6.1 Existing environment

The existing environment of the proposal corridor and its surroundings are described in detail in Chapter 6.5 of the Approved Project REF.

6.6.2 Potential impacts

Construction

Kiss and ride facility

Construction of the proposed kiss and ride facility has the potential to generate sediment during rainfall events due to vegetation clearing and ground disturbance. Pavement works associated with the construction of the entrance and exit to the kiss and ride facility also has the potential to generate spoil which could enter the stormwater system if not appropriately managed.

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.

Noise walls

Minor localised ground disturbance would occur as a result of installation of noise walls. While the clearing of some vegetation may be required at some locations, the area of clearing required is small and involves the clearing of individual trees rather than stands of vegetation. The amount of soil disturbed in each location would be minor and there is a low risk of impact on water quality.

During construction, there is potential for accidental spillage of fuels, chemicals and paint to impact on the quality of stormwater leaving the work sites.

Additional road and drainage works

The additional drainage works have been identified in order to enable connections to existing Council drainage systems and to accommodate other proposed refinements identified in this Addendum REF, such as the kiss and ride facility and the Hadrian Avenue/Keyworth Drive roundabout. The additional proposed drainage works typically extend between five metres and 95 metres beyond Approved Project boundary.

The need for the additional road works has arisen during detailed design as a consequence of design refinement and detailed survey. The additional works would extend between one and 110 metres outside the Approved Project Boundary.

The additional road and drainage works would typically occur within the existing road corridor however there would be a small increased risk of disturbed soil entering drainage lines at the additional locations. Generally it is not expected that any construction water quality impacts above what were identified in the Approved Project REF would occur.

Operational on-site detention basins

As described in Section 3.1.11, it is proposed to increase the capacity of the existing eastern basin and to add three new detention basins along the highway corridor (refer Table 6-19).

Construction of the detention basins and pipe connections would involve the disturbance of the land surface, exposure, movement and stockpiling of soils. Rainfall has the potential to erode and mobilise sediment, and transfer it offsite into downstream waterbodies. Sediment-laden stormwater runoff associated with construction is the major potential construction impact on water quality.

Table 6-19 Existing and proposed onsite detention basins

Ref. No.	Chainage	Catchment area (ha)	Maximum stored volume in 1 in 100 year ARI event (m^3)	Basin description	Location description
Existing western basin (1)	Ch.2040-2100	6.11	3,323	A new fill embankment required for the highway upgrade would encroach into this existing basin reducing the storage volume by approximately 200 m^3 at the spillway level (approximately 220 m^3 for a flow depth of 45 mm over the spillway). Compensatory storage of approximately 300m^3 by excavation is proposed. Maximum upstream embankment height (highway fill embankment) would be 6.4 m. Maximum downstream embankment height (adjacent to residential properties) would be 2.7 m.	Located to west of highway and the shared path within the largely cleared road reserve.
Existing eastern basin (2)	Ch.1980-2020	5.54	1,721	No refinements proposed.	Located to the east of the highway corridor and to the north of the pedestrian underpass. Trees are present within the basin.
4	Ch2180-2280	3.70	693	New basin proposed. Maximum upstream embankment height (highway fill embankment) would be 5.4 m. Maximum downstream embankment height (adjacent to residential properties) would be 3 m.	Located to west of highway within the largely cleared road reserve. The existing shared path was relocated closer to the road, as described in the Approved Project REF and in Section 6.1. One large tree within the road reserve would require removal.
5	Ch 400 on Great	2.65	273	New basin proposed. Maximum upstream embankment height (highway fill	Located to north of new proposed Link Road connection Prospect Highway to the

Ref. No.	Chainage	Catchment area (ha)	Maximum stored volume in 1 in 100 year ARI event (m^3)	Basin description	Location description
	Western Highway			embankment) would be 2.6 m. Maximum downstream embankment height (adjacent to Timbertop Reserve) would be 2 m.	Great Western Highway. Cleared area adjacent to road reserve, outside of Approved Project boundary. Adjacent to Cumberland Plain Woodland.
6	Ch-3080-3120	2.14	521	New basin proposed. Maximum upstream embankment height (open space side of basin) would be 5.0 m. Maximum downstream embankment height (highway fill embankment) would be 3.1 m.	Located to east of highway within a cleared and highly disturbed area. Location has been identified for use as a site compound during construction.

The proposed on-site detention basins have been referred to the NSW Dams Safety Committee in accordance with the *Dams Safety Act 2015* to obtain a decision on the possible declaration of any of the on-site detention basins as "prescribed" dams under the *Dams Safety Act 2015*. The requirements for a potential "prescribed dam" are not well documented and it is recommended that all new or modified basins should be communicated to the Dams Safety Committee for consideration. The Dams Safety Committee is likely to be concerned with issues such as wall heights, capacity and downstream flooding implications.

Operation

Kiss and ride facility

Once operational, run off from the kiss and ride facility would be delivered into the existing stormwater drainage system. This is not expected to have a noticeable impact on Council's stormwater system

Noise walls

During operation, there would be no impacts on water quality or hydrology as a result of the proposed noise walls.

Additional road and drainage works

Once operational, the overall project would have 10 outlet connections to the Council drainage system. Modelling has found that of the 10 outlet connections, five would have flow rates less than under existing conditions and two of the outflows that would otherwise be increased above existing values, would be limited to no greater than existing flows with the provision of on-site detention. Hence there would be no adverse impact on the receiving Council drainage at these seven outlets.

The remaining three pipes would have slight increases in outflow (increases over existing between 0.008 m^3/s to 0.212 m^3/s), each of which has been assessed as not having an adverse impact on the receiving Council drainage system.

Operational on-site detention basins

Once constructed and the site has been stabilised, the on-site detention basins are intended to capture, retain and slowly discharge stormwater from the upgraded Prospect Highway, mitigating the volume of peak flows, based on a 100 year ARI event.

The outlet pipes would be connected to the existing Council stormwater system except Basin No. 5 where the outlet pipe connects to an open concrete lined channel that drains to Blacktown Creek.

Section 6.5.3 of the Approved Project REF identified that while there are potential water quality impacts typically associated with the discharge of additional road runoff, including gross pollutants, sediment, toxic organics, nutrients, heavy metals and hydrocarbons, the Approved Project would result in only a minor change to the existing characteristics of the catchments through which the road passes. The Approved Project REF states that "the existing road does not include any water quality treatments. There is no proposal to include water quality treatment measures" (Section 6.5.3, page 249). The proposed refinements would not alter this intention.

6.6.3 Safeguards and management measures

The safeguards and management measures in the Approved Project REF would be sufficient to manage the soil and water quality impacts from the proposal. No additional measures would be required.

Should the Dams Safety Committee require any changes that would affect the environmental outcomes of the on-site detention basins, additional assessment may be required.

6.7 Non-Aboriginal heritage

6.7.1 Existing environment

The existing environment is described in Section 6.6 of the Approved Project REF. There are no non-Aboriginal heritage sites located near the proposed refinements with the exception of the proposed archaeological test excavations.

As detailed in the Approved Project REF, the Former Great Western Road, now called Reservoir 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 lies below the pavement of Reservoir Road.

6.7.2 Potential impacts

The Archaeological Management Plan (AMP) required under the Heritage Act exemption has been prepared by Artefact (2015) to detail the proposed test excavations on Reservoir Road.

The proposed test archaeological investigations are intended to determine the extent of archaeological remains underneath the existing road pavement and to support the exemption application under the Heritage Act. As such, disturbance to archaeological material is expected.

The AMP states that the archaeological remains are likely to be located mostly or entirely under the current road pavement, and within a depth of approximately 0.4 metres of the level of the current road pavement. The proposed test excavation works would involve excavation across the full width of the current road pavement, and would result in the removal of all archaeological remains from the affected area

The potential archaeological impact will affect a section approximately 280 metres in length, of the overall Former Great Western Road, Prospect, the curtilage of which covers a route approximately 3.8 kilometres in length. Removal of any archaeological remains relating to the original construction of the road would be likely to impact the State heritage values of the item. Removal of archaeological remains relating to the later maintenance, resurfacing and use of the road may impact the local heritage values of the item.

If the test excavation indicates that there is no or low potential for the presence of significant historical archaeological remains within the study area, then work can proceed with an unexpected finds procedure. The test excavation report would form the final report. Copies of the report would be lodged with Roads and Maritime, the Heritage Division, and Council. However if the test excavation finds that there are significant archaeological remains within the study area and that impact cannot be avoided, it would be necessary to apply for a Section 60 Permit from the NSW Heritage Division, and additional archaeological mitigation is likely to be required.

6.7.3 Safeguards and management measures

In addition to the safeguards and management measures in the Approved Project REF, the following safeguards and management measures are proposed.

Table 6-20 Additional non-Aboriginal heritage safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Test archaeological excavations in SHR listed former Great Western Road	Test archaeological investigations would be carried out in accordance with the approved Archaeological Management Plan.	Roads and Maritime	Pre-construction
Unexpected finds	In the event of an unexpected find, work would cease in the affected area and *Roads and Maritime Standard Management Procedure - Unexpected Archaeological Items* (2015) would be implemented. Roads and Maritime's Environment Manager would be notified immediately.	Contractor	Construction

6.8 Socio-economic and land use

6.8.1 Existing environment

The socio-economic environment for the proposal is described in Section 6.7 of the Approved Project REF. The following are located outside the study area for the Approved Project REF.

Kiss and ride facility

Shelley Public School is located in a highly urbanised area. It is surrounded by residential development to the north, south and west, and by Blacktown Road/ Prospect Highway to the east. Access to the school is available via formal entrances on Hadrian Avenue and Pelleas Street and an informal access via a service road on Blacktown Road.

Hadrian Avenue/Keyworth Drive roundabout

Hadrian Avenue and Keyworth Drive are local streets situated to the west of Prospect Highway and surrounded by low density residential development.

6.8.2 Potential impacts

Construction

Kiss and ride facility

Construction of the kiss and ride facility within the school grounds would represent a safety risk to students, staff and visitors due to the presence of machinery, workers and open excavation areas. The works would also have the potential to impact on the amenity of staff and students and disrupt classes and outdoor school activities. Temporary changes to pick-up and drop-off arrangements may be required to safety

accommodate construction activities. Adjoining residents are likely to experience some short-term amenity disturbance as a result of construction activities.

Noise walls

The noise walls would be constructed either along the rear property boundary of a number of residential properties, or adjacent to the roadway. Residents would likely experience a reduction in amenity during construction as a consequence of noise, vibration and dust impacts. These would be of relatively short duration at any one property.

Powerline relocation

The vegetation clearing and pruning would result in short term disturbance and inconvenience at a number of properties, with works required to access private properties in order to undertake the work. Consultation has commenced with the affected properties and all property owners have been made aware of the proposed works to be undertaken, as discussed in Section 5.

The works would have visual impacts, including potential loss of privacy, as discussed in Section 6.5 which would result in a reduction in amenity for residents.

Additional site compounds

The extension of site compound 4 and new site compound 6 would be located near the back fences of residential properties and would not be visible from these properties. Due to their close proximity to the site compounds, these residential properties may experience additional noise and dust impacts associated with construction vehicle movements and stockpiles and other materials stored on the site. However, these properties are located adjacent to the Prospect Highway road corridor and would be exposed to noise and dust impacts associated with the overall Project. There would be no expected amenity impacts during operation.

Property access adjustments

The proposed property access adjustments have the potential to cause concern to residents as a consequence of disturbance to their private properties, impacts on features and items they may value and the uncertainty caused by change and disruptive activities. As detailed in Section 5, consultation activities have already commenced to communicate the proposed impacts of the proposal on individual property owners and to agree on the access arrangements that would be put in place. Agreements have been documented on large plans containing drawings and photographs as required and all property owners receiving changes were required to sign the agreement before construction activities occur. This ensures that there is a shared understanding of the proposed activities by both parties.

Amenity impacts associated with the construction of the property access adjustments, such as traffic, noise and vegetation loss, are discussed elsewhere in Section 6.

Sydney Trains power pole relocation

The installation and relocation of Sydney Trains power poles would take place within the existing Sydney Trains power easement over an industrial warehouse zone. No impacts to the surrounding warehousing activities are expected. The design has considered the clearance requirements for warehousing activities and would represent an improvement in clearance over the current arrangements.

Operation

Kiss and ride facility

Operation of the kiss and ride facility would provide benefits to the community by:

- Providing a safe off-road drop-off and pick-up area for the students
- Providing an off-road parking area for staff, thus easing parking demand on Hadrian Avenue.

Parking would only be for staff and would typically not be accessed by children. This would be enforced and monitored by Shelley Public School directly. All vehicle movements would be at extremely low speed, which would minimise safety risks to the extent possible.

Noise walls

During consultation, some residents in properties located behind the noise walls identified concerns with safety, security and amenity of their properties as a consequence of the proposed new infrastructure. It was subsequently proposed that security fence and gates be installed at each end of the noise walls, extending from the property boundaries to the noise walls, to prevent unwanted access. Keys will be held by Roads and Maritime and Council for maintenance purposes.

There would be some reduction in informal recreation space, due to the closing off with security gates of the residual space between the noise walls and rear property boundaries, to address community concerns regarding security. The remainder of the road reserve corridor would be retained and there would be no impact on new shared user path, as identified in the Approved Project REF

The installation of noise walls would provide the residential community with an appropriate level of noise mitigation from noise associated with the operation of the upgraded Prospect Highway. The noise walls would have some amenity and visual impacts, including changes to solar access, and this is discussed in Section 6.5.

Powerline relocation

The works would have visual impacts, including potential loss of privacy, as discussed in Section 6.5 which would result in a reduction in amenity for residents.

A concern was raised during community consultation that the relocation of the powerlines would have negative health impacts on residents. Extremely low frequency (ELF) electric and magnetic fields (EMF) is produced by both natural and artificial sources, with the latter including the distribution and use of electricity. Exposure to high levels of ELF EMH is not normally found in the everyday environment from electrical sources. Furthermore, the strength of EMFs decrease rapidly with distance from the source (ENA, 2014). The Australian Radiation Protection and Nuclear Safety Agency (ARPNSA) states that ELF EMF exposure normally encountered in the environment, including in the vicinity of powerlines, does not pose a risk to human health. More information can be found at http://www.arpansa.gov.au.

Additional site compounds, property access adjustments, Sydney Trains power pole relocation

Once completed, there would be no expected amenity impacts from these activities during operation.

6.8.3 Safeguards and management measures

In addition to the safeguards and management measures in the Approved Project REF, the following safeguards and management measures are proposed.

Table 6-21 Additional socio-economic safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Construction works within Shelley Public School	Construction activities and timing of the kiss and ride facility would be co-ordinated with the relevant school authorities. A site specific safety management plan would be prepared for works at the school.	Roads and Maritime	Pre-construction Construction
Installation of noise wall at the back of residential properties	Affected properties would be notified prior to the commencement of construction. This would include notification of time and duration of the proposal, and provision of a contact name and number.	Construction contractor	Pre-construction
Access to private property to undertake vegetation clearance for powerline relocation	The communications plan for the powerline relocation works would include the requirement to secure access agreements for vegetation clearance works.	Endeavour Energy or Roads and Maritime	Pre-construction
Access to private property during property access adjustments	Affected properties would be notified and property access consent arrangements would be discussed prior to the commencement of property access adjustments.	Construction contractor	Pre-construction

6.9 Air quality

6.9.1 Existing environment

Local air quality is discussed in Section 6.10 of the Approved Project REF.

The proposed refinements are all located in an urbanised environment and air quality in the area is heavily influenced by emissions from motor vehicles. The following are located outside the study area for the Approved Project REF.

Kiss and ride facility

Shelley Public School is surrounded by residential development to the north, south and west, and by Blacktown Road/Prospect Highway to the east. The kiss and ride facility would be located within the school grounds and adjacent to school buildings. It would also be situated close to residential properties, with the closest residential properties located immediately to the north of the school compound on Tyrone Place and other residential properties located on the opposite side of Hadrian Avenue.

6.9.2 Potential impacts

Construction

Construction related air quality impacts associated with the proposed refinements would primarily be associated with vegetation clearing, wind erosion from unsealed surfaces and stockpiles, and exhaust emissions from construction vehicles and machinery. These impacts would typically be short-term and minor compared to emissions associated with traffic on the Prospect Highway and other local roads.

Kiss and ride facility

Construction of the kiss and ride facility would involve vegetation clearing and excavation of the pavement to create access from Hadrian Avenue into the site. Both of these activities have the potential to generate dust on site if not appropriately managed, and could cause health concerns for school children or nearby residents who may have health issues.

Powerline relocation

Removal of power poles, removing trees and relocating the powerline to the opposite side of Prospect Highway would result in only small areas of bare ground. As a result, residents in properties adjacent to the powerline works would experience only a minor short-term reduction in air quality, if any.

Additional site compounds

The proposed additional site compounds would be located adjacent to residential properties and could potentially affect air quality during windy conditions if stockpiles are not secured and odorous materials are not suitably stored. With appropriate controls, impacts on local air quality are expected to be minor and temporary. The proposed additional site compound locations are already cleared, therefore there would be no vegetation clearing or exposed ground at these locations, thus limiting potential dust impacts while preparing the sites for use as site compounds. At the end of construction the site compounds would be rehabilitated and returned to a general pre-existing condition.

Additional drainage works, road works and on-site detention basins

These activities would require varying levels of earthworks at a number of discrete locations. The additional drainage works and road works are not expected to have potential to generate large quantities of dust. Construction of the detention basins has the potential to generate high levels of dust during construction during certain weather conditions. The potential impacts of these works on air quality are expected to be short-term and minor with the implementation of appropriate controls.

Property access adjustments

Property access adjustments require the removal of trees and other planted vegetation at some locations. The presence of machinery and associated fumes, as well as potentially exposed surfaces, could generate dust in certain weather conditions. Work

would be undertaken progressively at individual properties, therefore the potential air quality impacts are expected to be minor and localised.

Operation

Kiss and ride facility

Once operational, the closure of the service road access to the school is likely to create a small increase in vehicle numbers using Hadrian Avenue for drop-offs and pick-ups; however the vehicle emissions associated with this increase are not expected to have any material impact on local air quality.

Powerline relocation, additional site compounds, additional drainage works and road works, on-site detention basins and property access adjustments

Once operational, there would be no impacts expected for the powerline relocation, additional site compounds, additional drainage works, road works, on-site detention basins or property access adjustments with regards to air quality.

6.9.3 Safeguards and management measures

The safeguards and management measures in the Approved Project REF would be sufficient to manage the air quality impacts from the proposal. No additional measures would be required.

6.10 Resource use and waste management

6.10.1 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 proposed 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 Addendum REF.

6.10.2 Existing environment

The existing road network within the overall Approved Project area currently generates minimal waste. Waste sources are currently limited to roadside litter, some waste material from clearing roadside drainage features, green waste from the maintenance of roadside vegetation and general litter generated in the school grounds.

6.10.3 Potential impacts

The materials required for the proposed works would include, but not be limited to:

- Small quantities of general fill material (recycled where possible)
- Road base material (recycled where possible)
- Asphaltic material
- Sand
- Concrete
- Fuel.

These materials and any additional materials required for the proposed are not currently in short supply and would be sourced locally if possible. It is not anticipated that the proposed works would substantially increase the demand on these resources. Where possible, spoil from any of the individual activities would be recycled within the Approved Project area.

Waste generated during construction would primarily be associated with:

- Green waste, such as logs and mulched material, associated with the removal and trimming of trees from the kiss and ride facility, roundabout, powerline relocation, property access works at residential properties, and minor clearing and grubbing required for many of the proposed activities
- Generation of asphalt pavement and concrete waste associated with the excavation of pavements and driveways for the construction of the kiss and ride facility, roundabout, modification of the shared pedestrian footpath, drainage works and refinements to property access
- Construction of temporary construction compounds and property access adjustments would require road surface grading, temporary drainage works and the placement of gravel road base where required, generating asphalt waste, pipe cuts and green waste
- Waste associated with the relocation of powerlines, including timber poles and electrical wires
- Off-cuts associated with the installation of environmental controls and fencing
- Surplus construction materials such as fencing, sediment and concrete
- Packaging materials from items delivered to site, such as pallets, crates, cartons, plastics and wrapping materials
- Plant and vehicle maintenance waste, such as oil containers
- General wastes such as paper, cardboard and food wastes
- Sewage waste generated through the use of personnel facilities.-

6.10.4 Safeguards and management measures

The safeguards and management measures in the Approved Project REF would be sufficient to manage the waste generation from the proposal. No additional measures would be required.

7 Environmental management

This chapter describes how the proposal would be managed to reduce potential environmental impacts throughout detailed design, construction and operation. A framework for managing the potential impacts is provided with reference to environmental management plans and relevant Roads and Maritime Services QA specifications. A summary of site-specific environmental safeguards is provided as detailed in Chapter 6 and the licence and/or approval requirements required prior to construction are also listed.

7.1 Environmental management plans (or system)

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

A Contractors Environmental Management Plan (CEMP) would be prepared to describe safeguards and management measures identified. 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 the Roads and Maritime Services Environmental Officer, Sydney Region, prior to the commencement of any on-site works. The CEMP would be a working document, subject to ongoing change and updated as necessary to respond to specific requirements. The CEMP would be developed in accordance with the specifications set out in the QA Specification G36 – Environmental Protection (Management System), QA Specification G38 – Soil and Water Management (Soil and Water Plan) and the QA Specification G40 – Clearing and Grubbing.

7.2 Summary of safeguards and management measures

In addition to the environmental safeguards detailed in the Approved Project REF, the environmental safeguards outlined in this document would be incorporated into the construction and operation of the Prospect Highway Upgrade project, should it proceed. These safeguards would minimise any potential adverse impacts arising from the proposed works on the surrounding environment. Table 7-1 presents a summary of all safeguards and management measures applicable to the Prospect Highway Upgrade project, including those from the Approved REF and Submissions Report. The additional safeguard and management measures identified in this Addendum REF are marked with *italics*.

Table 7-1 Summary of site specific environmental safeguards

No.	Impact	Environmental safeguards	Responsibility	Timing
1.	General	All environmental safeguards must be incorporated within the following: • Project Environmental Management Plan • Detailed design • Contractor specifications for the proposal • Contractor's Environmental Management Plan	Project manager	Pre-construction
2.	General	A risk assessment would be carried out on the proposal in accordance with the Roads and Maritime Services Audit Pack and PMS risk assessment procedures to determine an audit and inspection program for the works. The recommendations of the risk assessment are to be implemented. A review of the risk assessment must be undertaken after the initial audit or inspection to evaluate is the level of risk chosen for the project is appropriate. Any works resulting from the proposal and as covered by the REF may be subject to environmental audit(s) and/or inspection(s) at any time during their duration.	Project manager and regional environmental staff	Pre-construction After first audit
3.	General	The environmental contract specification G36, G38 and G40 must be forwarded to the Roads and Maritime Services Senior Environmental Officer for review at least 10 working days prior to the tender stage. A contractual hold point must be maintained until the CEMP is reviewed by the Roads and Maritime Services Senior Environmental Officer.	Project manager	Pre-construction
4.	General	The Roads and Maritime Services Project Manager must notify the Roads and Maritime Services Environmental Officer Central Region at least 5 days prior to work commencing.	Project manager	Pre-construction
5.	General	All businesses and residences likely to be affected by the proposed works must be notified at least 5 working days prior to the commencement of the proposed activities.	Project manager	Pre-construction
6.	General	Environmental awareness training must be provided, by the contractor, to all field personnel and subcontractors.	Contractor	Pre-construction and during construction

No.	Impact	Environmental safeguards	Responsibility	Timing
				as required.
7.	Consultation	Roads and Maritime would continue to provide updated regarding the progression of the proposal to stakeholders and the community via the Roads and Maritime website, emails and regular mail.	Roads and Maritime	Detailed, design, pre-construction and construction
8.	Traffic management	A construction traffic management plan would be prepared and implemented in accordance with the *Traffic Control and Worksites,* 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
9.	Emergency services	Consultation with emergency service authorities would be undertaken during development of the detailed design.	Roads and Maritime	Detailed design
10.	Property access	Vehicular property access would be maintained where possible including pre-schools, places of worship and ail commercial premises. Consultation with property owners would be undertaken prior to any changes to property accesses.	Roads and Maritime Construction contractor	Construction
11.	Property access	Potential private property adjustment works for fronting properties would be considered during detailed design, where required, to improve vehicle storage and turning capacity This would be subject to a reasonable and feasible assessment with property owners Affected residents would be kept informed during detailed design	Roads and Maritime	Detailed design
12.	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
13.	Shelley Public School	Roads and Maritime will investigate measures to improve traffic flow and access to Shelley Public School as part of the proposal in consultation with the school and Blacktown City Council Pedestrian fencing and controlled access to Shelley Public School via Hadrian Avenue and Pelleas Streets would be introduced to remove access to Shelley Public School from Prospect Highway.	Roads and Maritime	Detailed design Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
14.	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
15.	Bus services	Access to appropriate bus stop locations would be maintained during construction in consultation with bus operators.	Construction contractor	Construction
16.	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
17.	Operational noise	During the detailed design stage of the proposal, further investigations of ail 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 (OEM, 2011). A noise barrier assessment would be undertaken to determine the extent and design of any potential noise barriers. Affected residents would be kept informed during the detailed design process.	Roads and Maritime	Detailed design
18.	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. Where possible, noise mitigation treatment would be planned to occur as preliminary works of the construction phase.	Roads and Maritime	Construction
19.	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. The assessment would be used to identify treatment required for receivers who were not identified during concept design and REF. It would lead to additional treatment for already treated dwellings; Results of this assessment would be available to the community.	Roads and Maritime	Post construction

No.	Impact	Environmental safeguards	Responsibility	Timing
20.	Construction noise	A Construction Noise and Vibration Management Plan (CNVMP) would be prepared This plan would include but not be limited to: • 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 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		

No.	Impact	Environmental safeguards	Responsibility	Timing

		• The environmental induction program will include specific noise and vibration issues awareness training including, but not limited to, the following:
		  ○ 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.		

21.	Vibration management	A vibration assessment is to be prepared and included in the NVMP. The vibration assessment is to include (as a minimum): • 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 • Where construction activities may cause damage through vibration a Building Condition	Contractor	Pre-construction, construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		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.		
22.	Vibration management	• 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
23.	Vibration management	• Building condition surveys will be undertaken for any building or structure identified as having the potential to be affected by vibration impacts during construction works • A condition survey of the properties along Hampton Crescent that are adjacent to the two way link road construction area will be undertaken along with any other areas likely to be adjacent to construction • The condition survey would be provided to each property owner at least two weeks prior to the commencement of construction.	Contractor	Pre-construction
24.	Removal or modification of native vegetation	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: • 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. e.g. 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	Construction contractor	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		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.		
25.	Pre-clearing surveys	Where possible, pre-clearing surveys would be conducted during the optimal season and climatic condition. These surveys would be undertaken by an ecologist prior to vegetation removal.	Construction contractor	Pre-construction
26.	Spread of weeds	A weed management plan would be prepared in accordance with Roads and Maritime Biodiversity Guidelines (Guide 6) and incorporated into the BMP and would address: • 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

No.	Impact	Environmental safeguards	Responsibility	Timing
27.	Introduction or spread of pests and diseases	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 all pathogens as specified in Biodiversity Guidelines: Protecting and managing biodiversity on Roads and Maritime projects (RMS, 2011). All pathogens (e.g. Chytrid, Myrtle Rust and Phytophthora) are to be managed in accordance with the Roads and Maritime Biodiversity Guidelines - Guide 7 (Pathogen Management) and DECC Statement of intent 1: infection of native plants by *Phytophthora cinnamomi* (for Phytophthora).	Construction contractor	Pre-construction
28.	General impacts on threatened species and ecological communities	If unexpected threatened flora or fauna are discovered, works would stop immediately and the Roads and Maritime Unexpected Threatened Species Finds Procedure in the Roads and Maritime Biodiversity Guideline 2011 implemented.	Construction contractor	Construction
29.	Re-establishment of native vegetation	*As stated in the Approved Project REF, the loss of 0.69 hectares of Cumberland Plain Woodland does not trigger the biodiversity offsetting requirements in accordance with Roads and Maritime's Offset Policy (2011). The additional 0.64 hectares of Cumberland Plain Woodland to be removed as part of the proposal does not result in a significant impact, and similarly, does not require biodiversity offsets to be secured in accordance with Roads and Maritime's Offset Policy (2011)*.	Construction contractor	Pre-Construction
30.	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
31.	Removal or modification of native vegetation	Identify known Cumberland Plain Woodland areas and exclusion zones during induction of ail site personnel.	Construction contractor	Pre-Construction
32.	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
33.	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

No.	Impact	Environmental safeguards	Responsibility	Timing
34.	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 (RTA2011).	Construction contractor	Construction
35.	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 following factors: • The outcomes of the biodiversity assessment. • The requirement to maintain the function of the drainage easement corridor • Maintenance requirements in the vicinity of the Blacktown Road intersection • Maintenance requirements for the potential noise barriers • Road safety requirements • Blacktown City Council's visual character and maintenance requirements This would be done in consultation with Roads and Maritime environment staff and Blacktown City Council.	Roads and Maritime, design contractor	Detailed design
36.	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: • 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	Roads and Maritime, design contractor	Detailed design

No.	Impact	Environmental safeguards	Responsibility	Timing
		• The consideration of landscaping treatment to reduce the incidence of graffiti • To achieve an integrated, safe and minimal maintenance design.		
37.	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
38.	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
39.	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
40.	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: • 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
41.	Landscape character and visual impacts	The visual impact of the retaining wall along the two way link road would be reduced by the establishment of native vegetation screening and the inclusion of urban design principles into the design of the wall façade.	Roads and Maritime, design contractor	Detailed design
42.	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
43.	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
44.	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

No.	Impact	Environmental safeguards	Responsibility	Timing
45.	Water quality management	A Soli 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: • RMS Technical Guideline: Temporary Stormwater Drainage for Road Construction, 2011 • RMS Technical Guideline: Environmental Management of Construction Site Dewatering, 2011. The SWMP would detail the following as a minimum: • 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 process for monitoring, flocculating and dewatering water from site (i.e. 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	Construction contractor	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		and permanent erosion and sedimentation controls.		
46.	Spills	Emergency wet and dry spill kits would be kept on site at all times and ail staff would be made aware of the location of the spill kit and trained in its use.	Construction contractor	Construction
47.	Spills	The vehicles refuelling process will include a person attending the refuelling facility / vehicle and a spill kit on the vehicle.	Construction contractor	Construction
48.	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
49.	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
50.	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
51.	Potential physical impact on non-Aboriginal heritage items during construction.	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: • 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 *Heritage Act 1977* and any obtained permits or exemptions	Roads and Maritime and construction contractor	Pre-construction, construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		• 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.		
52.	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
53.	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
54.	Unexpected heritage find during construction.	If unexpected heritage item/s, archaeological remains or potential relics are uncovered during the works, ail 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
55.	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
56.	Unexpected heritage find during construction.	If unexpected Aboriginal heritage item/s, archaeological remains or potential relics are uncovered during the works, ail 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
57.	Property acquisition	Ail 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
58.	Community	A Communication Plan would be prepared and included in the Construction Environmental	Construction	Pre-

No.	Impact	Environmental safeguards	Responsibility	Timing
		Management Plan (CEMP). The Communication Plan would include: • 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 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 • 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). • The communications plan would include a complaint handling procedure and register and maintained for the duration of the proposal.	contractor	construction and construction
59.	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
60.	Erosion and sedimentation	During detailed design an Erosion and Sedimentation Management Report is to be prepared. The report is to include (as a minimum): • 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	Roads and Maritime, construction contractor	Detailed design

No.	Impact	Environmental safeguards	Responsibility	Timing
		• 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.		
61.	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
62.	Erosion and sedimentation	A soli conservationist from the RMS Erosion, Sedimentation and Soli 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
63.	Erosion and sedimentation	An Erosion and Sedimentation Control Plan (ESCP) would be prepared prior to construction and is to include as a minimum: • 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 (e.g. rock check dams, swales and sediment fences) • Controls/measures to be implemented on wet weather events	Construction contractor	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		• 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.		
64.	Erosion and sedimentation	Erosion and sediment control measures are to be implemented and maintained to: • 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 *Managing Urban Stormwater, Soils and Construction Guidelines* (the Blue Book)).	Construction contractor	Construction
65.	Erosion and sedimentation	Ail stockpiles will be designed, established, operated and decommissioned in accordance with the RMS Stockpile Site Management Guideline, 2011.	Construction contractor	Construction
66.	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: • 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, soli binder or spray grass • Identification of areas on site for progressive • Permanent stabilisation such as implementation of landscaping.	Construction contractor	Construction
67.	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

No.	Impact	Environmental safeguards	Responsibility	Timing
68.	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
69.	Erosion and sedimentation	Controls would be implemented at exit points to minimise the tracking of soli 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
70.	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
71.	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: • Contaminated Land Legislation and guidelines including any relevant licences and approvals to be obtained • 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. The CMP would be reviewed by Roads and Maritime Senior Environment Officer and Roads and	Construction contractor	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		Maritime Land Management Specialist prior to the commencement of works.		
72.	Hazardous materials	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. A hazardous materials assessment would also be carried out before demolishing structures within the proposal area.	Roads and Maritime/ demolition contractor	Pre-demolition
73.	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
74.	General air quality management	An Air Quality Management plan (AQMP) would be prepared as part of the CEMP. The plan would include but not be limited to: • 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
75.	Air quality during construction	The management measures within the AQMP would include but not limited to the following: • 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, soli 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
		• 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 • 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.		
76.	Dust from construction activities	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: • 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. • 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.	Construction contractor	Pre-construction
77.	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	Detailed design
78.	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	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		landfill.		
79.	Generation of construction waste	A Resource and Waste Management Plan (RWMP) would be prepared, which will include the following (as a minimum): • 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
80.	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	Construction contractor
81.	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
82.	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

No.	Impact	Environmental safeguards	Responsibility	Timing
83.	Generation of construction waste	All wastes will be managed in accordance with the *Protection of the Environment Operations Act 1997*.	Construction contractor	Pre-Construction and Construction
84.	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
85.	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
86.	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
87.	Generation of construction waste	Resource management hierarchy principles would be followed and are: • 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 *Waste Avoidance and Resource Recovery Act 2001).*	Detailed design contractor and Construction contractor	Detailed design. Pre-construction & Construction
88.	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
89.	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
90.	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,

No.	Impact	Environmental safeguards	Responsibility	Timing
				construction
91.	*Traffic management – general*	*The construction traffic management plan (CTMP) would include the proposed refinements, including arrangements for all early works. The CTMP would enable the safe management of traffic and pedestrians, provide for the safety of construction personnel and minimise impacts on the local community.*	*Construction contractor*	*Pre-construction*
92.	*Traffic management – construction at Shelley Public School*	*The CTMP for construction at Shelley Public School would include notification and safety requirements for the school community and be prepared in consultation with school authorities and/or Department of Education.* *No construction truck movements are to occur during school peak drop off times. These times are as follows:* • *Morning Peak - 8am to 9:15am, Monday to Friday* • *Afternoon Peak - 2:30pm to 3:15pm, Monday to Friday*	*Construction contractor*	*Pre-construction*
93.	*Traffic management – test excavations*	*Temporary lane closures at Reservoir Road would be undertaken outside peak hours.*	*Construction contractor*	*Construction*
94.	*Construction noise – kiss and ride facility*	*Where possible, preparation and construction activities would be undertaken during school holidays or out of school hours.* *Where this is not possible, the timing and operation of construction activities would be coordinated to limit the noise impacts to the school and local residents. Construction and preparation activities would not be undertaken during exam periods.*	*Construction contractor*	*Pre-construction, construction*
95.	*Construction noise – test excavation works*	*Construction work would not take place on Sundays to limit the disturbance to people attending Saint Marks Coptic Church.*	*Construction contractor*	*Construction*
96.	*Architectural acoustic treatments*	*Consultation with eligible properties would be undertaken during the construction period to determine the suitability of properties for treatment and the agreement of the proposed measures.*	*Roads and Maritime, construction contractor*	*Construction*
97.	*Tree removal at Shelley Public School*	*A Tree Protection Plan would be prepared by a qualified arborist as part of the CEMP in accordance with AS4970-2009 to protect all trees within the construction zone which are to be retained.*	*Construction contractor*	*Pre-construction*

No.	Impact	Environmental safeguards	Responsibility	Timing
		Tree numbers 111 (English Oak) and 116 (Aleppo Pine) would be retained and protected. At a minimum, tree protection fencing would be applied to mark and exclusion zone around these trees. *All personnel working on the site would be made aware of the location of the Aleppo Pine tree.*		
98.	*Removal of native vegetation*	*The construction footprint for all activities would be identified and marked before construction. Trees to be removed/ retained would be clearly identified prior to clearing.* *Tree clearing would be undertaken in accordance with AS 4373-2007.*	*Construction contractor*	*Pre-construction*
99.	*Impacts on trees at the proposed roundabout location*	*An arborist would inspect and assess Trees 131-132 at the intersection of Hadrian Avenue and Keyworth Drive to determine which trees can be retained and which would require removal. This would be undertaken once the existing guttering has been removed, so that the roots are visible.*	*Construction contractor*	*Construction*
100.	*Removal of vegetation – powerline relocation*	*A landscape plan would be prepared as part of the CEMP in consultation with landowners and Endeavour Energy to inform the appropriate planting of new vegetation in disturbed areas. The landscape plan would:* • *Establish suitable low height trees and shrubs under electrical powerlines* • *Provide taller trees where there are no powerlines, taking into consideration clearance zone requirements.* • *A qualified arborist would be consulted regarding the trimming of the Golden Cypress (Cupressus macrocarpa) at 239 Blacktown Road to ensure an appropriate treatment is implemented.*	*Construction contractor*	*Construction*
101.	*Potential for graffiti on noise walls*	*The noise wall panels would have a sand blasted or bead blasted finish to discourage graffiti on both sides of the panels.*	*Roads and Maritime and construction contractor*	*Construction*
102.	*Visual impact of introduced noise walls*	*The landscape plan would include a planting strategy to soften the visual impact of the noise walls. The planting strategy would:* • *Provide frangible shrub and ground cover planting between the road and the wall where possible. If space is limited, climbers are to be considered as an alternative* • *Plant mature tree stock in groupings at targeted locations*	*Construction contractor*	*Construction*

No.	Impact	Environmental safeguards	Responsibility	Timing
103.	*Test archaeological excavations in SHR listed former Great Western Road*	*Test archaeological investigations would be carried out in accordance with the approved Archaeological Management Plan.*	*Roads and Maritime*	*Pre-construction*
104.	*Unexpected finds*	*In the event of an unexpected find, work would cease in the affected area and Roads and Maritime Standard Management Procedure - Unexpected Archaeological Items (2015) would be implemented. Roads and Maritime's Environment Manager would be notified immediately.*	*Contractor*	*Construction*
105.	*Construction works within Shelley Public School*	*Construction activities and timing of the kiss and ride facility would be co-ordinated with the relevant school authorities.* *A site specific safety management plan would be prepared for works at the school.*	*Roads and Maritime and construction contractor*	*Pre-construction* *Construction*
106.	*Installation of noise wall at the back of residential properties*	*Affected properties would be notified prior to the commencement of construction. This would include notification of time and duration of the proposal, and provision of a contact name and number.*	*Roads and Maritime and construction contractor*	*Pre-construction*
107.	*Access to private property to undertake vegetation clearance for powerline relocation*	*The communications plan for the powerline relocation works would include the requirement to secure access agreements for vegetation clearance works.*	*Endeavour Energy or Roads and Maritime*	*Pre-construction*
108.	*Access to private property during property access adjustments*	*Affected properties would be notified and property access consent arrangements would be discussed prior to the commencement of property access adjustments.*	*Roads and Maritime and construction contractor*	*Pre-construction*

7.3 Licensing and approvals

No licences or approvals would be required in addition to those detailed in the Approved Project REF. The relocation of powerlines and associated vegetation clearing would be conducted in accordance with Roads and Maritime and Endeavour Energy's policies, procedures and any relevant licences and approvals.

The test archaeological excavations are being undertaken in accordance with Exemption 2 for the SHR listing as allowed under section 57(1) of the *Heritage Act 1977*. However if the test excavations finds that there are significant archaeological remains within the study area and that impact cannot be avoided, it would be necessary to apply for a Section 60 Permit from the NSW Heritage Division, and additional archaeological mitigation is likely to be required.

8 Conclusion

This chapter provides the justification for the proposal taking into account its biophysical, social and economic impacts, the suitability of the site and whether or not the proposal is in the public interest. The proposal is also considered in the context of the objectives of the EP&A Act, including the principles of ecologically sustainable development as defined in Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*.

8.1 Justification

The modified proposal is considered justified as the proposed changes to the design have been implemented to provide better results for the overall Prospect Highway Upgrade.

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 7.2.

The benefits of the proposal are considered to 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

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.	This REF has considered potential impacts to the environment and community by the modified proposal in accordance with the EP&A Act. Mitigation measures have been identified to minimise the impacts of the proposal on the environment.
5(a)(ii) To encourage the promotion and co-ordination of the orderly economic use and development of land.	The proposed road safety improvements and installation of noise walls to reduce the impact of an arterial road on local residents represent an appropriate economic use and development of land.
5(a)(iii) To encourage the protection, provision and co-ordination of communication and utility services.	The proposal would include the removal/pruning of vegetation located within the clearance zone of overhead power lines to ensure the continued safe operation of the network. Requirements for utility relocation and protection have been identified and managed where required.
5(a)(iv) To encourage the provision of land for public purposes.	Not relevant to the project.
5(a)(v) To encourage the provision and co-ordination of community services and facilities.	The kiss and ride facility would enhance the operation of Shelley Public School.

Object	Comment
5(a)(vi) To encourage the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats.	The proposal 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 Sections 8.2.1 – 8.2.4.
5(a)(viii) To encourage the provision and maintenance of affordable housing.	Not relevant to the project.
5(b) To promote the sharing of the responsibility for environmental planning between different levels of government in the State.	Not relevant to the project.
5(c) To provide increased opportunity for public involvement and participation in environmental planning and assessment.	Consultation activities for the proposal are discussed in Section 5.

8.2.1 The precautionary principle

This principle states that 'if there are threats of serious or irreversible damage, lack of scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation'.

The assessment of potential environmental impacts in the development of the proposed design changes that comprise this proposal has sought to minimise impacts on the urban and natural amenity of the proposal area while maintaining engineering feasibility and safety for all road users. A number of safeguards have been proposed to minimise potential impacts. These safeguards would be implemented during construction and operation of the proposal.

A CEMP would be prepared prior to commencing construction. This requirement would ensure that the proposed activities achieve a high-level of environmental performance. No mitigation measures or management mechanisms would be postponed as a result of a lack of information.

8.2.2 Intergenerational equity

The principle states that 'the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations'.

The proposal would improve safety for pick-ups and drop-offs at the school. It would also install noise walls and architectural treatments at eligible locations to reduce the long term impacts of traffic noise on residents along Prospect Highway. The proposal would benefit future generations by ensuring that the proposal does not give rise to long term adverse impacts on the environment and potential impacts would be minimised by implementation of appropriate safeguards.

Should the proposal not proceed, the principle of intergenerational equity may be compromised, as future generations would experience elevated traffic noise impacts on an ongoing basis.

8.2.3 Conservation of biological diversity and ecological integrity

This principle states that the 'diversity of genes, species, populations and communities, as well as the ecosystems and habitats to which they belong, must be maintained and improved to ensure their survival'.

An assessment of the proposed vegetation clearing/pruning has been undertaken in order to identify and manage any potential impacts of the proposal on local biodiversity. Specific design efforts have been taken to avoid and minimise impacts on biodiversity where possible.

The proposal is not considered to have a significant impact on biological diversity and ecological integrity.

An ecological assessment and appropriate site-specific safeguards are provided in Section 6.4 and Appendices E and F.

8.2.4 Improved valuation, pricing and incentive mechanisms

This principle requires that 'costs to the environment should be factored into the economic costs of a project'.

This Addendum REF has examined the environmental consequences of the proposal and identified management measures and safeguards for areas which have the potential to experience adverse impacts.

Requirements imposed in terms of implementation of these mitigation measures would result in an economic cost to the Roads and Maritime. The implementation of management measures and safeguards would increase both the capital and operating costs of the proposal. This signifies that environmental resources have been given appropriate valuation.

The design for the proposal has been developed with an objective of minimising potential impacts on the surrounding environment. This indicates that the concept design for the proposal has been developed with an environmental objective in mind

8.3 Conclusion

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

A number of potential environmental impacts from the proposal have been avoided or reduced during the detailed design development. The proposal as described in this Addendum REF best meets the project objectives but would still result in some impacts on biodiversity, noise and visual aspects. Mitigation measures as detailed in this Addendum REF would ameliorate or minimise these expected impacts. The upgraded Prospect Highway would provide the community with a road with greater capacity to accommodate future traffic growth, greater safety and reduced congestion. The design elements assessed in this Addendum REF contribute towards achieving that outcome.

The Approved Project would increase capacity on Prospect Highway to reduce traffic congestion and improve road safety. This would have benefit to the local and broader community. The proposed refinements would support the construction of the Approved Project. The proposal would also provide a safer pick-up and drop-off area at Shelley Public School away from the highway, provide greater safety by providing a roundabout near the school, and further mitigate noise impacts of the Approved Project

through the installation of additional noise walls and architectural treatments. On balance the proposal is considered justified.

The environmental impacts of the proposal are not likely to be significant and therefore it is not necessary for an environmental impact statement to be prepared and approval to be sought for the proposal from the Minister for Planning under Part 5.1 of the EP&A Act. The proposal is unlikely to affect threatened species, populations or ecological communities or their habitats, within the meaning of the *Threatened Species Conservation Act 1995* or *Fisheries Management Act 1994* and therefore a Species Impact Statement is not required. The proposal is also unlikely to affect Commonwealth land or have an impact on any matters of national environmental significance.

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 7.2.

The benefits of the proposal are considered to outweigh the adverse impacts that may be generated by the proposal, which are mostly temporary and local in nature.

9 Certification

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

Nicole Philps
Associate Environmental Planner
SMEC Australia
Date: 5 July 2016

I have examined this review of environmental factors and accept it on behalf of Roads and Maritime Services.

Van Tran
Project Manager
Project Delivery, WSPO
Date: 12/07/2016

10 References

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Terms and acronyms used in this REF

Abbreviation	Definition
ADI	
AMP	Archaeological Management Plan
Approved Project REF	The original Review of Environmental Factors prepared for the Prospect Highway Upgrade by Jacobs in 2014.
ARI	Average Recurrence Interval
CBD	Central Business District
CEMP	Construction environmental management plan
CPTED	Crime Prevention through Environmental Design
dB(A)	Decibel A-weighted – Expression of the relative loudness of sounds in air as perceived by the human ear
EIA	Environmental impact assessment
ELF	Extremely low field
EMF	Electro-magnetic frequency
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW).
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth).
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 Guidelines
INP	Industrial Noise Policy
ISEPP	State Environmental Planning Policy (Infrastructure) 2007
LCZ	Landscape Character Zone
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act.
LGA	Local Government Area
MNES	Matters of national environmental significance under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*
NCA	Noise Catchment Area
NCG	Roads and Maritime Noise Criteria Guidelines
NMG	Roads and Maritime Noise Mitigation Guidelines
NML	Noise Management Level
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
OEH	Office of Environment and Heritage
OSD	On-site detention
PEMP	Project Environmental Management Plan
Proposal	The proposal refers to the proposed refinements to the Approved Project described in this Addendum REF.
Prospect Highway	Prospect Highway' includes both Prospect Highway between Reservoir Road at Prospect to Blacktown Road, Prospect and Blacktown Road at Prospect to 200 metres north of St Martins Crescent at Blacktown
RBL	Rating Background Level
REF	Review of Environmental Factors

Abbreviation	Definition
REF boundary	The proposal boundary identified in the Approved Project REF
Revised REF boundary	The final proposal boundary, incorporating the Approved REF boundary and the additional design refinements assessed in this report.
RNP	Road Noise Policy
Roads and Maritime	Roads and Maritime Services
SEPP	State Environmental Planning Policy. A type of planning instrument made under Part 3 of the EP&A Act.
SHR	State Heritage Register
SIS	Species Impact Statement
TEC	Threatened Ecological Community
TMP	Traffic Management Plan
TSC Act	*Threatened Species Conservation Act 1995* (NSW)
QA Specifications	Specifications developed by Roads and Maritime Services for use with roadworks and bridgeworks contracts let by Roads and Maritime Services

Appendix A

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

Clause 228(2) Checklist

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

Factor	Impact
a. Any environmental impact on a community? During construction, the proposal would cause minor impacts on the community as a result of construction noise, potential air quality impacts, and vegetation removal/pruning. Neighbouring residents would be contacted prior to the commencement of works. The individual design elements assessed in this Addendum REF contribute to the overall Approved Project, which would provide the community with a safer and less congested road, one that can accommodate predicted traffic growth. The local and broader community would experience these benefits. The kiss and ride facility would provide the community with a safe drop-off and staff parking facility, and the proposed changes to property access arrangements would benefit individual property owners.	Short-term negative Long-term positive
b. Any transformation of a locality? The proposal would have some additional impacts on visual amenity from the additional noise walls and the vegetation removal/pruning associated with the relocation of the powerlines and the kiss and ride facility. The Approved Project includes measures to mitigate visual impacts associated with the initial set of noise walls and these would also be applied to the additional noise walls. The benefit to noise amenity and community safety is considered to outweigh the visual impacts of the noise walls and vegetation removal within the school grounds. There would be a permanent change to visual amenity associated with the need to maintain the required clearance between vegetation and the powerlines.	Long-term negative

Factor	Impact
c. Any environmental impact on the ecosystems of the locality? The proposal would require the removal/pruning of a number of trees associated with the relocation of the powerlines and ongoing management of vegetation under the powerlines to maintain required clearance distances. A number of trees would also be removed from the school grounds to construct the kiss and ride facility. The proposal would also result in the removal of about 1.33 hectares of disturbed Cumberland Plain Woodland within the road corridor, representing an additional 0.64 hectares over the 0.69 hectares identified in the Approved Project REF. The majority of this vegetation would be low quality vegetation, and comprising isolated trees and planted vegetation with affinities to the TEC community. In the context of other vegetation in the immediate area and the broader locality, it is not expected that there would be any material impacts on local ecosystems.	Neutral
d. Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? As described in (b) above, the proposal would require the removal of a number of trees. This would change visual amenity at Shelley School, mainly from Hadrian Avenue, as well as in areas where noise walls are proposed and where trees would be removed for the relocation of the powerline. A permanent reduction in visual amenity would also be associated with the relocation of the powerlines and the installation of the noise walls.	Long-term negative
e. Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations? The proposal would not have a material effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance.	Nil
f. Any impact on the habitat of protected fauna (within the meaning of the *National Parks and Wildlife Act 1974*)? The proposal would not impact on the habitat of any protected fauna.	Nil
g. Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air? The proposal would be undertaken on largely cleared sites and would not endanger any species.	Nil

Factor	Impact
h. Any long-term effects on the environment? The removal/pruning of the trees in the school grounds and where the powerlines would be relocated, and ongoing vegetation management to maintain the required clearance under the powerlines, would have a permanent but minor localised visual impact. The proposed replanting with suitable vegetation, where appropriate, would mitigate this impact.	Long term negative
i. Any degradation of the quality of the environment? The proposal is not expected to result in any degradation of the quality of the environment.	Neutral
j. Any risk to the safety of the environment? The proposal would not cause any risk to the safety of the environment.	Neutral
k. Any reduction in the range of beneficial uses of the environment? The proposal would reduce the amount of informal open space at the school in order to provide the kiss and ride facility. However it would reduce demand for staff parking in the surrounding local streets, which would be a positive outcome. It would also provide a safe off-road drop-off and pick-up location for children. The changes to access arrangements to individual properties on the Prospect Highway may reduce the space available for private front gardens at some properties. The noise walls and other design elements proposed in the Addendum REF would not reduce the range of beneficial uses of the environment. The relocation of the powerlines and the associated vegetation clearing and pruning would present some limits as to the future planting and usage in the front yard of the affected properties.	Long term negative
l. Any pollution of the environment? The proposal would not cause any pollution of the environment. Appropriate mitigation measures would be implemented to ensure the proposal does not create any pollution.	Neutral
m. Any environmental problems associated with the disposal of waste? There would not be any environmental problems associated with the disposal of waste. Mitigation measures would be implemented to ensure waste management is undertaken appropriately.	Neutral
n. Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? The proposal would not cause increased demands on resources that are, or likely to become, in short supply.	Neutral

Factor	Impact
o. Any cumulative environmental effect with other existing or likely future activities? The early construction activities associated with the powerline relocations would result in the affected properties experiencing extended period of construction activity and disturbance, however this is expected to be fairly minor and of short duration at any one residence. A number of properties would be impacted by tree removal associated with the powerline relocation and changes to property access.	Short-term negative
p. Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? The proposal would not have any impact on coastal processes and coastal hazards.	Nil

Matters of National Environmental Significance

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

Factor	Impact
a. Any impact on a World Heritage property? The proposal would not have an impact on a World Heritage property.	Nil
b. Any impact on a National Heritage place? The proposal would not have an impact on a National Heritage place.	Nil
c. Any impact on a wetland of international importance? The proposal would not have an impact on a wetland of international importance.	Nil
d. Any impact on a listed threatened species or communities? The proposal would have a minor impact on EPBC listed Cumberland Plain Woodland. The proposed refinements assessed in this Addendum REF would require the removal of an additional 0.02 hectares of High quality Cumberland Plain Woodland, compared to the 0.12 hectares assessed in the Approved Project REF. This vegetation is highly disturbed and located within the road corridor.	Nil
e. Any impacts on listed migratory species? The proposal would not have an impact on any listed migratory species.	Nil
f. Does the proposal involve a nuclear action (including uranium mining)? The proposal does not involve a nuclear action.	Nil
g. Any impact on a Commonwealth marine area? The proposal would not have an impact on a Commonwealth marine area.	Nil
h. Does the proposal involve development of coal seam gas and/or large coal mine that has the potential to impact on water resources? The proposal is not related to the development of coal seam gas or coal mining.	Nil
Additionally, any impact (direct or indirect) on Commonwealth land? The proposal would not have any direct or indirect impact on Commonwealth land.	Nil

Appendix B

Detailed design drawings

Appendix C

ISEPP letter sent to Council

Appendix D

Detailed design acoustic assessment

Appendix E

Arborist report – Powerline relocations

Appendix F

Arborist report – Shelley Public School

Appendix G

Landscape character and visual assessment

Appendix H

PACHCI clearance letters

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