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Light Rail

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CBD AND SOUTH EAST LIGHT RAIL PROJECT
STATE SIGNIFICANT INFRASTRUCTURE APPROVAL (SSI-6042)

MODIFICATION REPORT –
SSI-6042 MOD 4
Stop changes – High Street, Randwick

NOVEMBER 2015

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Wansey Cottage Heritage Report

Glossary and abbreviations

Approved Project	The CSELR project approved, as previously modified, by the Minister for Planning, 17 February 2015.
CBD	central business district
CSELR	CBD and South East Light Rail
CSELR EIS	<i>CBD and South East Light Rail Environmental Impact Statement</i>
dB	(decibel) unit of measurement for sound pressure level
dBA	A-weighted decibels
DDA	<i>Disability Discrimination Act 1992</i>
DECCW	Department of Environment, Climate Change and Water
DP&E	(NSW) Department of Planning and Environment
EP&A Act	(NSW) <i>Environmental Planning and Assessment Act 1979</i>
EMI	electromagnetic interference
HAMU	Heritage Archaeological Management Unit
HCA	heritage conservation area
ICNG	<i>Interim Construction Noise Guideline</i>
L _{Aeq}	The 'energy average noise level' evaluated over a defined time period. The L _{Aeq} can be likened to a noise dose representing the cumulative effects of all the noise events occurring in the relevant time period.
L _{ASMax}	The maximum sound pressure level measured with sound level meter using the 'A' frequency weighting and the 'S' (Slow) time weighting.
LRV	light rail vehicle
NML	noise management level
ONVR	Operational Noise and Vibration Review
Randwick LEP 2012	<i>Randwick Local Environmental Plan 2012</i>
RBL	rating background level
RNP	<i>Road Noise Policy</i>
SHR	State heritage register
SSI	State Significant Infrastructure
UNSW	University of NSW



Executive summary

CSELR Project approvals

The CBD and South East Light Rail (CSELR) project was identified as a key priority transport infrastructure project for the NSW Government in the NSW *Long Term Transport Master Plan*. *Sydney's Light Rail Future* presents the NSW Government's plan to expand light rail in Sydney.

The CSELR Project was declared Critical State Significant Infrastructure (SSI) by the NSW Minister for Planning and Infrastructure (now Planning) on 25 June 2013. Part 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) establishes an assessment and approval regime for SSI developments. Accordingly, an environmental impact statement was exhibited from 14 November 2013 to 16 December 2013. A subsequent Submissions Report (incorporating a preferred infrastructure report) was prepared and submitted to the Department of Planning and Infrastructure (now the Department of Planning and Environment (DP&E)) in March 2014. Planning approval was granted by the Minister for Planning under Part 5.1 of the EP&A Act on 4 June 2014.

Subsequent to the approval of the CSELR Project, three modifications to the approved Project have been submitted to DP&E in February, March and August 2015 respectively. These modifications included both design changes to the approved Project and minor modifications to the Department of Planning and Environment's Conditions of Approval.

Planning approvals process

Pursuant to Section 115ZI of the EP&A Act, Transport for NSW is seeking approval for the modification of the State Significant Infrastructure approval (SSI-6042), granted on 4 June 2014, and subsequently modified in February, March and August 2015.

Purpose of this report

This report has been prepared to support an application by Transport for NSW to modify the existing project approval and is intended to assist the Minister for Planning in forming a view as to the merits of the proposed modification. The application for modification has been prepared to:

- describe the changes to the existing project approval
- provide justification for the modification and describe the alternatives considered
- assess the environmental and community impacts of the modification.

Proposed modification

In response to further design investigations and ongoing consultation with stakeholders a series of design changes have been identified to the design of the approved Project. The design changes that are proposed to the approved Project include the following elements:

- relocation and re-design of the Randwick terminus stop
- reconfiguration of the UNSW High Street stop arrangement
- provision of a new access lane from Arthur Street to properties on High Street as a result of the new UNSW High Street stop configuration

- changes to the local traffic network to accommodate the modification, including:
 - introduction of a one-way westbound section along High Street between Wansey Road and Botany Street and introduction of a one-way eastbound section along High Street between Clara Street and Avoca Street
 - minor changes to bus routes and bus stops, including extension of the afternoon (southbound) peak period bus stop along Belmore Road and provision of a new northbound morning bus stop zone on the western side of Avoca Street
 - removal of some parking along Arthur Street and installation of new traffic light signals
 - conversion of the existing roundabout at the intersection of Barker Street and Botany Street to a signalised intersection
- revised location and arrangement for the High Cross Park substation.

Due to the proximity of these changes, the changes have been considered as a single modification. Further details regarding the proposed design changes are provided in Chapter 3 of this report.

Administrative changes to Minister's Conditions of Approval

In addition to the above modification, ongoing development of the approved Project has identified the need to modify two Minister's Conditions of Approval (MCoA).

- Transport for NSW is seeking, to amend the existing MCoA Condition B59 to remove reference to avoiding any direct impact or impacts to Wansey Cottage.
- It is also proposed to amend MCoA B89(b) to correct an inconsistency with the approval process for out-of-hours application that is provided in condition B4.

Further details regarding the proposed administrative changes being sought to the two existing MCoAs are provided in Chapter 6 of this report.

Environmental benefits and impacts

The modification is expected to deliver a number of improvements over the approved Project. These include:

- reduction in traffic impacts at the Avoca Street and Belmore Road intersection due to the reduced construction impacts at this location as the light rail would no longer need to cross this intersection
- beneficial visual and landscape character outcome in comparison to the approved Project, in particular as a result of reduced impacts to High Cross Park
- beneficial outcome to planted trees, in particular reduced impacts to High Cross Park
- overall improvement to the retention of the heritage significance of High Cross Park due to the relocation of the Randwick terminus stop to High Street
- improved accessibility to existing businesses and services such as the Randwick town centre and Prince of Wales Hospital
- benefits to electromagnetic interference impacts in comparison to the approved Project, in particular with respect to potentially sensitive equipment associated with the UNSW
- improved passenger safety and loading/disembarking at the UNSW High Street stop.



Some potential negative environmental impacts have also been identified as a result of the proposed design modification. These include:

- traffic and transport changes such as:
 - ▶ modification to existing local traffic movements/network including removal of eastbound traffic between Wansey Road and Botany Street and westbound traffic between Avoca Street and Clara Street and increased traffic on surrounding streets
 - ▶ increased delays at some intersections within the Randwick precinct due to expected local traffic movement changes
 - ▶ revised property access to four properties along High Street
 - ▶ removal of a net total of approximately 32 on-street parking spaces
- potential impacts to an identified World War II air raid trench due to subsurface excavation required in High Cross Park to allow for the substation to be placed below ground in High Cross Park
- additional impacts to existing properties to accommodate the access lane from Arthur Street
- noise and vibration impacts such as:
 - ▶ additional noise impacts during construction for receivers (including residential, educational and a child care centre) along Arthur Street and adjacent to the proposed construction of the access lane from Arthur Street
 - ▶ additional noise impacts to up to five additional properties along High Street between Wansey Road and Botany Street due to the change in the alignment at this location further to the north
 - ▶ potential minor additional impacts to the Prince of Wales Hospital due to the decrease in setback distance between the near track and the buildings to accommodate the revised stop platform
 - ▶ vibration impacts to an additional receiver (medical imaging centre) along High Street
 - ▶ road noise impacts resulting from changes to local traffic changes, in particular along Arthur Street.

A full assessment of these design changes is presented in Chapter 3 of this report. The impacts associated with the proposed design changes would be mitigated through the application of the environmental management measures previously identified in the *CBD and South East Light Rail Environmental Impact Statement* (Transport for NSW, 2013). The current consolidated conditions of approval identified in the State Significant Infrastructure approval (SSI-6042), dated 29 September 2015 would continue to apply, and would also be applied to the proposed modification, should it be approved.

Conclusions and next steps

This modification report documents proposed changes to the approved Project. Overall, the benefits of the proposed changes to the community, the environment and public transport are considered to outweigh the potential impacts of the design changes.

Following exhibition of this modification report, the Minister for Planning will subsequently decide whether to grant approval, or to refuse the proposed modification, under Section 115ZI of the EP&A Act. Should approval be given by the Minister, Transport for NSW would continue to consult with community members, government agencies and other stakeholders during the pre-construction, construction and commissioning phases of the Project.



1. Introduction

This chapter provides an overview of the approved project and outlines a summary of the proposed modification.

1.1 The CSELR Project

The CBD and South East Light Rail (CSELR) Project was identified as a key priority transport infrastructure project for the NSW Government in the NSW Long Term Transport Master Plan. Sydney's Light Rail Future presents the NSW Government's plan to expand light rail in Sydney.

The CSELR Project comprises the construction and operation of a new light rail service in Sydney, including approximately 12 kilometres of new light rail track from Circular Quay to Central, Kingsford and Randwick via Surry Hills and Moore Park. The approved Project includes:

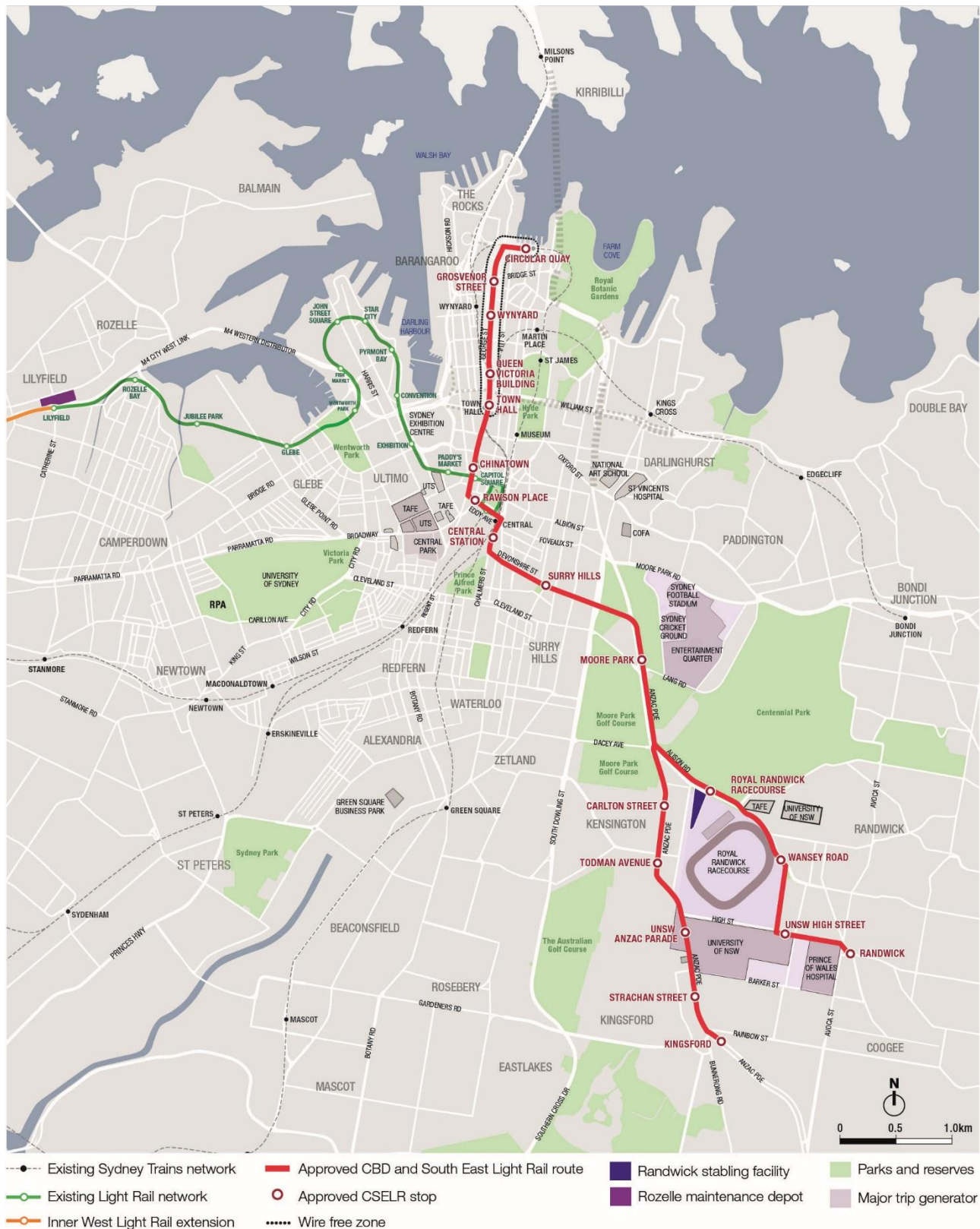
- 19 light rail stops
- a pedestrian zone on George Street (between Hunter and Bathurst streets)
- approximately 12 substations to provide power for the light rail vehicles (LRVs)
- an LRV stabling facility in Randwick and a maintenance depot in Rozelle.

1.2 Project approvals

The CSELR Project was declared Critical State Significant Infrastructure (SSI) by the NSW Minister for Planning and Infrastructure (now Minister for Planning) on 25 June 2013. The *CBD and South East Light Rail Environmental Impact Statement* (Transport for NSW, 2013) (CSELR EIS) was prepared and exhibited from 14 November 2013 to 16 December 2013. A subsequent Submissions Report (incorporating a preferred infrastructure report) was prepared and submitted to the Department of Planning and Infrastructure (now the Department of Planning and Environment (DP&E)) in March 2014.

Planning approval was granted by the Minister for Planning under Part 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) on 4 June 2014.

Following the approval of the Project on 4 June 2014, three modifications to the approval have been submitted to DP&E. These modifications are summarised in Table 1.1. Figure 1.1 provides an overview of the currently approved Project, including the incorporation of the above modifications.



Note: Indicative only. Subject to detailed design

Figure 1.1 Overview of the approved Project



Table 1.1 Summary of approved modifications

Mod ref.	Summary of modification(s)	Date approved
SSI 6042 MOD1	A total of ten design modifications were proposed which included: • removal of the World Square light rail stop • amendment of the Moore Park stop to reduce its scale and visual impact and to improve special event patronage management • realignment of the track along Alison Road and relocating the Royal Randwick stop to the northern side of Alison Road. This included flood mitigation works at Centennial Park • realignment of the track at the Anzac Parade and Alison Road intersection • increase to the length of light rail vehicles and stop platforms • revision of the construction methodology for the tunnel under Anzac Parade • provision of wire-free infrastructure within the CBD • increase to the height of components within the Randwick stabling facility, in order to accommodate the height of the required sand silo • revision of the location of two substations • change to the Grosvenor Street stop from two side platforms to an island platform.	17 February 2015
SSI 6042 MOD2	This modification requested a change of the definition of 'construction' (as defined in the conditions of approval) to allow some works to be undertaken as non-construction, including works such as surveying, investigative drilling and excavation, establishment of site compounds and utility adjustments/relocation.	17 March 2015
SSI 6042 MOD3	This modification requested a minor amendment to the conditions of approval (specifically conditions of approval B24) to amend the wording associated with the preparation of local access plans for individual properties.	30 September 2015

1.3 Proposed modification

Transport for NSW is seeking approval from the Minister for Planning to modify the SSI approval for the CSELR Project (SSI-6042). The design modification that is proposed to the approved Project includes the following elements:

- relocation and re-design of the Randwick terminus stop
- reconfiguration of the UNSW High Street stop arrangement
- provision of a new access lane from Arthur Street to properties on High Street as a result of the new UNSW High Street stop configuration
- changes to the local traffic network to accommodate the modification, including:
 - ▶ introduction of a one-way westbound section along High Street between Wansey Road and Botany Street and introduction of a one-way eastbound section along High Street between Clara Street and Avoca Street
 - ▶ minor changes to bus routes and bus stops, including extension of the afternoon (southbound) peak period bus stop along Belmore Road and provision of a new northbound morning bus stop zone on the western side of Avoca Street
 - ▶ removal of some parking along Arthur Street and installation of new traffic light signals
 - ▶ conversion of the existing roundabout at the intersection of Barker Street and Botany Street to a signalised intersection
- revised location and arrangement for the High Cross Park substation.

The proposed changes forming the modification offer significant overall benefits to the CSELR Project in terms of reducing environmental impacts and providing improvements to the operation of the proposed light rail network. The proposed changes are further described in detail in Chapter 3 of this report and an impact assessment is included in Chapter 5 of this report.

Administrative changes to the Minister's Conditions of Approval

In addition to the above modification, ongoing development of the approved Project has identified the need to modify two Minister's Conditions of Approval (MCoA).

- Transport for NSW is seeking, to amend the existing MCoA Condition B59 to remove reference to avoiding any direct impact or impacts to Wansey Cottage.
- It is also proposed to amend MCoA B89(b) to correct an inconsistency with the approval process for out-of-hours application that is provided in condition B4.

Further details regarding the proposed administrative changes being sought to the two existing MCoAs is provided in Chapter 6 of this report.



2. Description of the approved Project

This chapter provides a description of the approved Project, with reference to the design elements proposed to be modified.

2.1 Light rail alignment

As part of the approved Project, the alignment along High Street was located in the centre of the street between Wansey Road and Avoca Street before turning south at the junction with Avoca Street to a stop and bus interchange within High Cross Park. A single east and westbound traffic lane was to be maintained on either side of the light rail alignment along the length of High Street between Wansey Road and the Avoca Street/Belmore Road intersection.

2.2 Randwick terminus stop arrangement

The Randwick stop and interchange, as described in section 6.12.2 of the CSELR Project Submissions Report (Transport for NSW, 2014a), is located on the northern edge of High Cross Park along Belmore Road. The stop provided a light rail terminus and interchange with existing eastern suburbs buses. The stop would also service the retail precinct on Belmore Road and Avoca Street, the Sydney Children's Hospital, the Prince of Wales Hospital and Royal Hospital for Women and the broader residential area of Randwick. The approved location of this Randwick terminus stop would however require passengers to cross each of these roads to access their destinations.

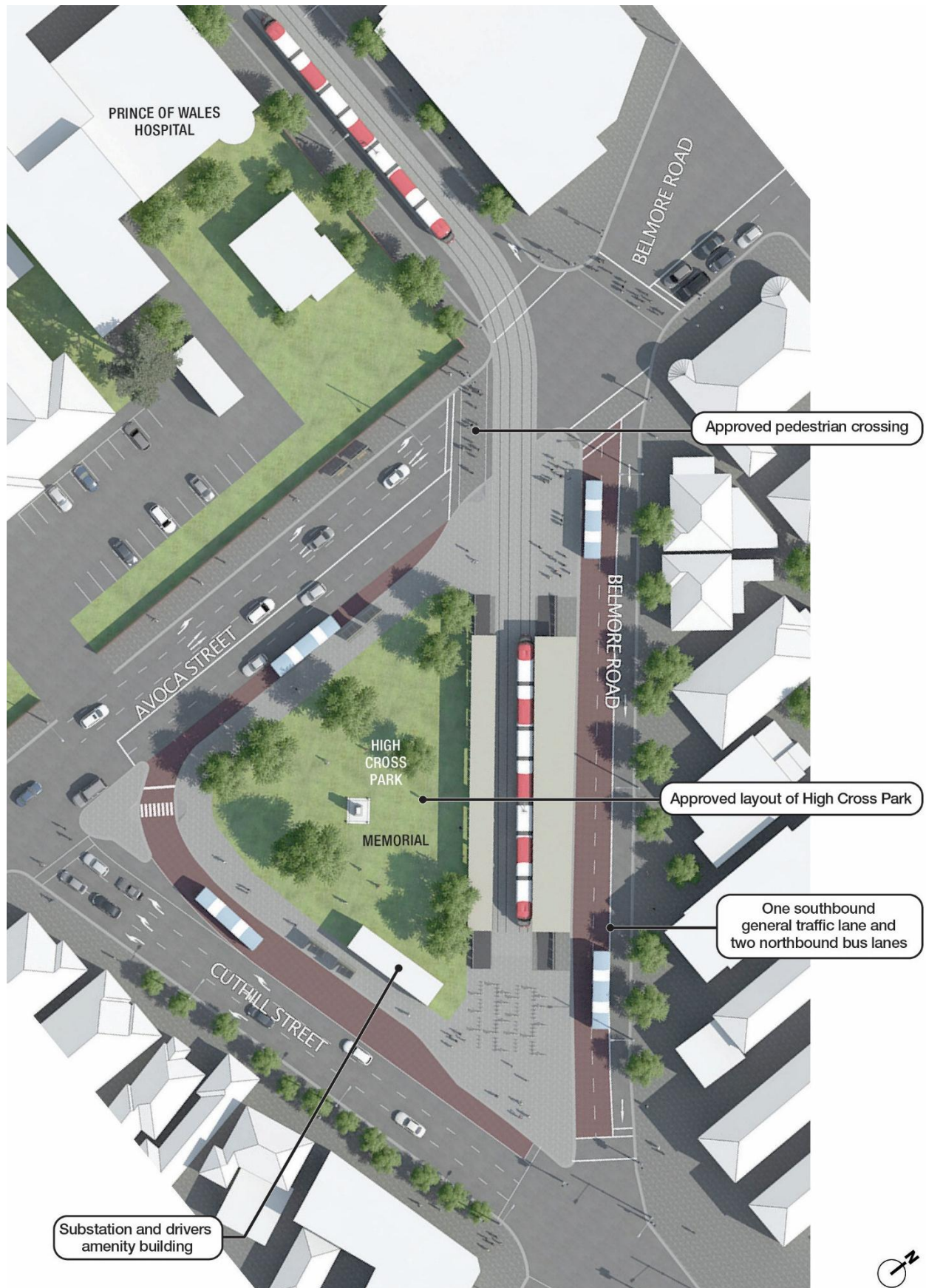
The approved stop included two side platforms between approximately 3.2 and 5.1 metres wide allowing for direct interchange with buses in both the morning and afternoon peak periods, providing for efficient transfer of passengers at this location. Bus stops were to be located on Belmore Road (servicing morning peak buses) and Avoca Street and Cuthill Street (servicing afternoon peak buses) (refer to Figure 2.1).

The approved Project also included the retention of a large turfed area within the park for non-transport use, however it required the removal of approximately 33 trees within High Cross Park, including some trees listed on Randwick City Council's (2007) *Register of Significant Trees*. The approved Project also included an above ground substation and driver's amenity facilities to be located towards the south-eastern end of High Cross Park, near the intersection of Cuthill Street and Belmore Road. The approved stop location and arrangement of the Randwick stop and interchange is shown in Figure 2.1.

2.3 UNSW High Street stop arrangement

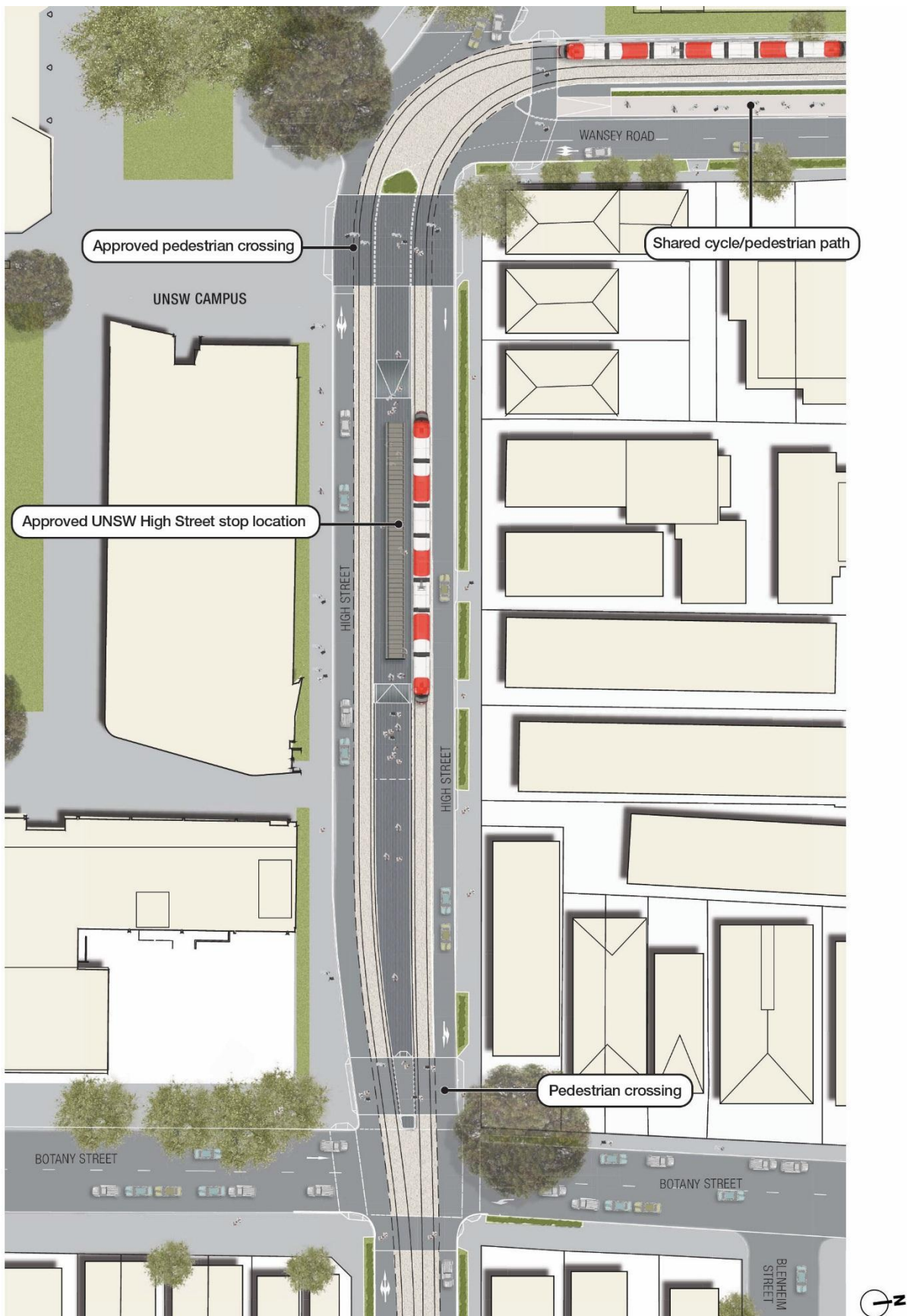
The UNSW High Street stop, as described in section 6.11.2 of the CSELR Project Submissions Report (Transport for NSW, 2014a), is located in the centre of High Street, approximately 40 metres to the east of the intersection of High Street and Wansey Road. The stop comprised an island platform configuration with a width of approximately 6.4 metres and a length of 67 metres.

The approved Project provided for signalised pedestrian crossings at both the western and eastern ends of the platform near the intersections of High Street with Wansey Road and Botany Street respectively. The existing trees on both the northern and southern side of High Street at the UNSW High Street stop were to be removed. The approved Project would require a strip of land approximately 6 metres in length along the southern side of High Street on UNSW land to be acquired for the Project. The approved stop location and arrangement of the UNSW High Street stop is shown in Figure 2.2.



Note: Indicative only

Figure 2.1 Plan of the approved Randwick stop and interchange arrangement



Note: Indicative only

Figure 2.2 Plan of the approved UNSW High Street stop arrangement

2.4 Local traffic and access

As described above, a single east and westbound traffic lane was to be maintained on either side of the light rail alignment along the length of High Street as part of the approved Project. New traffic signals were to be installed at a number of intersections along the alignment, including the intersection of High Street with Wansey Road, Hospital Road and Clara Street.

At the Randwick terminus stop, two traffic lanes along Avoca Street and Belmore Road (west of Avoca Street) were to be maintained. Additionally, general traffic along Belmore Road was to be reduced to one lane (southbound) and two northbound bus lanes (refer to Figure 2.1).

At the location of the UNSW High Street stop, the approved Project included the provision of one lane of traffic on either side of the proposed island platform. These traffic lanes allowed for movement of all vehicles, including general traffic in both directions. The currently unsignalised intersection of High Street and Wansey Road was to be signalised with the existing traffic signals at the intersection of High Street and Botany Street retained. Additionally, Wansey Road was to be one way (southbound) between Alison Road and Arthur Street, with the section between Arthur Street and High Street allowing for general traffic in both directions.

2.4.1 Property access

The approved Project maintained access to all existing properties along the length of High Street. However, as described in the CSELR EIS, most property access arrangements would generally be restricted to left-in-left-out operation with the exception of the right turn accesses into the hospital, which were to be maintained as part of signalising the intersection with Clara Street.

2.4.2 Cyclists

The approved Project proposed to impact upon the existing High Street on-road cycle route, linking Belmore Road and Anzac Parade. Therefore, in order to maintain cyclist access to the Randwick town centre, Arthur Street was identified to be designated as an on-road cycle route between Wansey Road and Belmore Road. Cyclists using the off-road cycleway on Wansey Road would cross the light rail alignment and use Wansey Road to access Arthur Street.

2.4.3 Bus operations

As identified in the CSELR EIS, no bus services were to be re-routed as part of the approved Project. However, some changes to the location of existing bus stops along High Street were identified as part of a wider change to the broader bus network. These changes included:

- new bus stops were proposed on Belmore Road (servicing morning peak buses) and Avoca Street and Cuthill Street (servicing afternoon peak buses) as part of an overall interchange with the Randwick terminus (refer to Figure 2.1)
- the current westbound UNSW stop (on the south side of High, adjacent to the Lowy Cancer Centre) was to be replaced by an indented bay within UNSW land
- the current eastbound bus stop on the north side of High Street (between Botany Street and Wansey Road) was to be removed
- outside the Prince of Wales Hospital, the eastbound bus stop on High Street would be removed. The stop location would be relocated to Clara Street.



3. Description of the proposed modification

This chapter documents the design changes forming the modification that Transport for NSW proposes to make to the approved Project. The modification was identified as a result of ongoing design development and continued stakeholder and community consultation.

3.1 Overview

The location of the proposed changes as part of the modification with respect to wider approved Project is shown in Figure 3.1.



Note: Indicative only. Subject to detailed design

Figure 3.1 Location of proposed design modification

A summary of the approved components of the SSI approval as they relate to the Randwick Precinct is provided at the end of this chapter in Table 3.1. This table also outlines where modification is sought for individual project components or where components remain unchanged.

3.2 Description of changes

3.2.1 Randwick terminus stop and interchange

Alternatives considered

A series of alternative designs for the Randwick terminus stop were investigated as part of the development of the proposed modification. Discussion regarding the design development of the Randwick terminus stop is provided in Appendix A.

Proposed design change

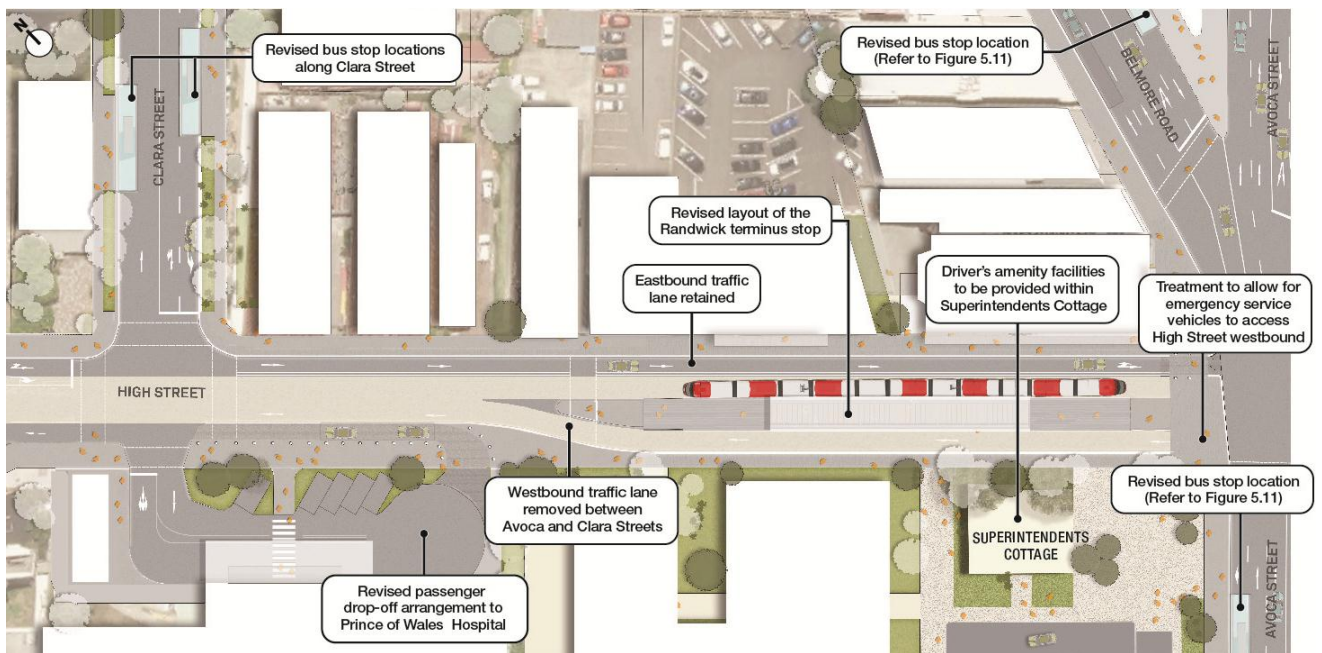
The revised design of the Randwick terminus stop would relocate the stop to High Street, west of the intersection of High Street and Avoca Street. The modified location for the stop would provide an approximately 67 metre long, 4.2 metre wide island platform with a weather protection shelter towards the eastern end of the platform. Revised pedestrian crossings would be provided at both the eastern and western ends of the platform.

A single, eastbound traffic lane for general traffic on High Street would be maintained to the north of the revised stop location between Clara Street and Avoca Street. The existing westbound traffic lane would be removed at this location. The east and westbound traffic lanes would be retained between Clara Street and Botany Street.

The existing pedestrian paths along the northern and southern sides of High Street would be retained as part of the proposed modification. The changes as part of the modification would also result in a slightly revised vehicle access to the Prince of Wales Hospital, including the provision of a revised public drop off zone for the Prince of Wales Hospital on the southern side of High Street and. This would be consistent with the Minister's Conditions of Approval (MCoA) B42 which requires that, as part of the project, a revised taxi rank and passenger drop off area at the entry to the Hospital be provided (refer to Figure 3.2).

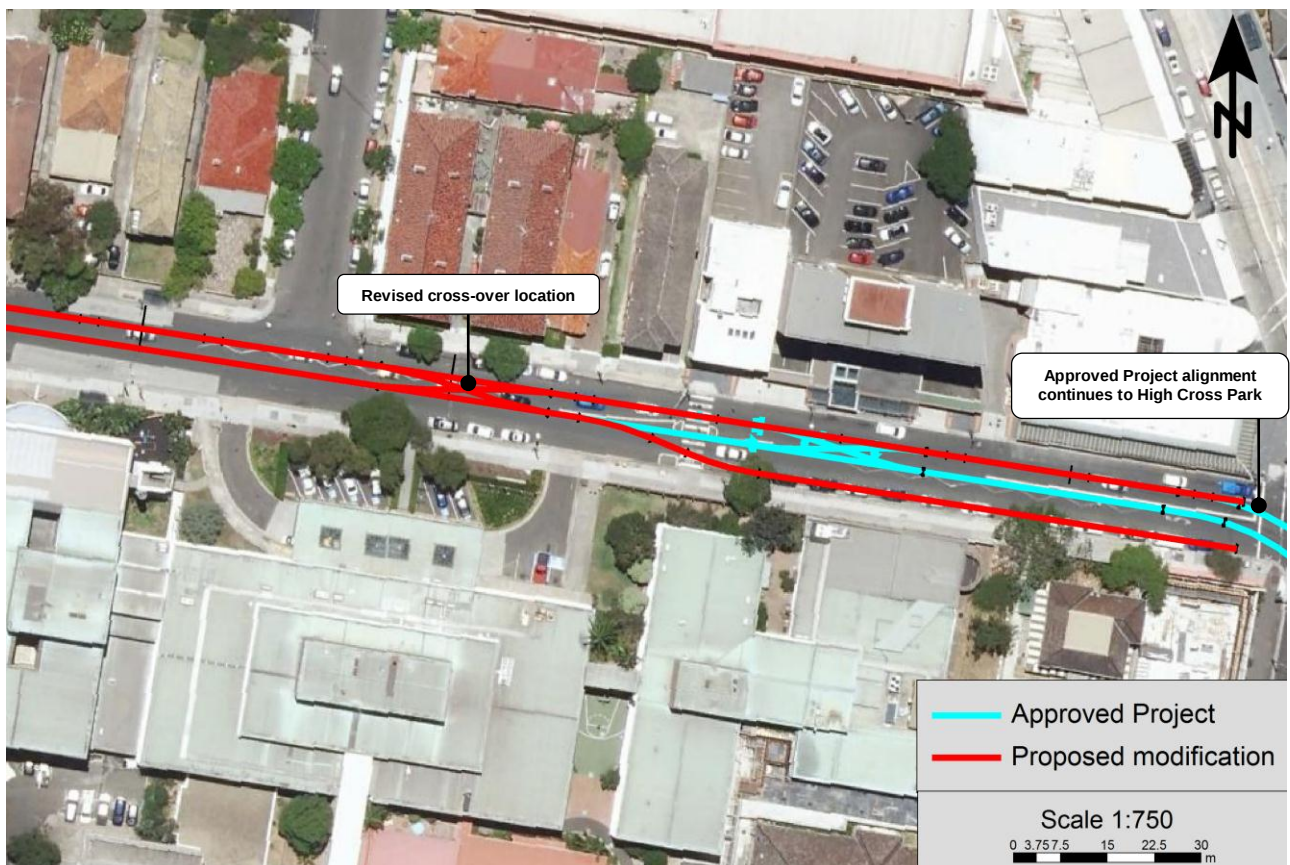
Similar to the design described in the CSELR EIS (Transport for NSW, 2013), track crossovers would be provided to the west of the relocated Randwick terminus stop to allow for the light rail vehicles (LRVs) to undertake a return trip (westbound). The platform was designed to be compliant with the *Disability Discrimination Act 1992* (DDA).

The revised stop location and arrangement of the Randwick terminus is shown in Figure 3.2 and a comparison of the approved and proposed track alignments as a result of the modified design is shown in Figure 3.3. An indicative visual perspective of the revised stop is also shown in Figure 3.4.



Note: Indicative only. Subject to detailed design

Figure 3.2 Plan of the proposed location for the revised Randwick terminus stop arrangement



Note: Indicative only. Subject to detailed design

Figure 3.3 Revised light rail track arrangement for the Randwick terminus stop



Note: Indicative only. Subject to detailed design

Figure 3.4 Indicative visual perspective (looking east) of the revised Randwick terminus stop

3.2.2 UNSW High Street stop

Alternatives considered

Discussion regarding the design development and consideration of the UNSW High Street stop arrangement is provided in Appendix A.

Proposed design change

The modification to the UNSW High Street stop would change the approved stop from a single island platform to two separate platforms. The northern platform would be integrated as part of the existing pedestrian footpath with a combined width of approximately 4.5 metres. The southern platform would consist of a platform approximately 6 metres wide with a fenced barrier between the southern edge of the platform and the westbound traffic lane along High Street. The stop would be located approximately 5 to 6 metres north of the previously approved location.

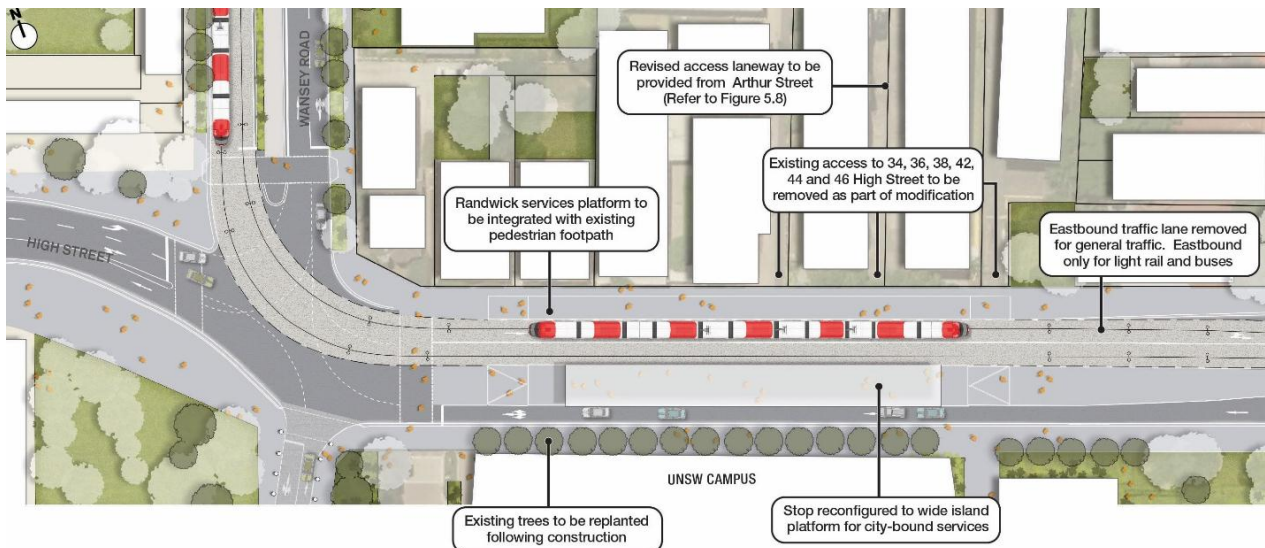
A canopy shelter would be provided on the southern platform for shade and weather protection. The northern platform would not be provided with a canopy shelter due to the primarily disembarking function of this platform. Passengers would cross High Street at the signalised crossings at either Wansey Road or Botany Street.

The modification would result in the removal of the eastbound traffic lane along High Street between Wansey Road and Botany Street. For this section of the alignment, the eastbound light rail tracks would become a bus and light rail-only shared zone (refer to Figure 3.7). Existing eastbound general traffic would be required to utilise an alternative route along Arthur Street. The existing westbound traffic lane would be retained for general traffic, however this lane would be realigned by approximately 4 to 5 metres to the south to accommodate the stop platform. A new pedestrian footpath would also be provided at this location on land currently owned by UNSW.

As a result of the proposed removal of the eastbound traffic lane, the existing driveway access to four properties on the north side of High Street would be removed and relocated to a new access lane to be provided from Arthur Street (refer to details below).

As with the approved Project, the stop would continue to be compliant with the DDA.

The revised stop arrangement for the UNSW High Street stop is shown in Figure 3.5 and a comparison of the approved and proposed track alignments as a result of the modified design is shown in Figure 3.6. An indicative visual perspective of the stop is also shown in Figure 3.7.



Note: Indicative only. Subject to detailed design

Figure 3.5 Plan of the revised UNSW High Street stop arrangement



Note: Indicative only. Subject to detailed design

Figure 3.6 Plan of the revised UNSW High Street stop arrangement



Note: Indicative only. Subject to detailed design

Figure 3.7 Indicative visual perspective (looking west) of the modified UNSW High Street stop arrangement along High Street

3.2.3 Property access changes

As described previously, the proposed removal of the eastbound traffic lane along High Street for general traffic between Wansey Road and Botany Street would result in existing access to four properties along High Street being removed. These properties are:

- 36 High Street (Creston College)
- 38 High Street (Kenvale College Hospitality and Event Management)
- 42 and 44 High Street (residential apartment buildings with shared access – 18 and 15 units respectively)
- 46 High Street (residential apartment building – 12 units).

Alternatives considered

A series of alternative access scenarios were considered to retain access to the impacted High Street properties. Discussion regarding the design development and consideration of the options for the new access lane from Arthur Street is provided in Appendix A.

Proposed design change

In order to maintain vehicle access to these properties, it is proposed that a new access lane be provided from the rear of these properties to Arthur Street to provide a reconfigured driveway access to all four affected properties. The cul-de-sac would be suitable to meet access requirements for a range of vehicles, including garbage collection and removalist vehicles, to turn around without the need to reverse along the entire length of new lane.



The proposed access lane would consist of widening an existing private lane. The existing lane from Arthur Street would be widened to approximately 6 metres, leading to a widened 'hammer head' area approximately 8 metres wide along rear boundaries of the affected properties.

The new access lane would consist of an asphalt surface (or other suitable material to be determined during detailed design). Ancillary work that would be required includes:

- a new retaining wall
- potential modification to existing drainage, utilities, regrading of existing surfaces to tie in with proposed ramps
- minor vegetation clearing along Arthur Street.

The new access lane would provide access to the existing car parking spaces at the rear of the Kenvale College and Creston College. The access lane would also require revised storage space for garbage bins for the private properties affected, similar to the current situation, however at the rear of each property to provide access for garbage trucks via the new lane. The location for this storage would be determined during detailed design, in consultation with the relevant property owners. Collection of these bins would continue to occur whereby the bins are collected from the storage locations within each property.

Due to ground level differences, a retaining wall between approximately 0.1 metres and 1.5 metres high would be required towards the north east side of the hammer head shaped road area.

New fencing would be provided along the boundary of the access lane area with appropriate lighting to maintain a suitable level of safety. Some minor vegetation clearance on Arthur Street would be required to maintain suitable sight distances along Arthur Street for vehicles accessing Arthur Street from the new lane.

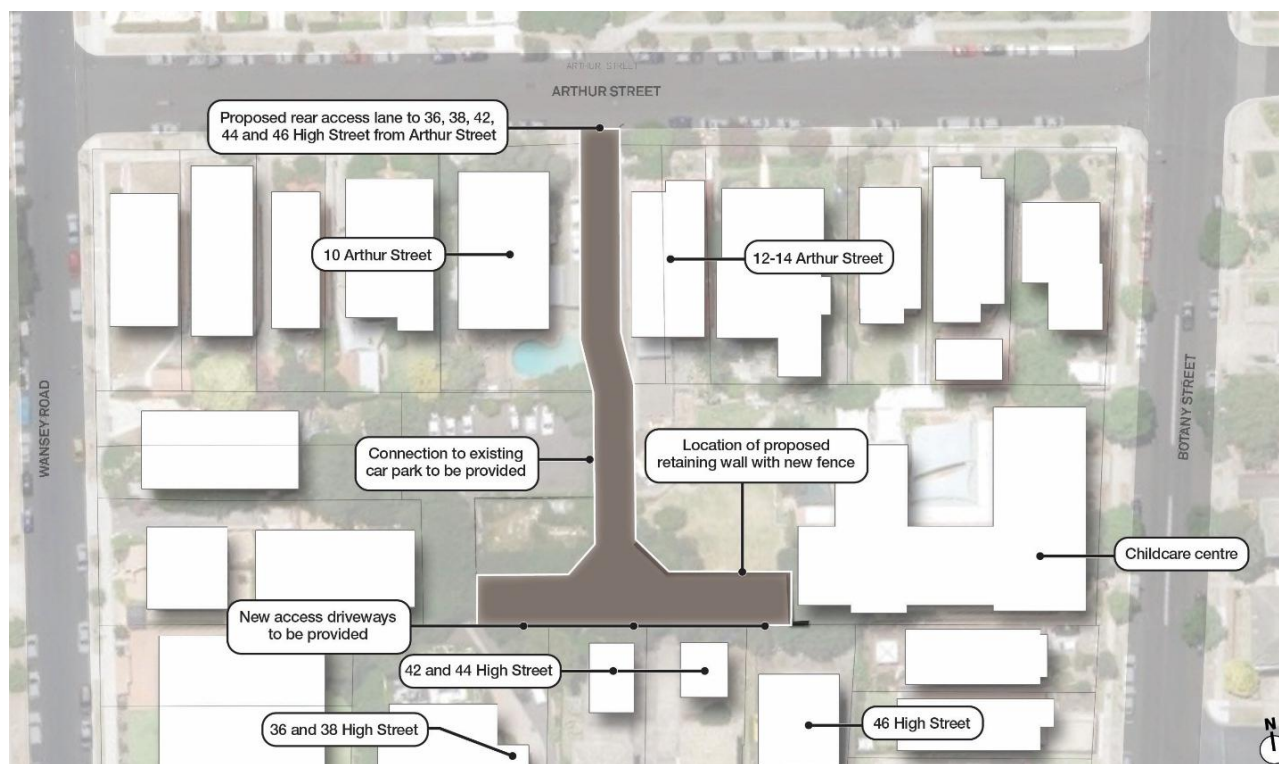
An indicative layout of the proposed access lane is shown in Figure 3.8.

Subdivision

The creation of the proposed access lane from Arthur Street would involve the subdivision of some private land, currently owned by UNSW. In seeking approval for the proposed modification, approval would be sought for a revised subdivision arrangement for the proposed lane. A detailed Deposited Plan of the subdivision layout would be prepared and lodged at Land and Property Information NSW for the subdivision of such land.

Access along High Street

No removal of property access along the remainder of High Street is proposed to occur. However, access to properties opposite the Randwick terminus stop, on the north side of High Street between Clara Street and Avoca Street would potentially be restricted to light vehicles only as a result of the modified location of the High Street terminus platform and light rail tracks.



Note: Indicative only. Subject to detailed design.

Figure 3.8 Plan of the proposed access lane arrangement from Arthur Street

3.2.4 Changes to local traffic network and associated works

Traffic network

As described above, the relocation of the Randwick terminus stop and the reconfiguration of the UNSW High Street stop would result in changes to general traffic movements along High Street. These changes would include removal of eastbound traffic between Wansey Road and Botany Street and removal of westbound traffic between Avoca Street and Clara Street.

General traffic which currently travels along the sections of High Street, which would be removed for the modified design, would be required to travel along an alternative route in order to reach their destinations. With respect to the proposed changes at the Randwick terminus stop, it is anticipated that the majority of traffic would travel along either Alison Road, Arthur Street or Barker Street, depending on the trip origin and destination.

With respect to the proposed changes associated with the UNSW High Street stop, it is anticipated that most vehicles would travel along Wansey Road and Arthur Street, and either continue along either Arthur Street or turn into Botany Street, depending on their destination. The revised traffic flows that would occur as a result of the modification are shown in Figure 3.9.

Infrastructure and parking changes

Due to the proposed removal of eastbound traffic along High Street, between Wansey Road and Botany Street, the modified design would require some local traffic improvements to accommodate the anticipated changes in traffic movements within the local area.



These changes would include:

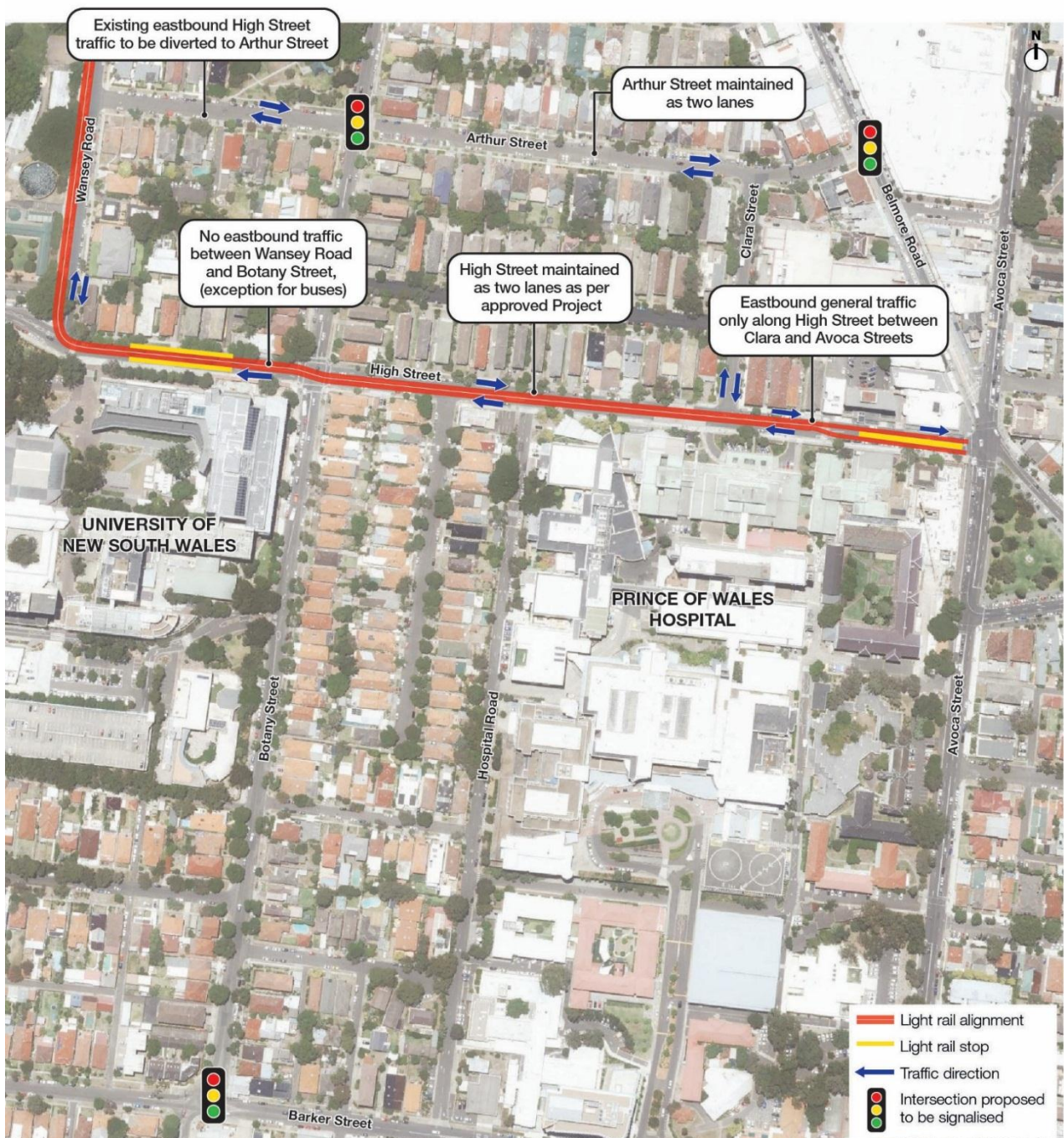
- conversion of the existing roundabout at the intersection of Barker Street and Botany Street to a signalised intersection
- provision of traffic signals at the intersection of Arthur Street and Botany Street. This would require the removal of up to approximately eight existing car parking spaces along Arthur Street immediately to the east of Botany Street to accommodate turning lanes at this location
- provision of traffic signals at the intersection of Arthur Street and Belmore Road. This would require the removal of up to approximately 11 car parking spaces along Arthur Street between Belmore Road and Arthur Lane and on Belmore Road to accommodate turning lanes at this location
- formal street line marking along Arthur Street between Wansey Road and Belmore Road.

The proposed infrastructure and parking changes along Arthur Street are shown in Figure 3.10.

In addition to the proposed changes along Arthur Street, the following roadway infrastructure changes are proposed in conjunction with the changes as part of the modification (to be undertaken by Randwick City Council):

- kerb adjustments to Belmore Road near High Street to widen the footpath and reduce the length of the Belmore Road pedestrian crossing
- removal of the existing slip lane from Belmore Road into Avoca Street (southbound)
- re-surfacing of the Avoca Street footpath (in the vicinity of the proposed morning bus interchange location)
- installation of bicycle storage facilities within the precinct surrounding the Randwick terminus stop.

The potential impacts of the proposed changes to local traffic network and associated infrastructure and parking works are described in section 5.2 of this report.



Note: Indicative only. Subject to detailed design

Figure 3.9 Proposed changes to traffic flow within the Randwick Precinct



Note: Indicative only. Subject to detailed design

Figure 3.10 Proposed infrastructure and parking changes within the Randwick Precinct

3.2.5 Bus operation and stop changes

Bus operation changes

Due to the relocation of the UNSW High Street and the Randwick terminus stops, as well as the proposed closure of traffic lanes associated with the modified stop configurations, some bus routes identified as corresponding to the approved Project would need to be modified.

Principally, these would involve diversion of bus routes that would use High Street between Clara Street and Avoca Street where access along this section of High Street would be removed. Bus route diversions would use Clara Street and the eastern end of Arthur Street to maintain access to Belmore Road and Avoca Street.

Buses travelling eastbound on High Street between Wansey Road and Botany Street would be allowed to use the light rail corridor, while those travelling westbound would use the general traffic lanes. Between Botany Street and Clara Street, buses would continue to be allowed in both directions as per the approved Project.

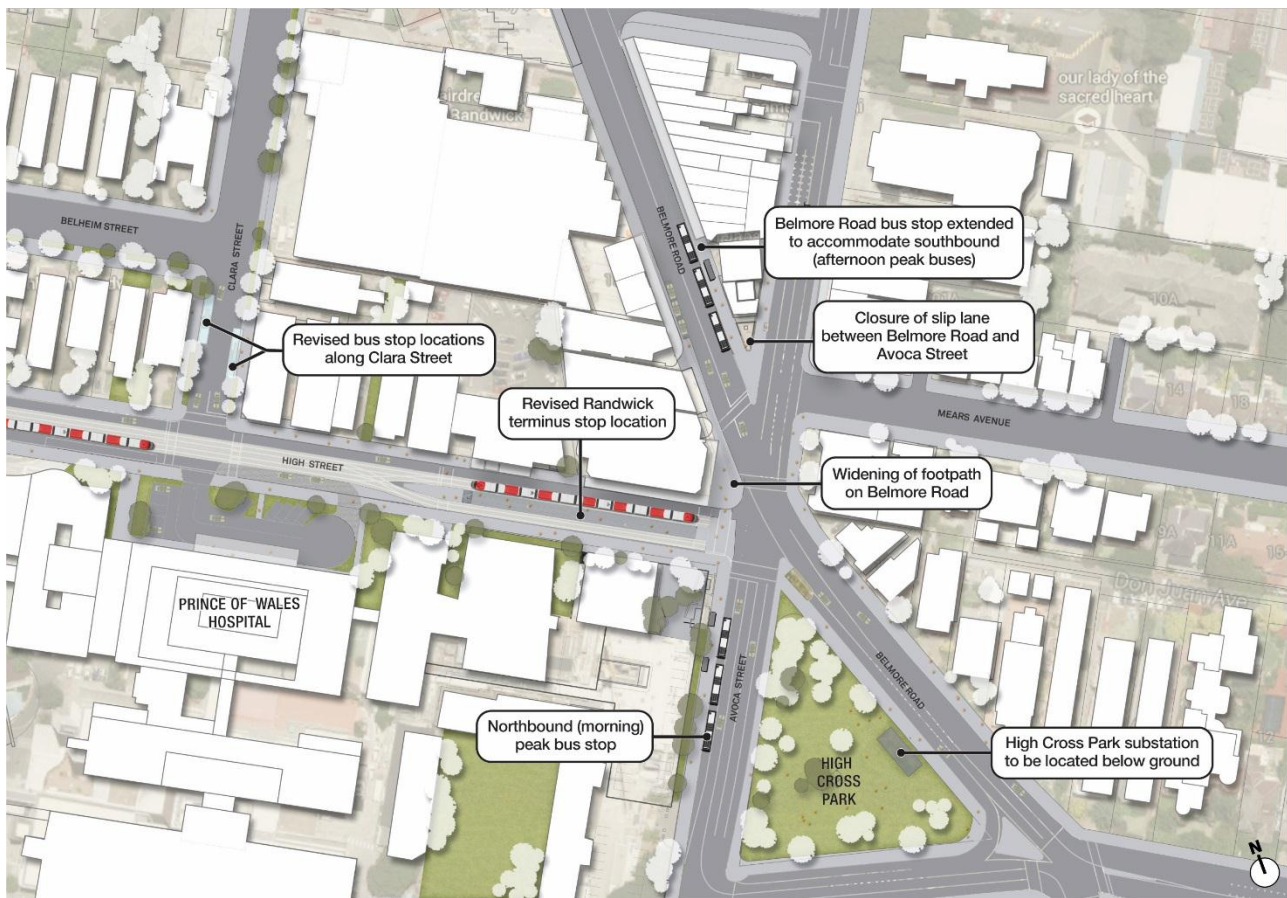
High Street bus stops

The existing westbound bus stop outside the Prince of Wales Hospital would be removed as part of the modified design due to the removal of the westbound lane along High Street. The stop would be relocated to Clara Street, near the intersection of Clara Street and High Street. This would result in the loss of approximately four short term parking spaces along this street. A new bus shelter would also be provided at this location.

Belmore Road and Avoca Street bus stops

A southbound bus stop currently exists at the intersection of Belmore Road and Avoca Street with capacity for up to two buses. The bus stop zone along Belmore Road at this location is proposed to be extended by approximately 20 metres to allow for up to two additional buses at this location in the afternoon peak period. The provision of the additional bus stop would result in the removal of approximately four short term parking spaces. An indicative arrangement of this stop is provided in Figure 3.11. As part of the revised bus stop arrangement, the awning coverage along Belmore Road would be extended to permit the afternoon bus stop to be located as close to the corner of Belmore and Avoca as possible (to be undertaken by Randwick City Council).

A new northbound morning bus stop zone on the western side of Avoca Street would also be provided as part of the changes associated with the modification. This would allow up to four buses to stop within the western-most lane along Avoca Street, to the south of High Street during the morning peak period. As a result of the proposed changes to bus stops along Belmore Road and Avoca Street, approved bus stops within High Cross Park along Avoca Street (southbound) and Cuthill Street (refer to Figure 2.1) would no longer be required. This would result in a reduced impact to High Cross Park, including the retention of approximately 33 trees and open space within the park and approximately 18 parking spaces adjacent to High Cross Park (on Belmore Road and Cuthill Street) which were previously identified to be removed under the approved project.



Note: Indicative only. Subject to detailed design.

Figure 3.11 Proposed reconfiguration of the Randwick terminus stop and interchange bus stop arrangements and proposed substation location (below ground)

3.2.6 High Cross Park substation and drivers amenity facilities

In addition to the relocation of the Randwick terminus stop away from High Cross Park, the location of the substation within High Cross Park has also been refined. The substation within High Cross Park is proposed to be placed underground within the Park. This change is consistent with the requirement outlined in MCoA B27(f)(ii) for the approved Project which requires that consideration be given to the undergrounding of substations where this is reasonable and feasible.

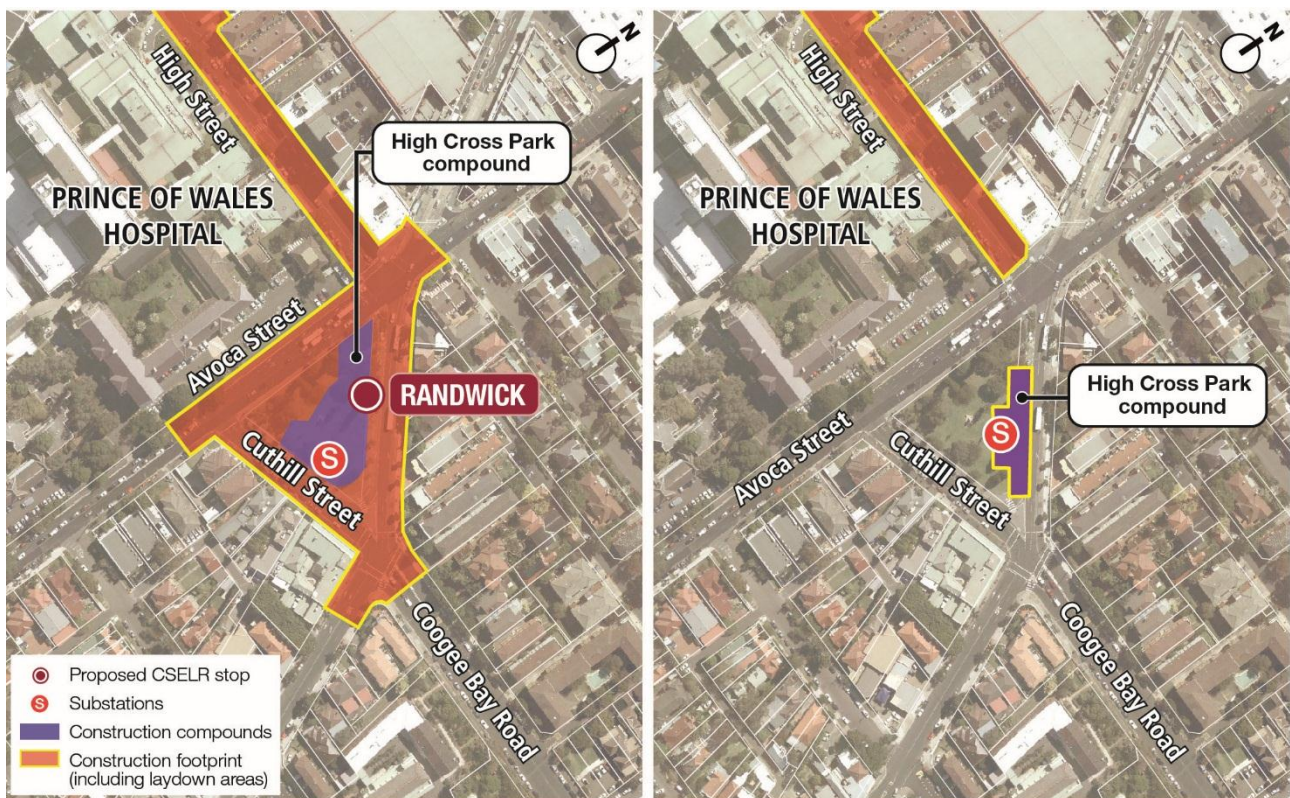
The substation would be relocated underground within High Cross Park in a similar position as the approved Project along the western side of Belmore Road (refer to Figure 3.11). The footprint of the substation would be approximately 16 metres by 9 metres and have a depth of approximately 8 to 9 metres below ground. Where feasible, the final location of the substation would be optimised during detailed design to minimise potential impacts to significant trees, cultural and heritage items within the park (refer to section 5.7 of this report).

In order to provide a connection between the substation and the Randwick terminus, an underground connection would also be required along Belmore Road and across the Avoca Street and Belmore Road intersection.

In addition to the relocation and undergrounding of the substation within High Cross Park, the driver's amenity facilities would be relocated to within the Superintendents Cottage building, located to the south of the relocated Randwick terminus stop (refer to Figure 3.2) within the Prince of Wales Hospital site.

3.2.7 High Cross Park compound site

As a result of the relocation of the Randwick terminus, the construction compound in High Cross Park would be reconfigured to reduce the overall impact on High Cross Park. The reconfigured compound site would occupy the existing footpath, one lane of parking and one lane currently used for vehicle traffic on Belmore Road. The revised construction compound layout would be arranged to limit impacts to any trees within High Cross Park. An indicative arrangement of the revised construction compound layout is shown in Figure 3.12.



Note: Indicative only. Subject to detailed design

Figure 3.12 Existing High Cross Park construction compound layout (left) and revised construction compound layout (right)



Table 3.1 Summary of approved Project and proposed modification

Project component	Summary of approved Project	Summary of proposed modification	Justification for change
Randwick terminus stop	- A light rail stop/terminus was to be located on the northern edge of High Cross Park along Belmore Road. - The light rail alignment was to travel along the centre of High Street and then cross Avoca Street to High Cross Park. - A stop design including two side platforms between approximately 3.2 and 5.1 metres wide, with canopies on both platforms, including a wider canopy on the eastern platform to allow for interchanging passengers. - Removal of approximately 33 trees within High Cross Park and impact to some of the open space within High Cross Park.	- Relocation of the stop from High Cross Park to the eastern end of High Street, west of the intersection of High Street and Avoca Street. - The modified location for the stop would provide an approximately 67 metre long, 4.2 metre wide island platform with a weather protection shelter towards the eastern end of the platform. - The light rail alignment would travel along the centre of High Street to past Clara Street, but the tracks would split to allow for the island platform. - Provision of track crossovers to the west of the relocated Randwick terminus stop.	Previous decisions for the location of the Randwick terminus used bus interchange priority as the deciding factor, where a location within High Cross Park was considered to provide the best transport outcome. However, as identified in the CSELR EIS, the High Cross Park terminus proposal has significant impacts on the park including reduction of open space, removal of trees and impacts to the heritage character of the park. These impacts continue to be a concern to stakeholders and the community. Due to these ongoing concerns, further options analysis was undertaken with key stakeholders, including Randwick City Council and NSW Health Infrastructure. The analysis identified a number of benefits for moving the Randwick stop to High Street, including: - customers using the light rail and bus stops would be closer to the casual surveillance from shops and other people in the town centre - the stop would more directly serve the town centre and primary entrances to the Prince of Wales and Sydney Children's Hospitals - reducing the need for a majority of customers to cross roads to access the stop - the High Street location would provide an urban solution that is better integrated with the Randwick town centre - the revised location offers faster journey times for the light rail service due to a reduced route and avoidance crossing Avoca Street and associated traffic signal delays. In addition, further refinement of customer movements identified that whilst a large proportion of customers would continue to interchange from buses to light rail, this was not significantly greater than customers who were using the light rail to access the Prince of Wales Hospital, medical offices or the commercial town centre of Randwick. The revised location provides a more balanced solution for interchanging and destination customers. Overall, the High Street solution delivers a public domain win that is considered, on balance, better than the High Cross Park location and is more widely supported by stakeholders. The High Street solution meets the twin objectives in the NSW Long Term Transport Master Plan for modern interchanges: to 'facilitate efficient travel' and be the 'cornerstones of lively, safe and attractive precincts that add value and amenity to their neighbourhoods.'

Project component	Summary of approved Project	Summary of proposed modification	Justification for change
UNSW High Street stop	- The UNSW stop was to be located in the centre of High Street, approximately 40 metres to the east of Wansey Road - The stop was to comprise an island platform configuration with a width of approximately 6.4 metres and 67 metres in length, including canopy. - The light rail alignment was to turn from Wansey Road into the centre of High Street, but separated to allow for the island platform. The tracks would reconverge at Botany Street. - Provision of signalised pedestrian crossings at the western and eastern ends of the platform - Removal of existing trees on the northern and southern side of High Street at the UNSW High Street stop. - Acquisition of a strip of UNSW land (approximately 6 metres) along the southern side of High Street.	- Relocation of the stop to northern side of High Street and re-design to an island platform. - The northern platform would be integrated with the existing footpath with a combined width of approximately 4.5 metres wide. The southern platform would be approximately 6 metres wide. - Provision of a canopy shelter on the southern platform only.	During ongoing discussions with the UNSW following Project approval, the use of the UNSW High Street stop as a key trip generator was further considered, and additional opportunities identified to improve the safety for customers during peak periods. The opportunities identified included: - incorporating the morning peak disembarking platform into the northern pedestrian footpath, removing the need for large numbers of customers to wait on the island platform before crossing High Street to the UNSW campus - providing segregated boarding and alighting allowing for flexibility to accommodate higher volumes of customers - providing increased platform widths for afternoon peak period, including additional customer waiting area for peak periods. The consideration of these opportunities has resulted in the approved stop design being amended to move the location of the light rail track alignment slightly north of its approved location and provide a widened (westbound) platform. Additional benefits that would occur as a result of the modified design would include: - reduced impact to the main UNSW campus to the south of High Street - improved compatibility with the overall UNSW campus masterplan for the precinct - potentially reduced conflict between the light rail and sensitive equipment utilised by the UNSW, in particular the Lowy Cancer Research Centre.
High Cross Park substation	Above ground substation and driver's amenity facilities to be located towards the south-eastern end of High Cross Park.	- Relocating the High Cross Park substation underground, in a revised location within the park. - The drivers amenity facilities to be incorporated into the existing Superintendents Cottage on High Street	This change is consistent with the requirement outlined in MCoA B27(f)(ii) which requires that consideration be given to the undergrounding of substations where reasonable and feasible.



Project component	Summary of approved Project	Summary of proposed modification	Justification for change
High Cross Park compound site	The High Cross Park construction compound would occupy the majority of the park, as well as the existing footpath, one lane of parking and one lane on Belmore Road.	Reconfiguration of the compound site to occupy only the existing footpath, one lane of parking and one lane on Belmore Road.	Due to the relocation of the Randwick stop, the permanent land requirements on High Cross Park are reduced. The construction compound has been reduced in size and reconfigured to minimise the compound site to that required to construct the substation and for some laydown to support the Randwick stop construction. This will significantly reduce impacts on the park.
Local traffic and road infrastructure	- Light rail alignment along High Street was to be located in the centre of the street between Wansey Road and Avoca Street, with a single east and westbound traffic lane to be maintained on either side of the light rail alignment. - Provision of new traffic signals at the intersection of High Street with Wansey Road, Hospital Road and Clara Street. - At High Cross Park two traffic lanes along Avoca Street and Belmore Road (west of Avoca Street) were to be maintained. General traffic along Belmore Road was to be reduced to one lane (southbound) and two northbound bus lanes.	- At the eastern end of High Street, between Clara Street and Avoca Street the westbound traffic lane would be removed. A single, eastbound traffic lane would be maintained for general traffic. - At the UNSW High Street stop section of High Street, between Wansey Road and Botany Street the eastbound traffic lane would be removed. A single westbound traffic lane would be retained for general traffic, approximately 4 to 5 metres to the south of its current location. - Local traffic improvements to accommodate anticipated changes in traffic movements, including: - conversion of the roundabout at Barker Street and Botany Street to a signalised intersection - provision of traffic signals at Arthur Street and Botany Street (and removal of up to eight car parking spaces) - provision of traffic signals at Arthur Street and Belmore Road (and removal of up to 11 car parking spaces) - formal street line marking along Arthur Street	Changes required to accommodate the revised stop locations and design and to manage predicted traffic and access impacts as a result of the road layout changes on High Street.

Project component	Summary of approved Project	Summary of proposed modification	Justification for change
Property access	Access to all existing properties along the length of High Street was to be maintained, however most property accesses would generally be restricted to left-in-left-out operation with the exception of the right turn accesses into the hospital (maintained as part of the signalised intersection at Clara Street).	- The removal of the eastbound lane on High Street between Wansey Road and Botany Street would result in the removal of vehicular access to four properties on the north side of High Street. - An alternative access would be provided via a new access lane off Arthur Street. - At the Prince of Wales Hospital a slightly revised vehicle access would be provided, including a revised public drop off zone on the southern side of High Street. - Access to properties on the north side of High Street between Clara Street and Avoca Street would potentially be restricted to light vehicles only.	Changes required to accommodate the revised stop locations and design and to manage predicted traffic and access impacts as a result of the road layout changes on High Street.
Bus operations	- No bus services are to be re-routed as part of the approved Project. - Some existing bus stops along High Street was to be relocated as part of a wider change to the broader bus network, including: - new bus stops on Belmore Road, Avoca Street and Cuthill Street to allow interchange with the Randwick terminus - replacement of the current westbound UNSW stop (adjacent to the Lowy Cancer Centre) with an indented bay within UNSW land	- The eastbound light rail tracks between Wansey Road and Botany Street would become a bus and light rail-only shared zone - Diversion of bus routes currently using High Street between Clara Street and Avoca Street to use Clara Street and Arthur Street to access Belmore Road and Avoca Street. - Modification to bus stops as follows: - Relocation of existing westbound bus stop on High Street outside the Prince of Wales Hospital to Clara Street, near High Street.	Changes required to accommodate the revised stop locations and design and to manage predicted traffic and access impacts as a result of the road layout changes on High Street.



Project component	Summary of approved Project	Summary of proposed modification	Justification for change
	○ removal of the current eastbound bus stop on High Street (between Botany Street and Wansey Road) ○ relocation of the eastbound bus stop on High Street, outside the Prince of Wales Hospital, to Clara Street.	○ Extension of the existing southbound bus stop (and awning) on Belmore Road (near Avoca Street). ○ Provision of a new northbound bus stop zone on the western side of Avoca Street. ○ Removal of approved bus stops within High Cross Park along Avoca Street, Belmore Road and Cuthill Street.	



4. Stakeholder consultation

This chapter outlines the consultation that has been undertaken with agencies and stakeholders during the preparation of this modification application.

4.1 Consultation undertaken to date

The CSELR Project Team undertook consultation with the following key stakeholders and agencies prior to the commencement and development of the proposed modification:

- City of Sydney
- Randwick City Council
- Centennial Park and Moore Park Trust
- Australian Turf Club
- University of New South Wales
- Roads and Maritime Services (Roads and Maritime)
- CBD co-ordination office
- Health Infrastructure.

4.2 Consultation undertaken during preparation of the modification

The CSELR Project team has undertaken consultation with key agencies and stakeholders during the preparation of this report. A summary of this consultation is presented in Table 4.1 below.

Table 4.1 Consultation with key agencies and stakeholders

Stakeholder	Date(s)	Summary of key issues raised	Section considered in modification report
Randwick Terminus Alternative Option Working Groups (including representatives from Randwick City Council, Transport for NSW, Health Infrastructure, Roads and Maritime Services, Centre for Road Safety, Policy and Regulation, NSW Trains, UNSW, Spackman Mossop & Michaels, EMGA Mitchell McLennan)	4 March 2015 11.30 am–1.30 pm	• Bus location options along High Street • Consideration of terminus arrangement • Road network impacts • Potential impacts to privately owned properties associated with UNSW High Street stop change.	Section 3.2.1 Section 3.2.3 Section 3.2.5 Section 5.2 (Traffic and transport) Section 5.5 (Property and land use) Appendix A

Stakeholder	Date(s)	Summary of key issues raised	Section considered in modification report
	6 May 2015 1.00–2.30 pm	- Transport network impacts - Road user safety and design - Location of outbound bus stops commuter boarding and alighting patterns in the morning and afternoon peak periods - Tree removal within High Cross Park - Residential property access arrangements - Current levels of service at intersections and the wider network impacts.	Section 3.2.3 Section 3.2.5 Section 5.2 (Traffic and transport) Section 5.4 (Planted trees) Appendix A
	5 August 2015 2.30–4.00pm	- Potential to improve the level of service at key intersections through upgrades - Lane adjustments and potential kerb works on Belmore Road - Heritage impacts in Randwick - Location of bus stops and integration with local amenities	Section 3.2.4 Section 3.2.5 Section 5.2 (Traffic and transport) Section 5.7 (Heritage)
University of NSW	29 September 2015 10.00–11.00 am	- High Street property access arrangements - Servicing requirements for High Street properties	Section 3.2.3
University of NSW Randwick City Council	1 October 2015 10.00 am–12.00 pm	- New access lane from Arthur Street - High Street property access arrangements - Servicing requirements for High Street properties - Local traffic impacts - Parking - Potential CPTED issues associated with the access lane from Arthur Street - Consideration that the access lane be a shared pathway, for both cars and pedestrians - Tree impacts along High Street - Location of the proposed Randwick terminus stop and interchange.	Section 3.2.1 Section 3.2.3 Section 5.2 (Traffic and transport) Section 5.4 (Planted trees) Section 5.5 (Property and land use)
University of NSW Tiggers Honeypot Childcare Centre Kenvale College and Creston College	28 October 2015 10.00–11.00 am	- High Street property access - Design of the new access lane from Arthur Street and access to parking - Delivery and service vehicle access - Access for Creston College - Ownership of residual landlocked' space between Kenvale College and UNSW - Need for further consultation during planning and detailed design process.	Section 3.2.3 Chapter 4 Section 5.5 (Property and land use) Appendix A



Stakeholder	Date(s)	Summary of key issues raised	Section considered in modification report
University of NSW Kenvale College Tiggers Honeypot Child Care Centre	28 October 2015 11.30 am–12.30 pm TBC	• High Street property access • Design of new access lane from Arthur Street and impact on childcare centre. • Loss of green open space in the Childcare centre • Identification of the existing uses of space by children, staff and parents • Health and wellbeing benefits available to children as a result of open and natural space to play • Impact to established uses including storage sheds, vegetable garden and activity space • Loss of trees • Preserving childcare access to land proposed to be located across the access lane • Types of materials used for any new boundary walls • Potential upgrade and landscaping of remaining space.	Section 3.2.3 Section 5.4 (Planted trees) Section 5.5 (Property and land use) Chapter 7

Consultation with the Australian Turf Club (ATC) as operators of the Randwick Racecourse was also undertaken in August and September 2015 with respect to the proposed demolition of Wansey Cottage. The ATC did not raise any objections regarding the proposed removal of the Wansey Cottage building. Further details regarding this design refinement is provided in Chapter 6 of this Modification Report.

4.2.1 Letterbox drop

A letter was delivered on 9 November 2015 to approximately 700 properties within the vicinity of the proposed modification. The boundary of the letterbox drop areas is outlined on the map provided in Figure 4.1. The letterbox drop was also issued directly to all non-resident property owners.

The purpose of the letter was to inform residents about the changes as part of the modification, provide them with high level information about the potential impacts and advise them of the project contact details for more information.



Figure 4.1 Location of letterbox deliveries and door knocking undertaken

4.2.2 Door knocking

Door knocking was undertaken in the afternoon/evening of Monday 9 November 2015. The project team door knocked 73 properties and spoke to 13 residents. The map below (refer to Figure 4.1) outlines the location of the door knocking.

The purpose of the door knocking was to follow up on the letterbox update on the project, explain the background to the proposed modification and the potential impacts it would have to the local area. The exercise also provided the opportunity for residents to provide initial feedback and raise potential concerns.

A summary of feedback and issues raised is included in Table 4.2 below:

Table 4.2 Issues raised during door knocking exercise

Issue	Feedback received during door knocking	Section considered in modification report
Traffic	Concern about an increase in vehicular traffic along Arthur Street.	Section 5.2
Noise	Concern about the vehicle noise that would be generated from the access lane – particularly for the properties located at 10 and 12 Arthur Street.	Section 5.4
Access	Questions about access during construction and whether the access lane would be built before access from High Street ceased.	Section 3.2.3 Section 5.2



Issue	Feedback received during door knocking	Section considered in modification report
Bus routes	• Questions about the eastbound bus stop on High Street and where it would be located to. • Concern that if the bus stop were to be moved it would negatively impact a number of elderly people who regularly use the stop, particularly for the 400 bus route to Bondi Junction.	Section 2.4.3.
Support for the project	• There was overwhelming support for the Light Rail project. The majority of residents thought it was a good idea and were looking forward to the project being completed. ▪ There was an understanding that construction would be disruptive, but that it would be worth it in the long run.	Support for the project was noted.

4.3 Consultation to be undertaken during display

This modification report will be exhibited from 25 November until 11 December 2015. During the exhibition period, government agencies, interest groups and organisations, stakeholders and the community will be invited to make written submissions regarding the proposed modification. A summary of the engagement activities and tools that will be used to encourage community and stakeholder participation during the public exhibition period is outlined below.

4.3.1 Advertising

In addition to the statutory notice placed by the Department of Planning and Environment, the exhibition will be publicly advertised in the Southern Courier and Wentworth Courier prior to commencement.

4.3.2 Display of the proposed modification

This modification report will be placed on public exhibition at a number of locations including:

- Transport for NSW Community Information Centre, King Street, Sydney CBD
- Randwick City Council offices.

During this time display material and hard copies of this modification will be made available to the public in order to provide the community, stakeholders and agencies an outline of expected environmental and social impacts and proposed management and mitigation measures.

4.3.3 Stakeholder briefings

Stakeholder briefings will be offered with the following stakeholders during the public exhibition of the Modification, either on an individual meeting basis or through the Sydney Light Rail project's Community, Business or Urban Domain Reference Groups:

- Randwick City Council
- Centennial Park and Moore Park Trust
- Australian Turf Club
- University of New South Wales
- CBD co-ordination office
- Health Infrastructure.

4.3.4 Sydney Light Rail Forums

The Modification will be presented for feedback and discussion at the quarterly Randwick, Kensington and Kingsford Community and Business Forum to be held by ALTRAC Light Rail during the exhibition period on 30 November 2015.

4.3.5 Submissions report

Submissions received during the exhibition period will be considered by Transport for NSW. After reviewing the submissions a submissions report will be prepared by Transport for NSW that documents all the submissions received and Transport for NSW's responses.

The submissions report will be publicly available on the Transport for NSW website and the DP&E website.

4.4 Ongoing consultation

Ongoing discussions with stakeholders and key project partners (including Randwick City Council, City of Sydney, Australian Turf Club, University of NSW and Centennial Parklands) would continue throughout detailed design.

As part of the ongoing community consultation, the project team will communicate the proposed changes and potential impacts outlined in the modification to local residents and businesses via:

- door knocking
- letter box drops
- community newsletters
- maps and diagrams
- community and business forums
- the project website.



5. Environmental assessment

This chapter assesses the design modification that Transport for NSW proposes to make to the approved Project. An assessment of the difference in environmental impact for each design modification demonstrates that, in each case, they would represent a positive outcome for the proposal or can be adequately managed through the application of suitable environmental management measures.

5.1 Assessment approach

Consideration of key and non-key environmental, social and economic issues was undertaken for the proposed modification. This included an assessment of the potential changes to the environmental impacts described and discussed in the approved Project planning approval documents (including the CSELR EIS and CSELR Submissions Report).

An overview summary of the potential changes to environmental impacts by each of the components of the proposed design change is provided in Table 5.1. Only the issues that would have a different impact to that which was described in the CSELR EIS, Submissions Report or subsequent modifications were assessed.

A summary of the potential impacts resulting from the proposed modification compared to those previously identified as part of the approved Project, and the subsequent net impact, is provided in Table 5.10 at the end of this chapter.

Table 5.1 Overview of potential change to environmental impacts

Environmental aspect	Applicable to proposed modification	
	Potential impact	Comment/reason(s) for change in impact
Traffic and transport	✓	The modification would result in some changes to local traffic movements/network, property access, bus routes, bus stop locations and on-street parking.
Visual and landscape character	✓	The modification would result in a beneficial visual and landscape character outcome in comparison to the approved Project, in particular as a result of reduced impacts to High Cross Park.
Planted trees	✓	The modification would result in a beneficial outcome to planted trees, in particular reduced impacts to High Cross Park. No change to identified trees impacts at UNSW.
Property and land use	✓	The modification would result in some additional impacts to property and land use, in particular additional impacts to existing properties to accommodate the rear access lane from Arthur Street and loss of vehicle access from High Street. However, some beneficial impacts would occur through reduced impacts to High Cross Park.
Noise and vibration	✓	The modification would result in some additional noise and vibration, in particular additional impacts to existing properties to accommodate construction of the rear access lane from Arthur Street and change of traffic patterns due to the closure of some lane directions along High Street.

Environmental aspect	Applicable to proposed modification	
	Potential impact	Comment/reason(s) for change in impact
Non-Indigenous heritage	✓	The proposed modification would result in improvements to High Cross Park (and the existing war memorial), however may result in some impacts to High Cross Park heritage due to subsurface excavation required to place the substation below ground. Some additional impacts may also occur as a result of the relocation of the Randwick terminus stop closer to the existing Prince of Wales Hospital Group site, including the Superintendents Cottage, (listed as a local heritage item).
Socio-economic	✓	The modification would provide some beneficial socio-economic impacts including improved access to existing businesses and services such as the Randwick town centre and Prince of Wales Hospital. The modification would also have some negative impacts associated with the change to existing property accesses along High Street between Wansey Road and Botany Street.
Hydrology, drainage and surface water	✗	The modification is generally consistent with approved Project.
Soil and contamination	✗	The modification is generally consistent with approved Project.
Groundwater	✗	The modification is generally consistent with approved Project.
Aboriginal heritage	✗	The modification is generally consistent with approved Project.
Biodiversity	✗	The modification is generally consistent with approved Project.
Air quality	✗	The modification is generally consistent with approved Project.
Utilities and services	✓	The modification would result in some additional utility impacts along High Street.
Greenhouse gases	✗	The modification is generally consistent with approved Project.
Hazards and risks (including electromagnetic interference impacts)	✓	The modification would result in some benefits to electromagnetic interference impacts in comparison to the approved Project, in particular with respect to potentially sensitive equipment associated with the UNSW.
Privacy	✗	The modification is generally consistent with approved Project.

5.2 Traffic and transport impacts

This section outlines the potential traffic, transport and access impacts associated with the proposed changes to the approved Project and provides a summary of the *Traffic, Transport and Access Impact Assessment*, prepared by GTA Consultant (GTA, 2015) and included as Appendix B.

5.2.1 Construction impacts as a result of the modification

General changes in construction activities and staging

The traffic and transport impact associated with the construction of the revised design would generally be consistent with the impacts identified in the CSELR EIS (Transport for NSW, 2013) as part of the approved Project.



A series of key changes in construction activities have been identified which may result in changed impacts. These include:

- potential traffic disruptions and footpath diversions along Arthur Street associated with the reconfiguration of kerbside parking arrangements, reconfiguration of the Wansey Road, Botany Street, Clara Street and Belmore Road intersections, and construction of the proposed access lane for impacted properties along High Street
- minor localised traffic impacts associated with the installation of traffic signals at the following intersections:
 - ▶ Botany Street and Arthur Street
 - ▶ Arthur Street and Belmore Road
 - ▶ Botany Street and Barker Street
- potential temporary footpath closures on the north side of High Street associated with the UNSW High Street stop, between Wansey Road and Botany Street
- construction activities on the Belmore Road footpath associated with the closure of the southbound slip lane to Avoca Street
- potential traffic disruptions on Avoca Street northbound (south of High Street) associated with the new bus zone.

The modified design would also result in some key benefits including:

- reduced traffic impacts on Avoca Street, Cuthill Street and Belmore Road surrounding High Cross Park as a result of a reduced construction area and traffic generation, including the removal of construction works required to provide the bus stops in the approved Project
- reduced road closure requirements as a result of the light rail tracks no longer required to be built across Avoca Street.

Other than the above potential impacts, no other significant changes and impacts are anticipated relating to the construction of the modified UNSW High Street stop and Randwick terminus stop, compared with impacts identified with the approved Project.

Modified construction access routes

The overall construction routes developed as part of the Construction Traffic Management Plan for the approved Project are not proposed to be modified. The identified construction routes would continue to be used to accommodate the construction of the proposed modification.

5.2.2 Operational impacts as a result of the modification

Stop accessibility

UNSW High Street stop

The modified Project would require the bulk of morning peak alighting passengers to cross the full length of High Street, compared with the situation in the approved Project, in which light rail passengers alighting at the UNSW High Street stop and heading towards UNSW only cross one track and the westbound traffic lane. This change would likely have some impact on the length of signal phase time required to accommodate pedestrian crossing, and would impact on the operation of the Wansey Road/High Street intersection.

Randwick terminus stop

Relocating the Randwick terminus stop to west of the High Street/Avoca Street/Belmore Road intersection would reduce walking distances for light rail passengers in the direction of the Randwick Hospital Precinct, as well as those with destinations (or origins) within the Randwick shopping precinct on Belmore Road. These customers would likely experience shorter walking distances compared with the location of the stop in the approved Project.

Interchange functionality

The relocation of the Randwick stop and terminus, and the associated relocation of bus stops would continue to allow bus to light rail transfers and provide a functional transport interchange. However, the revised location of the terminus stop would result in slightly longer walking distances to achieve this, in particular between light rail and the bus stop on Belmore Road.

A positive impact arising from the changes as part of the modification would be that light rail passengers who would not need to interchange (i.e. using light rail only) would no longer need to cross Belmore Road or Avoca Street in order to access the location the light rail stop in High Cross Park (as per the approved Project).

Traffic

Network operations

Transport modelling of the anticipated network changes was undertaken as part of the assessment (GTA, 2015). The results of this modelling provided a holistic view of the performance of the road network along High Street and Anzac Parade and provides information on the expected travel pattern changes. The key results from this modelling are provided in section 4.2 of the *Traffic, Transport and Access Impact Assessment* (GTA, 2015) and included as Appendix B and summarised below.

The morning peak modelling results illustrated a marginal impact to the network operation, with an approximately 4 per cent increase in average delay across the assessed road network and negligible impact to the average speed. In the afternoon peak, the road network operation would improve marginally with average delays reduced by approximately 3 per cent and average speed increased by approximately 1 per cent.

In the modified Project scenario, Arthur Street and Alison Road were identified to become the primary routes for diverted trips, and to a certain extent, Barker Street and Botany Street south of High Street in the morning peak.

In addition to the assessment of traffic volume changes, traffic volumes at key sections of road within the study area were also assessed to provide a better understanding of changes in traffic flow patterns (refer to section 4.2.2 of the *Traffic, Transport and Access Impact Assessment* (GTA, 2015)). The results of the traffic flow assessment for both the morning and afternoon peaks indicated the following:

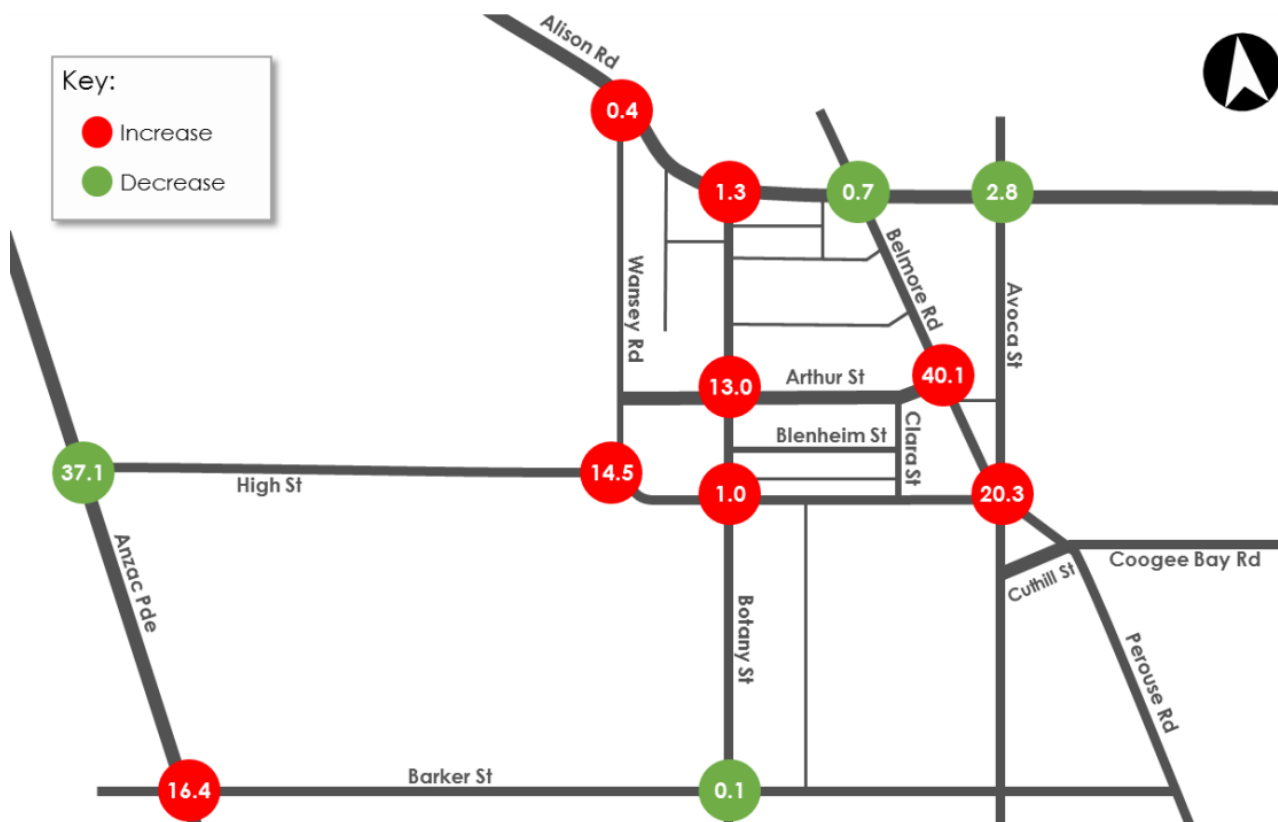
- Traffic flows along Anzac Parade and Alison Road would generally be consistent for both the approved Project and the proposed modification in both morning and afternoon peaks. This indicates that the travel pattern would not be significantly affected by the proposed changes on High Street.
- Westbound afternoon peak flows along Alison Road would increase by more than 100 vehicles.



- Traffic flows would be reduced on High Street eastbound, as a result of the lane closures and diversions. Consequently, traffic flows would increase on the adjacent alternate routes, in particular Arthur Street and Barker Street.
- The section of Arthur Street between Clara Street and Belmore Road would experience significant increases in volumes during both the morning and afternoon peak periods. Similarly, sections of Arthur Street between Wansey Road and Clara Street would be expected to experience various increases in volumes that could impact on local amenity, including access to properties.

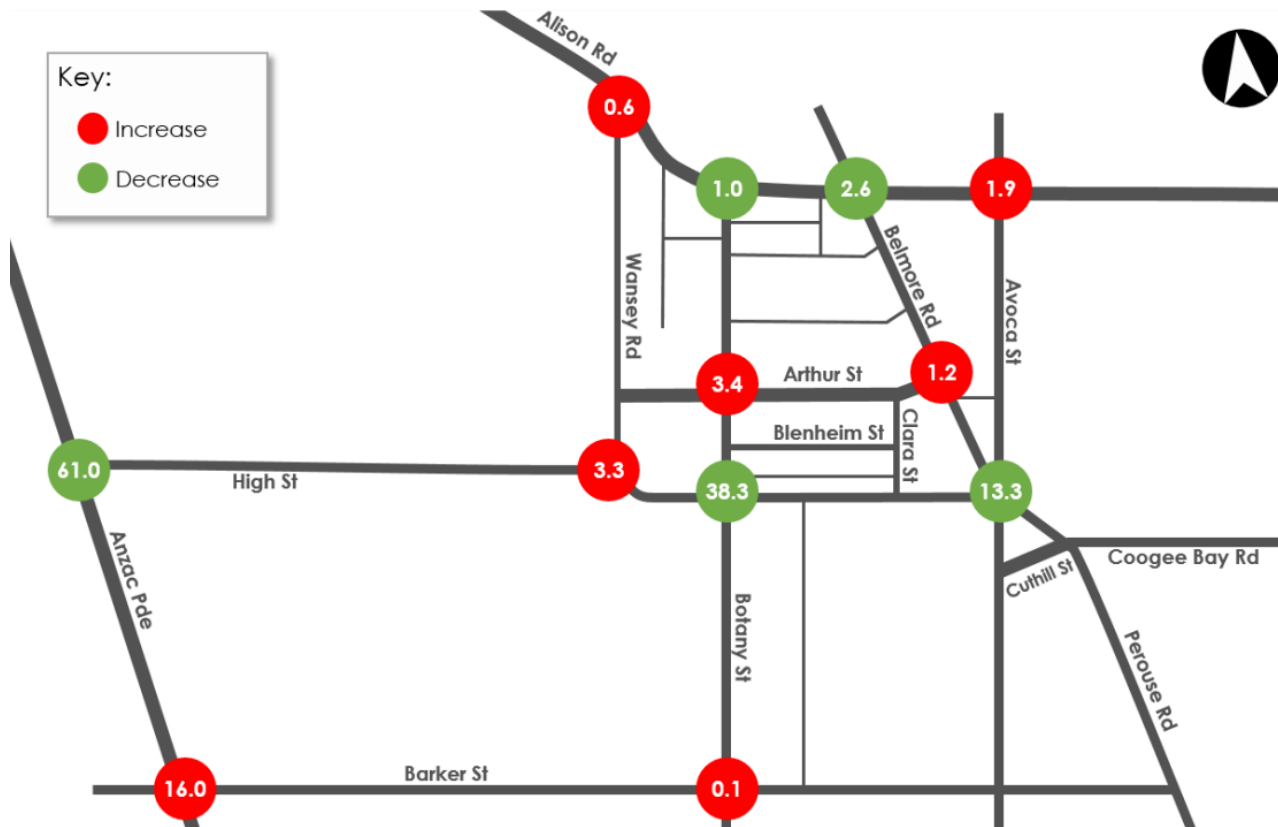
Intersection operations

The impact to the operation of key intersections has been assessed. The impacts of the proposed modification in comparison to the compared to the approved Project in terms of average intersection delays are presented in Figure 5.1 and Figure 5.2 for the morning and afternoon peaks, respectively.



Source: Traffic, Transport and Access Impact Assessment (GTA, 2015), Figure 4.7

Figure 5.1 Changes in morning peak average intersection delays with proposed modification (seconds)



Source: Traffic, Transport and Access Impact Assessment (GTA, 2015), Figure 4.8

Figure 5.2 Changes in afternoon peak average intersection delays with proposed modification (seconds)

During the morning peak, average delays would generally increase at the intersections nearest to the light rail stops, though the High Street and Botany Street intersection would remain unchanged. The (currently unsignalised) intersection of Arthur Street and Belmore Street would have the highest increase in average delay from the approved Project scenario, with an approximately 40 second increase in average delays. The Arthur Street and Botany Street intersection would also result in a 13 second increase in average delay, while the High Street and Wansey Road intersection would increase by approximately 14.5 seconds (average delay).

During the afternoon peak, average delays at the intersections near the UNSW High Street stop would generally be consistent with the conditions in the approved Project scenario, with increases of about 3 seconds at intersections along the Arthur Street alternate route. However, the High Street intersections with Botany Street and Avoca Street would result in average delay increases of approximately 38 and 13 seconds, respectively. The High Street and Anzac Parade intersection would also likely experience a decrease in average delay over the approved Project scenario. However, in both the morning and afternoon peaks, the Anzac Parade and Barker Street intersection is expected to result in a 16 second increase in average vehicle delays.

Considering the average vehicle delays and predicted intersection operation, the intersections immediately adjacent to the UNSW High Street stop and Randwick stop locations, the Arthur Street/Belmore Road, Belmore Road/Avoca Street and High Street/Botany Street intersections would be operating at capacity during the morning peak, while additional capacity would be required for the Wansey Road/High Street intersection for both the morning and afternoon peaks. The potential impacts associated with these capacity increases would be considered during the detailed design phase and incorporated into the Network Management Plan which is required to be developed as part of the MCoA for the Project (specifically MCoA B26).



Further details regarding potential impacts to intersection performance is provided in section 4.2.3 of the *Traffic, Transport and Access Impact Assessment* (GTA, 2015).

Regional travel times

Travel times on three key routes within the Randwick precinct were assessed for the approved Project and the proposed modification scenarios. The key routes assessed were along Anzac Parade, Alison Road and Perouse Road to Todman Avenue as illustrated in Figure 5.3.

A comparative analysis of the approved Project scenario and the proposed modification scenario travel times indicated the following changes for each key routes:

- *Anzac Parade – Northbound* – Travel times for the northbound direction along Anzac Parade respectively would remain relatively consistent for the two scenarios. The changes in travel patterns due to High Street closures would have marginal impact on the operation of this route, indicating a minor reduction in travel time during the morning peak period.
- *Anzac Parade – Southbound* – Similarly to the northbound trips, travel time for the southbound trips would remain unchanged when compared to the approved Project scenario.
- *Alison Road – Westbound* – The average travel time for Alison Road westbound, indicate that the westbound travel times would be likely to remain unaffected in both scenarios in both the morning and afternoon peaks.
- *Alison Road – Eastbound* – Travel times for eastbound trips along Alison Road would increase by approximately 20 seconds. This would be caused by congestion at the Alison Road/Avoca Street intersection resulting from traffic rerouting from Belmore Road. This redirection would be caused by increased delays along the section of Belmore Road where High Street traffic travels via Arthur Street.
- *Perouse Road to Todman Avenue (via High Street) – Westbound* – Only minor changes in the average travel times for this route would be anticipated.
- *Todman Avenue to Perouse Road (via High Street) –Eastbound* – These trips would be subject to the highest rate of rerouting, resulting in increased travel journeys. The increase in travel time would be largely attributed to the closure of the eastbound movement on along High Street.

Further details regarding potential impacts to intersection performance is provided in section 4.2.4 of the *Traffic, Transport and Access Impact Assessment* (GTA, 2015).



Source: Traffic, Transport and Access Impact Assessment (GTA, 2015), Figure 4.9

Figure 5.3 Travel time routes assessed



Bus operations

There would be minor impacts to bus services that pass the High Street/Randwick interchange. Table 5.2 details the changes to the approved Project and the implications on the approved Project bus network.

Table 5.2 High Street/Randwick Bus Network Changes (morning peak)

Route number	Original route	Approved route	Implication of proposed modification on approved route
370	Coogee–Market Place, Leichhardt via Newtown	Route operates as existing.	Section of route on High Street between Clara Street and Avoca Road to be diverted through Belmore Road, Arthur Street and Clara Street, then back to High Street.
372	Coogee–Railway Square via Cleveland Street	Coogee–Railway Square via Cleveland Street, through routed with 412/413 to align with the city centre bus network redesign.	No route change required.
373	Coogee–Circular Quay via Oxford Street	Route cancelled.	Not applicable.
375	Not applicable	New service operating Maroubra Beach–Sydney University via Randwick Junction, High Street and Todman Avenue.	Route diverted through Belmore Road, Arthur Street and Clara Street.
376	Maroubra Beach–Circular Quay via Marine Parade, Alison Road and Foveaux Street	Route cancelled, replaced with 375.	Not applicable.
377	Maroubra Beach–Circular Quay via Marine Parade, Alison Road and Oxford Street	Operates existing route to Alison Road via Belmore Road and terminates.	Bus stop relocation.
M50	Metrobus route between Maroubra Junction and Leichhardt	Will no longer operate in the Eastern Suburbs to align with the Sydney city centre bus network redesign.	Not applicable.

In order to understand impacts of bus route diversions on travel times, representative routes were selected for typical bus route patterns through High Street. Bus routes 370, 400 and 373 were analysed for various sections for the assessment. The results of the bus travel time assessment indicated the following:

- Redirecting the High Street bus routes via Arthur Street would increase inbound bus travel times in the morning peak.
- The bus travel times in the afternoon peak outbound direction would not significantly increase. Two of the three routes investigated would experience shorter travel times with the proposed modification.
- Bus routes along Belmore Road (represented by Route 373) would potential experience longer delays as an indirect result of the proposed closure of High Street westbound (between Avoca Street and Clara Street), as a result of increased delays at the Belmore Road/Arthur Street intersection in the inbound direction during the morning peak.

- In the afternoon peak, the outbound services along Belmore Road (Route 373) would be expected to benefit from a simplified signal phasing arrangements at the High Street/Avoca Street/Belmore Road intersection, which would operate with only three signal phases, in comparison to five signal phases required for the approved Project scenario in order to accommodate light rail and general traffic movements.

Changes to bus routes and travel times would continue to be refined during detailed design through ongoing consultation with bus service providers and Randwick City Council. Further details regarding the potential bus operation impacts are discussed in section 4.3 of the *Traffic, Transport and Access Impact Assessment* (GTA, 2015) and included as Appendix B.

Kerbside parking conditions

The modification would include changes to the intersection upgrades along Arthur Street and Barker Street. The potential impacts to kerbside parking (subject to detailed design of the intersection works) in comparison with the approved Project are summarised in Table 5.3.

Table 5.3 Impacts on kerbside parking

Street	Section	Proposed modification	Summary of parking impacts
Arthur Street and adjacent roads			
Arthur Street (North Side)	Wansey Road to Botany Street	20 m No Stopping (Loss of 3 parking spaces)	Loss of 3 parking spaces
	Botany Street to Arthur Lane	20 m No Stopping at Botany Street, 45 m No Stopping/turn lane at Arthur Lane	Loss of 9 parking spaces
	Arthur Lane to Belmore Road	35 m No Stopping/turn lane	Loss of 7 parking spaces
	Arthur Lane to Belmore Road	10 m No Stopping	Loss of 1 parking spaces
Arthur Street (South Side)	Botany Street to Arthur Lane	20 m No Stopping at Botany Street and new upstand	Loss of 7 parking spaces
	Wansey Road to Botany Street	20 m No Stopping at driveway and 20 m No Stopping at Botany Street	Loss of 5 parking spaces
Wansey Road (West side)	Arthur Street to High Street	No Stopping full length	No impacts to parking relative to approved Project
Wansey Road (East side)	Arthur Street to High Street	No Stopping full length	No impacts to parking relative to approved Project
Botany Street (West side)	Within 20 m of Arthur Street	20 m No Stopping north of Arthur Street and 20 m south of Arthur Street	No impacts to parking
Botany Street (East side)	Within 20 m of Arthur Street	20 m No Stopping north of Arthur Street and 10 m No Stopping south of Arthur Street	Loss of 2 parking spaces
Clara Street	Within 20 m of Arthur Street	As per existing	N/A
Arthur Lane	Within 20 m of Arthur Street	As per existing	N/A



Street	Section	Proposed modification	Summary of parking impacts
Belmore Road (West side)	Within 20 m north of Arthur Street	20 m No Stopping	Loss of 2 parking spaces
	Within 20 m south of Arthur Street	20 m No Stopping	Reduced Bus Zone
Belmore Road (East side)	Within 20 m of Arthur Street	20 m No Stopping north of Arthur Street, 10 m south of Arthur Street	Loss of 7 parking spaces
Barker Street and adjacent roads			
Barker Street (North side)	Botany Lane to Botany Street	As per existing	N/A
	Botany Street to Maud Street	20 m No Stopping	Loss of 1 parking space
Barker Street (South side)	Botany Lane to Botany Street	20 m No Stopping	Loss of 2 parking space
	Botany Street to Maud Street	20 m No Stopping	Loss of 1 parking space
Botany Street	20 m north of Barker Street	20 m No Stopping, Relocation of bus stop	Loss of 2 parking space
	20 m south of Barker Street	20 m No Stopping	Loss of 3 parking space
Belmore Road/Avoca Road intersection			
Belmore Road (East side)	Within 60 m north of the intersection	60 m bus zone peak, 40 m bus zone off peak and 20 m parking off peak, 20 m No Stopping	No impacts to parking
Belmore Road (West side)	Within 60 m north of the intersection	20 m taxi rank off peak, 20 m parking off peak	No impacts to parking
Avoca Street (West side)	Within 80 m north of the intersection	20 m No Stopping Zone, 60 m Proposed Bus Zone	No impacts to parking
Belmore Road (east of Avoca Road)			
Belmore Road (North side)	Avoca Road to Cuthill Street	Existing parking impacted as part of approved Project, no longer impacted	Reduced impact by 10 parking spaces
Cuthill Street (North side)	Avoca Road to Belmore Road	Existing parking impacted as part of approved Project, no longer impacted	Reduced impact by 10 parking spaces
Total impact			32 car parking spaces

Table 15.12 of the CSELR EIS (Transport for NSW, 2013) identified that a total of 297 parking spaces would be lost as a result of the approved Project within the Randwick Precinct.

Overall, the modified design would impact an additional 52 car parking spaces. A majority of these spaces would be impacted through the proposed intersection works along Arthur Street and at the intersection of Barker Street and Botany Street to accommodate required turning lanes at existing intersections.

The removal of the approved bus bays within High Cross Park, as a result of the relocation of the Randwick terminus stop, would however result in approximately 20 short term parking spaces along Cuthill Street and Belmore Road (east of Avoca Street) no longer being impacted by the Project. The overall impact to parking spaces within the Randwick precinct would therefore result in the net loss of approximately 32 parking spaces. In comparison to the approved Project, this would result in a total loss of parking for the Randwick Precinct of 329 parking spaces.

The potential impacts on parking within the Randwick precinct would be considered during the detailed design phase. Specifically, potential parking impacts would be considered as part of the Parking Offsets and Management Strategy which is required to be developed as part of the MCoA for the Project (MCoA B29). Specifically, MCoA B29(c) notes that the development of the management strategy requires the identification of measures to address identified parking impacts, including but not limited to, replacement parking, parallel parking, resident parking schemes and provision of clearways. The additional net loss of approximately 32 additional parking spaces, in comparison to the approved Project, would be considered as part of the ongoing development of management measures to address parking through the Parking Offsets and Management Strategy.

Walking and cycling

There would be some minor changes to access arrangements for pedestrians and cyclists within the Randwick and UNSW High Street precincts during operation of the Project. The following details the key changes in access arrangements.

Randwick terminus Precinct Access Plan

The northbound (morning peak) bus stop which was previously provided as part of the light rail interchange within High Cross Park would be relocated to Avoca Street, south of High Street. The southbound (afternoon peak) bus stop on Avoca Street would be removed and would be relocated to the existing stop on Belmore Road, north of High Street (refer to Figure 3.11).

The pedestrian connection between the southbound bus stop on Belmore Road and the light rail stop on High Street would be improved through the removal of the existing slip lane between Belmore Road and Avoca Street and associated improvements to the pedestrian crossing on Belmore Road (to be provided by Randwick City Council). The slip lane/pedestrian crossing would be replaced by a footpath which would reduce the number of times pedestrians are required to cross the road to access the light rail stop from the bus stop.

UNSW High Street Access Plan

The separation of the UNSW High Street platforms would improve the free flow of passengers, particularly given the high patronage of the stop during the morning peak. It is noted that this morning peak patronage would largely be transferred to the northern footpath given the higher westbound patronage. The morning passengers would largely include alighting light rail passengers who would now need to cross the full width of High Street (compared with the situation in the approved Project, in which these passengers only needed to cross a shorter section of High Street).

The pedestrian crossings located west of the UNSW High Street stop would be maintained as identified as part of the approved arrangement to allow the light rail passengers to access both sides of High Street. Additionally, the revised stop has been designed so as not to preclude a future potential pedestrianisation of High Street between Wansey Road and Botany Street in accordance with MCoA B43.



Cyclist accessibility through High Street would be slightly reduced through the removal of the eastbound traffic lane. Cyclists would be required to divert to roads located north of High Street including Waratah Avenue or Blenheim Street. Waratah Avenue and Blenheim Street would be suitable cycling routes as they would contain relatively lower traffic volumes than Arthur Street.

Waratah Street and Blenheim Street however do not connect to the Wansey Road shared path. Thus, access to the Wansey Road shared path from the east would also require the use of Arthur Street from Botany Street. This investigation would be undertaken as part of the Pedestrian and Cyclist Network and Facilities Strategy, required by condition B33 of the planning approval.

Property access

Private properties

With the closure of vehicle access on particular traffic flows along High Street, the proposed modification would impact on vehicular access to a number of properties along High Street. In particular, changes to vehicular access to the following properties would occur:

- 36 High Street (Creston College)
- 38 High Street (Kenvale College Hospitality and Event Management)
- 42 and 44 High Street (residential apartment buildings with shared access)
- 46 High Street (residential apartment building).

Vehicle access to the current High Street frontage to these properties would no longer be possible with the proposed modification in place. In order to retain access to these properties a new rear access lane would be provided. This has been previously described in section 3.2.3 of this report. No removal of property access along the remainder of High Street would occur as a result of the proposed modification.

Access to these properties for emergency services from High Street (such as NSW Fire and Rescue and NSW Ambulance) would not be prohibited to these properties, if required.

Sydney Children's Hospital – emergency vehicle access

The existing emergency vehicle area of the Sydney Children's Hospital on High Street would continue to be accessible from various directions, as per the approved Project. The closure of the eastbound traffic lane on High Street between Wansey Road and Botany Street, and the westbound traffic lane between Clara Street and Avoca Road would potentially restrict some movements of general traffic. However, emergency vehicles accessing the Sydney Children's Hospital ambulance area would be allowed to use the light rail corridor (when no LRVs are stopped at the Randwick terminus stop). Where LRVs are occupying the light rail tracks, emergency vehicles would be required to use Arthur Street and Clara Street in order to access the hospital.

This would be consistent with the MCoA B30 which requires that the project should maintain emergency vehicle access to health facilities along the project alignment, including facilities along High Street, Randwick.

In order to minimise the risk of emergency vehicles being held up by LRVs, alternate access routes which avoid the affected traffic lanes would be identified (such as the use of Arthur Street and Clara Street) and communicated to emergency service operators.

5.2.3 Proposed mitigation

In addition to the existing MCoAs and mitigation measures previously proposed as part of the approved Project, the following additional mitigation measures are proposed to manage the potential additional traffic and transport impacts:

- Further investigation would be undertaken during the detailed design stage to allow for a more efficient connection along Arthur Street, in consideration of increased traffic flows. This investigation would be undertaken as part of the Pedestrian and Cyclist Network and Facilities Strategy, required by condition B33 of the MCoA.
- Following completion of the intersection upgrade works along Arthur Street and at the intersection of Barker Street and Botany Street, it is proposed that monitoring of these locations would be undertaken to assess their ongoing operation and determine whether additional operational requirements (such as increase of 'No Stopping' areas) are required. This would be undertaken in consultation with Randwick City Council.

5.3 Visual and landscape character impacts

5.3.1 Construction impacts as a result of the modification

The changes associated with the modification to the Randwick terminus stop would result in benefits to the visual impact of the approved Project during construction as the construction would not result in the use of a majority of High Cross Park as a construction compound. The overall construction area at this location would be substantially reduced (refer to Figure 3.12) providing a moderate benefit during construction in comparison to the approved Project.

With respect to the proposed changes to the UNSW High Street stop, this component of the modification would not result in any noticeable changes to the visual impact of the approved Project during construction. Some additional temporary impacts would however occur along Arthur Street and Belmore Road where minor works, such as line marking and extension of the bus stopping zone are now proposed. This impact would be minor in nature and would be temporary in nature.

The construction of the revised access driveway from Arthur Street would also result in some visual impacts during construction (such as vegetation clearing and placement of construction machinery and other equipment), however the visual impacts of these works would be predominantly limited to immediately adjacent residences.

5.3.2 Operational impacts as a result of the modification

At the Randwick terminus end, the proposed modification would include the relocation of the Randwick Terminus from High Cross Park to High Street, between Clara Street and Avoca Street, on the southern side of the road reserve. Most notably the modified design would result in a substantial beneficial outcome through the avoidance of the landscape and visual impacts to High Cross Park which would occur as part of the approved Project through the relocation of the Randwick terminus stop platforms and the proposed placement of the substation below ground within High Cross Park.



The island platform of the modified design, with a length of approximately 70 metres, would become the most visible component of the relocated Randwick terminus stop. The platform would include a light rail canopy extending approximately half of the platform, and would be accessed via two pedestrian crossings; one at Avoca Street, and one at the location of the existing pedestrian crossing east of Clara Street. The terminus canopy would become a visually dominant element within the centre of the street. The height of the canopy would be at approximately the same height as the existing adjacent building awnings.

The landscape and visual impacts would result in a significant change to the views down High Street. The platform and canopy would add to the visual clutter of the streetscape in this location, however the changes are in keeping with the existing urban character of the street and surrounding Randwick town centre retail district. This would therefore result in a minor adverse impact overall.

As part of the overall works, the existing southern footpath along High Street would be slightly reduced where it is located adjacent to the terminus platform, due to the proximity of the light rail tracks. However, the footpath would be slightly wider beyond the platform towards Clara Street. The southern footpath would be paved with new concrete unit paving to match the existing northern footpath paving (or similar, subject to ongoing consultation with Randwick City Council regarding proposed finishes). The landscape and visual impacts of this change would result in an improvement to the amenity of the streetscape due to the change in pavement material from a low quality to high quality material.

The footpath reduction adjacent to the platform would result in a negative visual impact due to the constrained footpath width at that location, however this will be offset by the footpath widening beyond the platform. Therefore the changes on the southern footpath will result in a minor beneficial improvement overall.

At the UNSW High Street stop location, the modification would include a side platform integrated within the northern footpath, and an island platform located centrally in the road which would only service westbound (towards the city) LRVs. This northern platform, due to its predominant purpose as a disembarking stop, would exclude a stop shelter.

The integration of the side platform with the northern footpath would require a series of modifications to this side of the street. These changes include the replacement of the footpath with a combined footpath and side platform (approximately 70 metres long); the removal of four existing driveways; and the replacement of the existing footpath with new paving consistent with the urban design objectives of the stop (subject to detailed design). The platform would also include a number of 'totem pole' type digital card readers placed along the platform with integrated platform lighting and signage.

The new pavement would result in a minor beneficial improvement to the streetscape amenity, however the additional 'totem' poles would be the most visible component of the modification and would add some visual clutter to the street, resulting in a minor adverse change in comparison to the approved Project. Overall, the proposed changes are considered to be comparable to the approved Project, resulting in a negligible change to the visual impact of this stop overall. The proposed modifications to the southern footpath, adjacent to the UNSW Lowy Cancer Research Building would also not be significant and would include a minor widening of the footpath from the approved Project. Therefore the landscape and visual changes to this side of the street would be considered to be consistent with the approved Project which identified the UNSW High Street stop as having a high adverse impact overall.

The modification to provide the proposed access lane from Arthur Street would result in some additional visual impacts to those identified as part of the approved Project. This would include the removal of existing vegetation and the creation of an additional hardstand area. However, given the location of the proposed access lane towards the centre of the broader block of land between High Street and Arthur Street, a majority of the views to this site would be limited to immediately adjacent properties, and not visible to the general public.

The overall impact would be a moderate beneficial impact overall as compared to the approved Project. This is due to the regional sensitivity of the area, and the avoidance of significant impacts to the existing High Cross Park. The avoidance of these impacts would offset the potentially minor adverse visual impacts associated with the other elements of the proposed modification.

5.3.3 Proposed mitigation

In addition to the existing MCoAs and mitigation measures previously proposed as part of the approved Project, the following additional mitigation measure is proposed to manage the potential additional visual and landscape impacts:

- The detailed design phase of the modification would investigate urban design opportunities to minimise the potential impacts associated with the proposed access lane. This would include the consideration of appropriate landscaping, treatments for the retaining wall and provision and replacement of fencing which is of a similar style to that currently provided for adjacent properties.

With the exception of the additional mitigation measure proposed to manage visual impacts associated with the new access lane from Arthur Street (refer to section 3.3.3), the existing MCoAs and previously proposed mitigation measures identified as part of the approved Project would be sufficient to manage the potential visual and landscape impacts associated with the modification.

5.4 Planted tree impacts

5.4.1 Impacts as a result of the modification

A comparison of between the tree impacts associated with the approved Project and the proposed modification is shown in Table 5.4

Table 5.4 Tree impacts for the approved Project and the proposed modification

Location	Approved impacts	Proposed modification impacts
High Cross Park	33 trees to be removed in High Cross Park including trees listed on Randwick City Council's significant tree register	26 trees to be retained (7 trees along Belmore Road still to be removed, as per approved project)
High Street	Most trees along High street to be removed	As for the approved project plus an additional 2 trees to be removed adjacent to Randwick stop
New lane off Arthur Street	No tree impacts	12 trees to be removed for construction of lane

As seen in Table 5.4 the proposed modification would result in a net gain of 12 trees, taking into account trees saved in High Cross Park and additional trees to be removed in High Street and for the laneway. The trees that would be retained would include the significant trees within High Cross Park, including the five Cook Pines, Moreton Bay Fig and Port Jackson Fig.



This would result in a highly beneficial landscape and visual improvement over the approved Project. However, the modified design for the Randwick terminus stop would include the removal of approximately two additional trees on the southern side of High Street adjacent to the revised location for the terminus stop, in addition to the trees proposed to be removed along High Street as part of the approved Project.

Overall, the proposed modification would result in a reduced amount of tree impacts by the Project. The net benefit would be a reduced impact to approximately 12 trees, in comparison to the approved Project. This would include reduced impacts to a number of the significant trees within High Cross Park.

5.4.2 Proposed mitigation

It is considered that the existing MCoAs and previously proposed mitigation measures identified as part of the approved Project would be sufficient to manage a majority of the residual impacts with respect to planted tree impacts. However, the following additional mitigation measure is proposed to manage the potential additional planted tree impacts with respect to the proposed location of the substation in High Cross Park:

- The location of the substation within High Cross Park would ensure that the works would not impact on any significant trees within High Cross Park.

5.5 Property and land use impacts

5.5.1 Impacts as a result of the modification

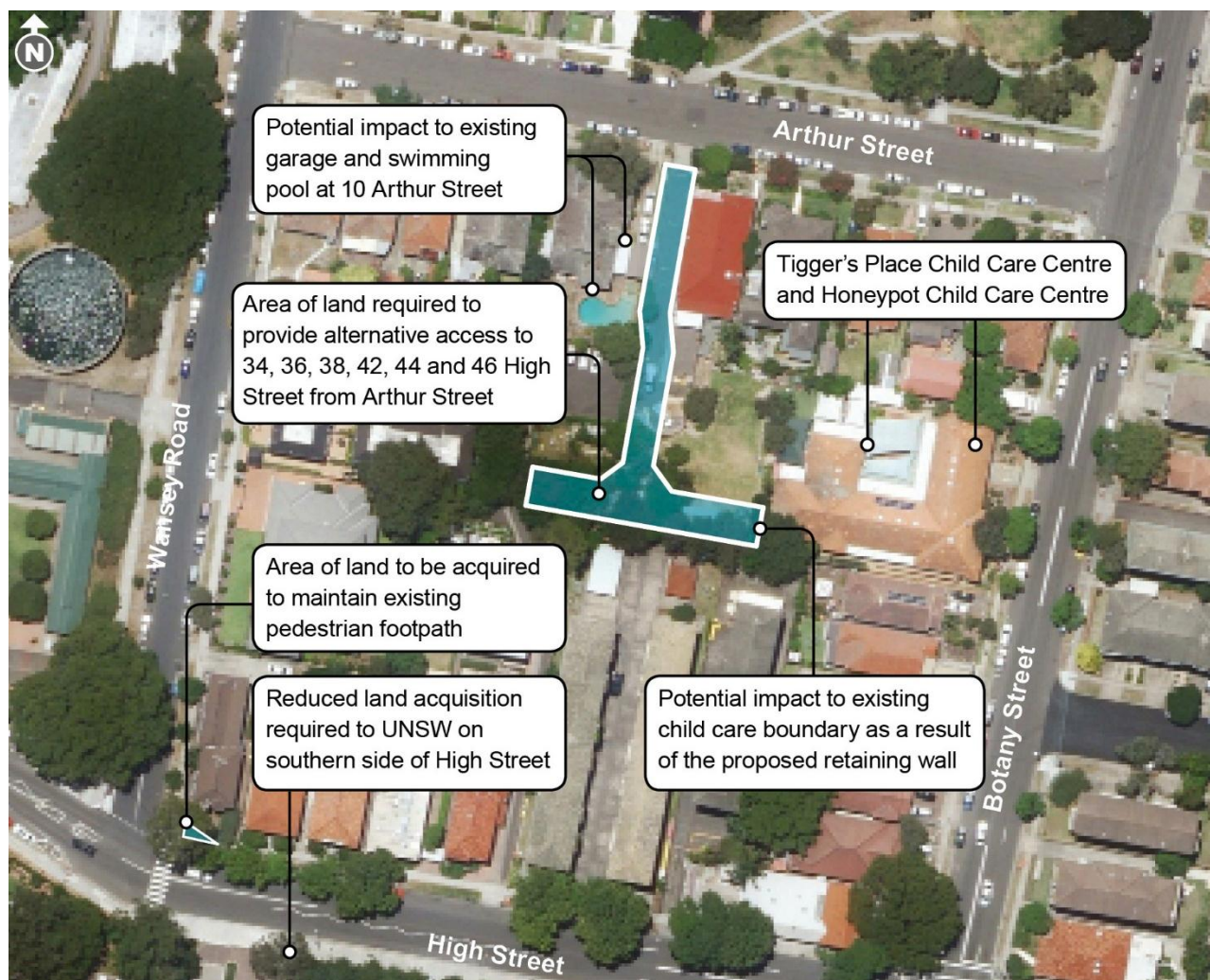
The proposed modification would result in both beneficial outcomes and some additional impacts to existing properties and land use.

The modified design would result in a decrease to the land use and property impacts on the High Cross Park. The relocation of the Randwick terminus stop and associated bus interchange bays, which were proposed as part of the approved Project, would require a substantially reduced area of High Cross Park to be impacted. The revised arrangement for the Randwick substation to be located underground would also result in an overall beneficial outcome for the ongoing use of High Cross Park during operation.

The modified location of the Randwick terminus stop within High Street would also provide an opportunity for improved land use integration and amenity with the surrounding areas. This could be achieved through the provision of new public plazas (to be provided by others) and improved access to and integration with key land uses including the Prince of Wales Hospital and the Randwick town centre.

The proposed modification would however result in some additional impacts to existing properties associated with the revised access driveway from Arthur Street. The revised access driveway would require approximately 550 square metres of existing UNSW land between High Street and Arthur Street which has been utilised by the adjacent childcare centre (Tigger's Place Childcare Centre and Honeypot Childcare Centre) under an informal agreement with UNSW for a number of years (refer to Figure 5.4). This area is not currently part of the formally licenced area for the childcare centre, with the exception of a small area of land at the eastern end of the proposed cul-de-sac.

With the exception of the existing driveway, this land is currently vegetated and contains a series of sheds, a playhouse and garden and vegetable patches used and maintained by the childcare centre.



Note: Indicative only. Subject to detailed design

Figure 5.4 Land use impacts resulting from the modification

The provision of the proposed access lane would potentially result in the following additional impacts to those identified as part of the approved Project (subject to detailed design):

- removal of an existing garage structure and swimming pool associated with 10 Arthur Street, Randwick
- relocation of an existing shed and playhouse structure
- relocation of existing fences to maintain safe areas adjacent to the access lane
- relocation of existing utilities located along Arthur Street
- some vegetation removal.

Further detailed design of the proposed access lane would aim to minimise the potential impacts to existing items such as the existing garage structure and swimming pool located at 10 Arthur Street.



The location of the proposed retaining wall at the eastern end of the access way would also potentially impact a small portion of the existing childcare centre to provide a sufficient driveway access to 46 High Street. To offset the area of impact associated with the childcare centre, the existing rear boundary fence of the childcare would be modified to retain the same area of outdoor space currently provided by the childcare centre (in order to meet its licence obligations for outdoor space). The location for the realignment of the boundary fence would be determined during detailed design in consultation with UNSW as the land owner and the childcare centre operators.

Transport for NSW, would continue to maintain engagement with other affected land owners and organisations including the UNSW (as land owners), Kenvale College, Creston College and affected property owners to mitigate and minimise potential impacts associated with the proposed access lane.

A small area of land currently owned by UNSW (30 High Street) would also be required to be transferred to Randwick City Council at the corner of Wansey Road and High Street. This land would be required to maintain the existing pedestrian footpath width which would be affected through the minor realignment of the light rail track at this location. The track would be modified to accommodate the relocated UNSW High Street stop. This area of land would be approximately 30 square metres (refer to Figure 5.4). The modified design of the UNSW stop would however result in a reduced amount of land required from UNSW landholding on the southern side of High Street at this location.

5.5.2 Proposed mitigation

In addition to the existing MCoAs and mitigation measures previously proposed as part of the approved Project, the following additional mitigation measures are proposed to manage the potential additional property and land use impacts:

- During detailed design, the location for the realignment of the boundary fence would be determined during detailed design in consultation with UNSW as land owner and the childcare centre operators to avoid reduction of the outdoor space.
- Where feasible, opportunities to replace the existing open space area between the proposed access lane and the childcare centre affected by the proposed modification would be investigated. Investigation would include consideration of appropriate vegetation, relocation of the existing shed and playhouse structure, and relocation of an existing vegetable garden currently used by the childcare centre. The final use and layout for this area of land would be determined through consultation with the UNSW and the childcare centre.

5.6 Noise and vibration impacts

This section summarises the potential noise and vibration impacts associated with the proposed changes to the approved Project and provides a summary of the *Noise and Vibration Impact Assessment*, prepared by WSP | Parsons Brinckerhoff 2015 and included as Appendix C.

5.6.1 Construction assessment

Construction within light rail corridor

The construction footprint within the light rail corridor is not expected to change significantly. Due to the minor realignment and reconfiguration of the UNSW High Street and Randwick terminus stops, some changes in the schedule and timing of various construction stages is likely to occur.

This is however not likely to significantly change the overall noise impact or the receiver's perception of the construction activities. It is therefore considered that the existing MCoAs and previously proposed mitigation measures identified as part of the approved Project would be sufficient to manage the potential impacts associated with the modification.

Construction of the proposed access lane off Arthur Street

The proposed construction of the access lane is expected to result in some additional noise and vibration impacts to the receivers in the vicinity of the proposed lane. Based on noise monitoring results conducted in October 2015, the rating background level (RBL) for day time in this area was calculated to be 43 dBA. This implies that the applicable noise affected construction noise management level (NML) of $L_{Aeq(15\text{minute})}$ 53 dBA would be applicable during standard hours (based on the recommended NML being the RBL plus 10 dB).

The level of impact due to construction is likely to differ based on the stages of work being undertaken (e.g. ground preparation, foundation work, and concrete pouring). However, based on the source noise levels which are anticipated for the construction of the proposed lane (refer to Table 4.4 of the Noise and Vibration Impact Assessment (WSP | Parsons Brinckerhoff, 2015) included as Appendix C), noise levels in the order of 95 dBA would potentially be expected during the concrete pouring stage (anticipated to be the noisiest activity). This would be more than 40 dB in exceedance of the applicable NML. Noise levels of this magnitude at receivers make them 'highly noise affected' in accordance to the Interim Construction Noise Guideline (ICNG) (Department of Environment, Climate Change and Water, 2009). The construction duration of the proposed access lane is not anticipated to be extensive and short-term (approximately 3 months, subject to detailed design), the duration of noise disturbance would only be temporary in nature. The properties identified to be most impacted by the construction of the proposed access lane were identified to be:

- 8, 10, 14, 16, 18 Arthur Street, Randwick
- 24 Botany Street, Randwick (child care centre)
- 36-38, 42, 44, 46 High Street, Randwick
- 41, 43, 45 Wansey Road, Randwick.

On this basis, consistent with the current MCoA B5 for the approved Project, a site specific Construction Noise and Vibration Impact Statement would be prepared during detailed design stage to quantify the likely noise and vibration impact during various stages of construction and the timeline of the construction stages. In particular, the most impacted receivers would also be further consulted and informed of the full details of the proposed construction and to ensure that all feasible and reasonable mitigation strategies are applied to minimise or shorten the potential noise and vibration impact.

Also, in accordance with MCoA B89 (b)(ii), specific liaison and consultation would be undertaken with the operator of the childcare centre located at 24 Botany Street. Children at the childcare centre would likely be the most impacted by the anticipated construction noise and vibration during outdoor activities and also during daytime rest periods. Consultation with the childcare centre operator (and UNSW as the landowner) during detailed design would continue to understand potentially noise sensitive time periods and plan the construction works so that the expected highest noise and vibration intensive works can be carried out outside of these times, wherever possible. Where this is not possible, the childcare centre operator would be notified of such activities so that precautionary actions can be taken to minimise potential impact on the childcare centre.



5.6.2 Operational assessment

Airborne noise

Wansey Road to Botany Street

The properties 36, 42 and 44 High Street and the UNSW Lowy Cancer Research Centre were predicted to exceed the applicable airborne noise trigger levels as part of the approved Project. The light rail alignment at these locations would be located closer towards the residential properties along High Street and further away from the UNSW Lowy building (approximately 4 metres for the residential properties and approximately 8 metres for the UNSW Lowy building). It is anticipated that the change to the approved alignment, and associated setback distances, would be likely to trigger a change in noise levels of approximately +1.5 dB and -2 dB for the residential properties and the UNSW Lowy building respectively.

Based on the approved Project, this relative increase is likely to cause all properties from 30 High Street to 46 High Street to exceed the applicable airborne noise trigger levels (refer to Table 2.1 of the *Noise and Vibration Impact Assessment* (WSP | Parsons Brinckerhoff, 2015) included as Appendix C). This represents an additional five properties that may be impacted, and require further consideration of mitigation, than the approved Project.

For the UNSW Lowy building, despite the potential decrease in airborne noise impacts, the applicable noise trigger level for an educational building would still be likely to be exceeded, as previously identified for the approved Project.

Botany Street to Avoca Street

Most of the residential dwellings between Botany Street and Avoca Street were previously identified to potentially exceed the airborne noise trigger levels as part of the approved Project. This outcome is not anticipated to change as the location of the alignment within the roadway has substantially not changed.

However, for the properties located in close proximity to the revised location of the crossover near Clara Street (due to the revised location of the Randwick terminus stop), there is likely to be a marginal increase in potential airborne noise impact due to the gaps introduced on the rail tracks. Therefore the level of exceedance of the airborne noise trigger levels would potentially be higher at this location.

Additionally, there is likely to be an increase in the airborne noise impact at the Prince of Wales Hospital buildings adjacent to the Randwick terminus platform due to the decrease in setback distance between the near track and the buildings (reduced from approximately 9 metres to 5 metres) to accommodate the stop platform. LRVs are likely to be operating at low speeds (less than 15 kilometres per hour) at this location. Therefore, the dominant noise source at this location is expected to be due to on-board systems such as air-conditioning, motors, power equipment or the like rather than noise due to LRV movements. These noise sources are likely to be steady state in nature when the LRV is stationary and when travelling at low speeds.

The potential airborne noise impact would be likely to exceed the average 1 hour maximum noise level ($L_{Aeq(1hour)}$) trigger for hospital wards at the Prince of Wales Hospital. In the case where the façade of these buildings facing the light rail tracks do not contain hospital wards, the applicable noise trigger level is met. As part of the detailed design process, further investigation would be undertaken regarding potentially affected buildings which form part of the Prince of Wales Hospital, to determine the type of spaces directly impacted by noise from the LRV. This would be consistent with existing MCoAs B16, B17 and B18.

Airborne noise – summary

A summary of the predicted change in airborne noise impact is provided in Table 5.5.

Table 5.5 Light rail vehicles airborne noise impact

Location	Trigger level (external)	Predicted noise levels (dBA)		Additional properties to be considered for mitigation
		Approved Project	Proposed modification	
30–46 High Street (residential dwellings)	60 L _{Aeq} (15hour) 50 L _{Aeq} (9hour) 80 L _{Amax}	54–56 L _{Aeq} (15hour) 49–52 L _{Aeq} (9hour) 73–75 L _{Amax}	56–58 L _{Aeq} (15hour) 50–54 L _{Aeq} (9hour) 75–77 L _{Amax}	30, 32, 36, 38 High Street (exceedance of night time trigger level)
56–58 High Street (residential dwellings)		58–59 L _{Aeq} (15hour) 55–56 L _{Aeq} (9hour) 83 L _{Amax}	58–59 L _{Aeq} (15hour) 55–56 L _{Aeq} (9hour) 85 L _{Amax}	Previously identified as part of approved Project. No additional mitigation required.
UNSW Lowy Cancer Research Centre	50 L _{Aeq} (1hour)	54–55 L _{Aeq} (1hour)	52–53 L _{Aeq} (1hour)	Previously identified as part of approved Project. No additional mitigation required.
Prince of Wales Hospital building closest to the City-bound track	45 L _{Aeq} (1hour) (ward) 60 L _{Aeq} (1hour) (other)	53–54 L _{Aeq} (1hour)	54–55 L _{Aeq} (1hour)	Consideration of mitigation required if the buildings closest to the light rail tracks contain hospital wards.

Note: L_{Aeq}(15hour) – day time noise level; L_{Aeq}(9hour) – night time noise level; L_{Aeq}(1hour) – average 1 hour maximum noise level; L_{Amax} – maximum noise level

Vibration

Residential dwellings (Wansey Road to Avoca Street)

Along this section of the light rail track alignment, the proposed modification would result in similar vibration impacts to the approved Project. At the revised location of the light rail track crossover (near 56–58 High Street), the modification would introduce multiple gaps along the light rail tracks.

However, the expected vibration levels at this location are anticipated to be below the prescribed trigger levels and are therefore not likely to trigger any significant additional vibration impacts beyond the approved Project.

Existing establishments with vibration-sensitive equipment

As described for the approved Project, a number of properties along the alignment within the Randwick Precinct have been identified as having the potential to house vibration-sensitive scientific instruments (refer to Table 2.4 of the Noise and Vibration Impact Assessment (WSP | Parsons Brinckerhoff, 2015) included as Appendix C).

Based on the proposed modification, the following impacts are anticipated to occur relative to the approved Project:

- the potential vibration impact at the UNSW Lowy Cancer Research Centre is likely to decrease due to increased setback distance from the light rail tracks to this building



- the potential vibration impact at some buildings of the Prince of Wales Hospital is likely to increase due to the introduction of a crossover near the Clara Street intersection as well as the light rail tracks being located closer to the hospital at the relocated Randwick stop location.
- a medical imaging centre located at 64 High Street has the likelihood of housing vibration-sensitive equipment and is in close proximity to the relocated crossover. On this basis, this medical imaging centre would require further investigation during detailed design stage, in addition to the properties currently identified as part of the approved Project.

Overall, the previously identified properties are still considered to require further investigation during detailed stage to confirm the type of equipment being used on site and specific vibration criteria as identified as part of the approved Project. This investigation would be undertaken in accordance with the requirements of existing MCoAs B16, B17 and, in particular, B18. As part of the investigations, the medical imaging centre located at 64 High Street would also be required to be considered due to its proximity to the proposed crossover.

Ground-borne noise

Ground-borne noise is associated with noise radiating from the structure and/or interior surfaces (e.g. floor, walls) of a building due to vibration being transmitted from the source to the subject vibration receiving buildings. Typically, ground-borne noise impact is only relevant when it is expected to be higher than the airborne noise and if it is expected to be audible within habitable areas or potentially noise-sensitive spaces.

The potential ground-borne noise levels at selected potentially impacted properties were predicted in comparison to the approved Project. The results of the potential ground-borne noise impacts are presented in Table 5.6.

Table 5.6 Ground-borne noise impact – Proposed modification

Location (interior)	Ground-borne noise $L_{A\text{Smax}}$			Estimated airborne noise ¹ $L_{A\text{Smax}}$
	Trigger level	Approved Project	Proposed modification	Proposed modification
30–46 High Street (residential dwellings)	40 $L_{A\text{Smax}}$ (day) 35 $L_{A\text{Smax}}$ (night)	37 dBA	39 dBA	55 dBA
56–58 High Street (residential dwellings)		39 dBA	49 dBA	60 dBA
Prince of Wales Hospital building closest to the City-bound track	35 $L_{A\text{Smax}}$	32 dBA	35 dBA	55 dBA

Note 1: Airborne noise levels estimated based on the levels presented in the EIS and the relative change in distance to the nearest receivers as discussed in section 2.4 of the Noise and Vibration Impact Assessment (WSP | Parsons Brinckerhoff, 2015) included as Appendix C.

Based on the results presented in Table 5.6, the proposed modification would have the potential to cause ground-borne noise to exceed the prescribed trigger levels. This included an estimated 10 dB increase at 56–58 High Street due to the relocated crossover in front of these properties.

However, based on a review of the airborne noise assessment findings from the approved Project, the predicted external airborne L_{Amax} noise level associated with an LRV passby would be in the order of approximately 75 to 80 dBA. On this basis, the likely internal airborne L_{Amax} noise levels was estimated to be in the order of 55 to 60 dBA, assuming a closed façade with standard construction. Such levels are higher than the predicted ground-borne noise in Table 5.6.

In accordance with the NSW *Rail Infrastructure Noise Guideline* (NSW EPA, 2013), ground-borne noise is only relevant when it is higher than the airborne noise component and if it is likely to be audible in habitable areas. On this basis, ground-borne noise is not likely to cause significant impact as the airborne noise component would be dominant.

The potential ground-borne noise impact at the Prince of Wales Hospital building in front of the Randwick terminus platform was also considered as part of the proposed modification. Due to the expected low speeds of the LRV operations at this point, the effect of ground borne noise is not expected to exceed trigger levels.

High Cross Park and Belmore Road receivers

As part of the proposed modification, the proposed light rail tracks would no longer cross the Avoca Street/High Street intersection and the Randwick terminus would no longer be located adjacent to High Cross Park. This would result in approximately seven properties which were previously located directly adjacent to the terminus having significantly reduced noise and vibration impacts.

Road traffic noise impacts

In addition to the consideration of potential changes to light rail noise and vibration impacts, consideration of the potential noise impacts associated with the changes to the local traffic network resulting from the modification was undertaken. A summary of this assessment is provided below. Additional detail regarding the road traffic noise assessment undertaken is provided in Chapter 3 of the *Noise and Vibration Impact Assessment* (WSP | Parsons Brinckerhoff, 2015).

Assessment criteria

Road traffic noise assessment in NSW are primarily based on the *Road Noise Policy* (RNP), (Department of Environment, Climate Change and Water (DECCW), 2011). The assessment criteria that are applicable to a project is dependent on the functional class of the road and the type of project/land use. The applicable RNP assessment criteria for residential land uses are summarised in Table 3.1 of the *Noise and Vibration Impact Assessment* (WSP | Parsons Brinckerhoff, 2015).

The assessment criteria associated with the functional class of each road is presented in Table 5.7 below.

Table 5.7 Road category and associated assessment criteria

Road	Category	Assessment criteria (dBA)	
Wansey Road	Collector/sub-arterial road	$L_{Aeq,15 \text{ hour}}$ 60 (day)	$L_{Aeq,9 \text{ hour}}$ 55 (night)
Arthur Street (entire length)	Local road	$L_{Aeq,1 \text{ hour}}$ 55 (day)	$L_{Aeq,1 \text{ hour}}$ 50 (night)
Clara Street			



Road noise assessment areas

Traffic flow modelling was conducted as part of the assessment of noise impacts from the modification. A traffic flow increase threshold of 60 per cent was used as an initial screening criterion to identify the road sections that potentially required noise impact assessment. From an acoustic perspective, an increase in road traffic volume of 60 per cent is generally considered to be equivalent to an increase in noise level of approximately 2 dB (assuming that other parameters, such as traffic speed, traffic mix and road surface, remain constant).

Based on results of the traffic flow modelling for the morning and afternoon peak hour periods, it was determined that the following sections of road had the potential of experiencing a relative increase of road traffic of 60 per cent or more in comparison to the anticipated traffic impacts associated with the approved Project (as illustrated in Figure 5.5):

- Wansey Road (between High Street and Arthur Street) with a maximum relative increase of approximately 80 per cent in the morning peak period (representing an increase of approximately 327 vehicles).
- Arthur Street (between Wansey Road and Botany Street) with a maximum relative increase of approximately 70 per cent in the afternoon peak period (representing an increase of approximately 270 vehicles).
- Arthur Street (between Botany Street and Belmore Road) with a maximum relative increase of approximately 125 per cent to 250 per cent in the morning peak period (representing an increase of approximately 315 vehicles).
- Clara Street (between Arthur Street and High Street) with a maximum relative increase of approximately 90 per cent in the morning peak period (representing an increase of approximately 240 vehicles).
- Silver Street with a maximum relative increase of approximately 70 per cent in the morning peak period (representing an increase of approximately 71 vehicles).

For the purpose of the noise impact assessment resulting from road traffic increases, the study area was therefore limited to these roads only.

Additional detail regarding the traffic data used for the assessment of noise impacts is presented in Table 3.2 of the *Noise and Vibration Impact Assessment* (WSP | Parsons Brinckerhoff, 2015). At the time of assessment, forecast information for total traffic volumes over the day and night periods, night time traffic flows and vehicle classification were not available. Therefore, the assessment undertaken was primarily based on the available morning and afternoon peak data.



Source: Data based on Traffic, Transport and Access Impact Assessment (GTA, 2015)

Note: Graphic above shows the maximum noise levels of traffic increase (i.e. the greater of either the morning or afternoon peak period).

Figure 5.5 Morning peak percentage road traffic increase – approved Project vs proposed modification

Ambient noise monitoring

To assist with understanding the existing noise environment for the road noise study area, noise monitoring was undertaken on site in October 2015. One noise monitoring location was selected for each road segment. Results for the noise monitoring are presented in Table 3.4 and Table 3.5 of the *Noise and Vibration Impact Assessment* (WSP | Parsons Brinckerhoff, 2015) respectively, with a summary of the measured noise levels shown in Table 5.8.

Road noise impact assessment

Based on the traffic forecast, noise predictions due to increases in road traffic were performed with the results presented in Table 5.8. The noise level predictions were verified by a validation process based on the concurrent noise monitoring and traffic count results.



Table 5.8 Road traffic noise assessment results

Road	Receiver typical setback	Criteria ¹	Measured noise levels dBA ²	Predicted noise levels (day) dBA	
				Approved Project	Proposed modification
Wansey Road	15 metres	L _{Aeq,15 hour} 60 (average day time) (collector road)	L _{Aeq,15hour} 58	L _{Aeq,15 hour} 58	L _{Aeq,15 hour} 60
Arthur Street (Wansey-Botany)	15 metres	L _{Aeq,1 hour} 55 (average day time peak) (local road)	L _{Aeq,1 hour} 55	L _{Aeq,1 hour} 59	L _{Aeq,1 hour} 61
Arthur Street (Botany-Clara)	15 metres		L _{Aeq,1 hour} 54	L _{Aeq,1 hour} 56	L _{Aeq,1 hour} 59
Arthur Street (Clara-Belmore)	15 metres			L _{Aeq,1 hour} 56	L _{Aeq,1 hour} 61
Clara Street	10 to 12 metres		L _{Aeq,1 hour} 61	L _{Aeq,1 hour} 58	L _{Aeq,1 hour} 61
Silver Street	13 to 15 metres		Location not measured, however is considered to be similar and representative of results obtained for Arthur Street	L _{Aeq,1 hour} 49	L _{Aeq,1 hour} 52

Note 1: The use of average day time noise levels (L_{Aeq,15 hour}) for collector roads and average day time peak 1 hour noise levels (L_{Aeq,1 hour}) for local roads is in accordance with the NSW RNP (DECCW, 2011) and generally reflects the noise characteristics of these road types.

Note 2: Measured noise levels are based on noise monitoring undertaken in October 2015.

Based on the results provided in Table 5.8, the following findings were made:

- The predicted day time average 1 hour peak noise level (L_{Aeq,1 hour}) for both the approved Project and the proposed modification exceeded the criterion of 55 dBA for all local roads assessed, with the exception of Silver Street.
- The predicted day time average 1 hour peak noise level (L_{Aeq,1 hour}) for Silver Street for both the approved Project and proposed modification were below the criterion of 55 dBA. On this basis, the proposed modification is not expected to cause significant noise impact at this location.
- The relative noise level increase between the approved Project and the proposed modification along all local roads were predicted to increase by 2 dB to 3 dB over the respective assessment time periods (15-hour and 1-hour). At the section of Arthur Street between Clara Street and Belmore Road, a relative increase of up to 5 dB was predicted.
- Wansey Road is likely to be classed as a collector road/sub-arterial road as part of the operation of the project (refer to Table 5.7), which would carry a less onerous day time criterion of day time noise level (L_{Aeq,15hour}) 60 dBA. Based on the noise monitoring results identified for this road, the existing day time noise level (L_{Aeq,15 hour}) was measured to be 58 dBA, which was below the applicable day time criterion. The day time noise level (L_{Aeq,15 hour}) associated with the proposed modification was predicted to be 60 dBA, which meets the day time criterion.

- Further investigation of feasible and reasonable mitigation strategies should be considered for properties along Arthur Street (entire length) and Clara Street due to exceedance of the average 1 hour peak noise level ($L_{Aeq,1 \text{ hour}}$) criterion for day time and a predicted relative increase of greater than 2 dB.
- Any additional heavy vehicle traffic along the subject roads has the potential of causing sleep disturbance if they occur during the night time hours.

Proposed access lane off Arthur Street

In addition to the proposed changes to road traffic, the proposed new rear access lane is proposed to operate as a public road. However, in reality, this access road would only be used by residents/users of the properties of 34, 42–44 and 46 High Street and would not provide for through traffic. Therefore, the characteristics of this driveway are generally more in line with a private road.

For the purpose of this assessment, it was anticipated that a conservative estimate of up to 60 vehicles could potentially use the access road during the morning peak hour. This is based on the assumption that all residents to either leave or arrive at the properties within the same hour, which represents an unlikely worst case scenario.

The nearest receivers which have the potential to be impacted by the operation of the proposed access lane would be 10 and 14 Arthur Street, which share the boundary with the proposed access lane. Based on noise measurement data for typical light passenger vehicles travelling at low speed (less than 20 kilometres per hour) on private driveways (maximum noise level (L_{Amax}) of 64 dBA at 5 metres), the average 1 hour peak noise level ($L_{Aeq,1 \text{ hour}}$) noise level was predicted to be in the order of approximately 53 dBA at these receivers. This would meet the applicable day time criterion for local roads. On this basis, the operation of the proposed access lane off Arthur Street is not expected to cause significant acoustic impact.

Child care centre (24 Botany Street)

The NSW Road Noise Policy prescribes the following assessment criteria for child care centres:

- $L_{Aeq,1 \text{ hour}}$ 35 dBA in sleeping areas (internal noise)
- $L_{Aeq,1 \text{ hour}}$ 40 dBA in indoor play areas (internal noise)
- $L_{Aeq,1 \text{ hour}}$ 55 dBA at outdoor play areas (external noise)

Based on an hourly peak traffic volume of 60 vehicles and assumptions discussed above, the external noise levels were predicted to be approximately 53 dBA at the existing perimeter of the outdoor play area of the child care centre. This meets the external noise level criterion for outdoor play areas. Based on the predicted external noise level above, the internal noise level was estimated to be in order of about 33 to 35 dBA, assuming a closed façade with standard construction. This also meets most stringent internal noise level criterion for sleeping areas within a child care centre. These results indicate that the operation of the proposed access lane is not expected to cause significant noise impact at the existing child care centre at 24 Botany Street.



5.6.3 Proposed mitigation

Based on the identified potential noise and vibration impacts associated with changes to road traffic, the following mitigation would be undertaken during the detailed design phase of the project:

- The existing Infrastructure Approval for the Project (SSI-60412 dated 29 September 2015, MCoA C11(h), development of an Operational Noise and Vibration Management Plan) would include the areas identified to be potentially impacted by relative increase of road traffic noise of greater than 2 dB due to the proposed modification.

5.7 Non-Indigenous and Aboriginal heritage impacts

This section outlines the potential Non-Indigenous and Aboriginal heritage impacts associated with the proposed changes to the approved Project and provides a summary of the *Aboriginal and Historic (Non-Indigenous) Heritage Assessment* which was prepared by Artefact Heritage Consultants (Artefact, 2015), contained as Appendix D.

5.7.1 Existing heritage

The CSELR EIS (Transport for NSW, 2013) identified a total of 26 heritage listed within, or immediately adjacent to, the approved Project corridor within the overall Randwick Precinct. The CSELR EIS however noted that only eight of these items would have the potential to be directly affected by the approved Project, with only three items located within the vicinity of the proposed modification.

A summary of the heritage-listed items which were identified as being potentially impacted by the approved Project and which are within the vicinity of the modified design is provided in Table 5.9.

Table 5.9 Heritage items potentially impacted by the approved Project and the proposed modification

Item	Listing ¹	Level of significance	Potential change in impact resulting from proposed modification
Corana and Hygeia (211–215 Avoca Street, Randwick)	SHR	State	Yes
Semi-detached pair (17–19 Clara Street, Randwick)	RLEP 2012	Local	Yes
Prince of Wales Hospital group (High Street, Randwick)	RLEP 2012	Local	Yes
High Cross Reserve (Avoca Road, Cuthill Street, Belmore Road, Randwick)	RLEP 2012	Local	Yes
High Cross Reserve (five Cook Pines, one Moreton Bay Fig, one Port Jackson Fig)	RCCRST 2008	Local	Yes

Note 1: SHR – State Heritage Register; RLEP 2012 – *Randwick Local Environmental Plan 2012*; RCCRST 2008 – Randwick City Council Register of Significant Trees 2008

Additional research undertaken as part of this assessment has identified a World War II air raid trench shelter located within the south eastern portion of High Cross Park (near Belmore Road). This subsurface item is not listed as a heritage item in its own right however would be considered to be an item of local significance as well as part of the fabric of High Cross Park and the High Cross Conservation Area.

5.7.2 Impacts as a result of the modification

Built heritage/landscape

The study area includes High Cross Park which is listed on the Randwick local environmental plan (LEP) 2012 (Randwick LEP 2012). High Cross Park has been assessed to be of local significance. The park contains the c.1922 War Memorial which is also of local significance as well as trees listed on the Randwick Council Register of Significant Trees. The approved location of the Randwick terminus stop involved substantial impacts to High Cross Park and associated significant trees. This location was assessed as part of the approved Project to have major adverse heritage impacts on the historic character of the park.

This design modification, through the relocation of the stop to High Street, would reduce the originally identified impacts associated with High Cross Park. The modified design proposes this site to now only be impacted by the proposed below ground substation. Therefore minimising heritage impacts to High Cross Park from major adverse impacts to neutral impacts.

The High Cross Park substation would be located towards the eastern boundary of the park. Based on current design, the substation in High Cross Park would have a footprint of 16 metres long by 9 metres wide with a depth of approximately 8 to 9 metres below ground.

As the substation would be below ground, it is unlikely it would have an adverse visual impact compared to the original proposal which was to place the substation above ground (following completion of construction and restoration of the existing park at this location). This is consistent with the mitigation measure proposed in the CSELR EIS (Transport for NSW, 2013), specifically mitigation measure D.12, and the MCoA B27(f)(ii) that the substation be placed underground to minimise impacts to the views, vistas and character of the park. Significant elements of the park such as the cenotaph and significant trees would not be impacted by the construction of the substation. However, given the size of the substation it is likely that the substation would have a potential adverse impact on potential archaeological remains, including the remains of the WWII air raid trench.

Historical archaeology

The CSELR EIS defined a series of Historical Archaeological Management Units (HAMUs) based on the level of significance for the potential archaeological resource located within the CSELR project area. These HAMUs have been retained for the assessment of the proposed modification.

High Street and Arthur Street

The CSELR EIS identified High Street (HAMU 31 and 32), as having low to moderate archaeological potential to contain locally significant archaeological remains. Given that Arthur Street is located within the same local historical context as High Street this area has also been assessed as having low to moderate archaeological potential to contain locally significant archaeological remains.

High Cross Park

High Cross Park (HAMU 33) was assessed as having low archaeological potential to contain locally significant archaeological remains. The area was also considered to have low to moderate potential for historical archaeological remains. In addition to the previous assessment of archaeological potential High Cross Park is considered to have high archaeological potential to contain archaeological remains associated with the WWII air raid trenches. Whilst these remains are buried and therefore archaeological in nature, they would be considered a heritage item rather than an archaeological relic as defined by the Heritage Act.



The CSELR EIS assessed the High Street and High Cross Park precinct as being Zone 2 for non-Aboriginal (historical) archaeological sensitivity. Zone 2 represented areas of locally significant archaeological resource (known or potential) (GML 2013).

The proposed design modification is considered to be consistent with the impacts identified as part of the approved Project and have been assessed as having minor to moderate adverse impacts on the potential historical archaeological resource (if present). Although the substation would be located below ground, given the size of the substation there is the potential that wherever the substation is placed within the park it would have a potential adverse impact on archaeological remains such as the WWII air raid trenches.

The mitigation measures outlined for Zone 2 areas in the CSELR EIS (in particular mitigation measure V.1) are therefore still be considered appropriate.

Aboriginal heritage

The CSELR EIS defined Aboriginal archaeological management zones based on the level of potential and proposed impacts for areas within the CSELR project area. The CSELR EIS noted that Zone 1 and Zone 2 represented areas with archaeological potential for Aboriginal objects to be found and/or impacted, and represented the highest levels of archaeological sensitivity for the approved Project (GML 2013).

The areas along Arthur Street and High Street are assessed as having low potential to contain intact archaeological deposits in areas where subsurface impacts have truncated the underlying sand body. Areas which have not been subject to extensive subsurface impacts are assessed as having moderate potential to contain intact archaeological deposits. High Cross Park is assessed as having moderate to high potential to contain intact Aboriginal archaeological deposits.

The CSELR EIS designated High Street and High Cross Park as Zone 1, this zone being the designated Aboriginal archaeological management zone for any excavation impacts up to and over 750 millimetres in depth. As with the approved Project, the modified design would involve excavation up to and deeper than 750 millimetres. The mitigation measures associated with Zone 1 areas outlined in the approved Project are therefore considered to still be appropriate.

Arthur Street was not included in the approved Project and mitigation measures for the area were not recommended. However, the revised access lane from Arthur Street would include subsurface impacts deeper than 750 millimetres (a portion of the proposed retaining wall which would be up to 1.5 metres in height (subject to detailed design)). Therefore Arthur Street would be subject to the mitigation measures outlined for Zone 1 in the approved Project.

Overall, the proposed modification would be consistent with the impacts to Aboriginal heritage identified as part of the approved Project.

Views and vistas

The eastern portion of the study area is located within the High Cross Heritage Conservation Area (Conservation Area C12). The original heritage impact assessment stated that the location of the Randwick terminus for the project within the High Cross Park would transform the area from a Victorian era park to a much reduced contemporary landscape, dominated by the transport interchange.

Relocating the Randwick terminus stop to the junction of High Street and Avoca Street would lower the impact on the views and vistas of the High Cross Heritage Conservation Area. The revised Randwick terminus stop would still be visible from the conservation area, but would not impact on views towards the area. The proposed placement of the substation in High Cross Park below ground would reduce impacts on the views and vistas to or from the conservation area (following construction) in comparison to the approved Project.

Overall the proposed modification would have a considerably reduced (neutral) impact on the High Cross Park and the High Cross Heritage Conservation Area. The proposed works would however have minor adverse impacts to the adjacent heritage items. The visual impacts to state heritage item The Corana and Hygeia (SHR #00454) would be minor in nature and consistent with the original impact assessment made for the approved Project.

5.7.3 Proposed mitigation

The original mitigation measures proposed for High Cross Park in the CSEL R EIS were aimed towards preserving the Victorian character and values of the heritage item. These mitigation measures are still appropriate for the proposed modification with additional consideration associated with the substation location:

- where feasible, the final location of the substation would be optimised during detailed design to avoid impacts on the heritage fabric of the park and the WWII air raid trenches
- if an alternative position within the park cannot be determined mitigation measures associated with heritage archaeological management zone 2 (as detailed in the CSEL R EIS) would be implemented. These would include:
 - ▶ archaeological excavation and archival recording of archaeological remains of WWII air raid shelter that will be impacted
 - ▶ investigate options for WWII air raid shelter interpretive signage following works
 - ▶ archival recording of items within the park and significant trees
 - ▶ an exclusion zone surrounding the significant elements of heritage significance within the park
- any proposed impacts to the park area would avoid significant trees and the cenotaph area
- a photographic archival recording of the reserve would be undertaken prior to works commencing.

5.8 Socio-economic impacts

5.8.1 Construction impacts as a result of the modification

The proposed modification is anticipated to result in some social benefits during the construction period of the Project. These benefits would predominantly relate to the reduced impact that the construction of the proposed modification would have on High Cross Park. The retention of this park during the construction period would positively impact access to public spaces, leisure and recreational areas which were to be removed as part of the approved Project. This was previously identified as having a slight negative impact as part of the approved CSEL R EIS (Transport for NSW, 2013). As the park would be retained during construction, it would be considered that the proposed modification would result in a neutral overall impact, rather than negative.



However, some minor additional adverse impact would occur with respect to property required. As part of the approved CSELR EIS (Transport for NSW, 2013), property acquisition for the Randwick Precinct was identified as having a neutral impact. It is considered that the requirement of some additional land to accommodate the access lane from Arthur Street (refer to section 6.5 for details) would result in a slight negative impact in comparison to the approved Project. It should be noted that the impacted land is currently owned by the UNSW.

The remaining social benefits and impacts identified as part of the approved Project during construction are considered to be consistent with the proposed modification.

With respect to potential economic impact, the changes associated with the modification are not anticipated to result in any substantial changes to the economic impacts during construction that were identified in the approved CSELR EIS (Transport for NSW, 2013).

5.8.2 Operational impacts as a result of the modification

The modification is anticipated to result in an overall beneficial outcome during the operation of the project. The relocation of the Randwick terminus stop would aid in the further development of the Randwick Health and Education Specialised Centre by locating the stop closer to these services, providing improved integration and a more convenient location with less road crossings. The remaining social benefits and impacts identified as part of the approved Project during operation are considered to be consistent with the proposed modification.

With respect to potential economic impact, the proposed modification is not anticipated to result in any substantial changes to the economic impacts during operation that were identified in the approved CSELR EIS (Transport for NSW, 2013). However, some minor benefits may occur through the improved integration of the Randwick terminus stop with surrounding businesses located within the Randwick town centre.

The existing MCoAs and previously proposed mitigation measures identified as part of the approved Project would be sufficient to manage the potential impacts associated with the modification.

5.9 Utilities

To accommodate the revised platform arrangement for the UNSW High Street stop, the existing westbound traffic lane would be moved slightly south towards UNSW. As part of the realignment of this road the existing Ausgrid electricity kiosk located towards the corner of High Street and Botany Street would be impacted and would need to be relocated.

The relocation of the electricity kiosk (including the required approvals) would be undertaken by Ausgrid. The new position of the kiosk would be determined by Ausgrid, in consultation with relevant stakeholders.

5.10 Electromagnetic interference

Section 10.10 of the CSELR EIS (Transport for NSW 2013) identified that potential electromagnetic interference (EMI) sources associated with the approved Project would include 750 volt overhead contact wires, buried cables and to a lesser extent, running rails. The LRVs themselves were also identified as also a source of potential EMI.

The CSELR EIS noted that the only potential issue which may arise as a result of the approved Project would be the potential interaction of the light rail with very sensitive electronic equipment located in buildings near the alignment. The CSELR EIS noted that LRVs would be required to comply with internationally recognised standards for electromagnetic compatibility, and so should not present any EMI issues.

In accordance with the MCoA B17 and B18, ongoing consideration of EMI has been undertaken by Transport for NSW to further identify and confirm potential impacts and sensitive receivers.

A preliminary survey of UNSW campus undertaken by Enotrac (2014) identified a set of equipment potentially sensitive to external EMI. This included a magnetic resonance imaging and nuclear magnetic resonance equipment, an electron microscope, single molecule microscope and quantum computing Lab. Other equipment identified as having a potential to be impacted included audio induction loop(s), a magneto-spectrometer, X-ray equipment and a laser scanning microscope. Distances between the approved Project and the nearest room containing sensitive equipment was estimated to be approximately 15 to 20 metres. Of particular importance was equipment located within the Lowy Cancer Research Centre immediately adjacent to the approved Project on High Street.

For the Prince of Wales Hospital, a desktop survey was also undertaken by Enotrac (2014). Whilst specific information on potentially sensitive equipment was not available, it has been assumed that equipment would include those used for diagnostic, therapeutic activities and for life support purposes. The distance between the approved Project and the nearest room potentially containing sensitive equipment was estimated to be approximately 25 to 30 metres.

As part of the modified design, the relocation of the UNSW High Street stop to the north of the approved location would assist in reducing potential EMI impacts between the Project and critical equipment that has been identified as being in use by the neighbouring UNSW. In particular, the relocation of the stop would allow for an increase in the distance between the light rail tracks and Lowy Cancer Research Centre, providing an overall benefit in terms of electromagnetic emissions on this sensitive receiver. This would be consistent with the requirements of the approved Project, in particular MCoA B18(d) which includes the identification of reasonable and feasible electro-magnetic field reduction strategies which may impact on the operation of, among other sensitive receivers, UNSW assets.

The relocation of the Randwick terminus stop from High Cross Park to the eastern end of High Street is also not considered to result in any change to EMI impacts to sensitive equipment in the Prince of Wales Hospital in comparison to the approved Project.

With respect to potential EMI impacts associated with the modification on residential receivers, the location of the modified light rail alignment would be consistent with that of a range of other locations along the approved alignment, such as along Devonshire Street. The Conditions of Approval regarding EMI/electromagnetic forces would therefore be considered to be consistent with and applicable to the modified alignment.

Based on the anticipated impacts, it is considered that the existing MCoA (B17 and B18) are sufficient to manage any potential impacts.

5.11 Summary of environmental impacts

Table 5.10 provides a summary of the changes in environmental impact between the approved Project and proposed modification.



Table 5.10 Summary of environmental impact changes between the approved Project and proposed modification

Issue	Summary of approved impacts	Impact of proposed modification	Change in impact / mitigation required
Traffic and transport	- During construction of the UNSW High Street stop, there only one lane of traffic was available between Wansey Road and Botany Street. - Minor impacts during off-peak periods at Botany Street and High Street intersection. - Removal of all existing on-street parking along High Street between Wansey Road and Belmore Road and removal of on-street parking on Belmore Road during peak hours. - Impacts to existing parking and traffic lanes around High Cross Park, including impacts to Belmore Road, Avoca Street and Cuthill Street. - Minimal impact to bus operations along High Street. - Key changes to road conditions along High Street such as introduction of traffic signals and amendments to bus stops. - Restriction to left-in, left-out property access along High Street. - Relocation of the designated on-road cycle route to and from Randwick from High Street to Arthur Street. - Introduction of signalised pedestrian crossings along High Street.	- Retention of parking spaces around High Cross Park, and reduced impact to traffic lanes at this location, including along Belmore Road. - Potential additional construction impacts including traffic disruptions and footpath diversions along Arthur Street and additional temporary footpath closures on High Street. - Reduced traffic flows on High Street eastbound and significantly increased traffic flows adjacent alternate routes, in particular Arthur Street and Barker Street. - Increased intersection delays at some intersections, with corresponding decreased delays at others. - Increased travel times on some streets including Alison Road (eastbound) and Todman Avenue to Perouse Road (via High Street) (eastbound) - Minor diversion of some existing bus routes, resulting in minor increase to travel times for these services - Additional impacts to existing car parking spaces, in particular along Arthur Street.	- Reduced traffic impacts to streets surrounding High Cross Park. - Reduced walking distances for passengers in the direction of the Randwick Hospital Precinct. - Additional property access impacts to five properties along High Street - Net loss of approximately 32 parking spaces - Existing MCoAs considered to be suitable to manage potential impacts.
Visual and landscape	- Temporary visual impacts resulted from placement of plant, equipment and fencing as well as temporary lighting during construction. - Moderate to high impacts resulting from tree removal and the instruction of LRVs moving through key viewpoints along High Street and Wansey Road.	- Substantial beneficial outcome through the avoidance of the landscape and visual impacts to High Cross through the relocation of the Randwick terminus stop platforms and the proposed placement of the substation below ground - No noticeable changes to the visual impact of the approved Project at the UNSW High Street stop.	- Overall impact of the proposed modification would be a moderate beneficial impact due to the regional sensitivity of the area, and the avoidance of significant impacts to the existing High Cross Park. - No additional mitigation required.

Issue	Summary of approved impacts	Impact of proposed modification	Change in impact / mitigation required
Visual and landscape (cont.)	High impacts to High Cross Park resulting from change to character of the Park and tree removal. LRVs would also be visually prominent.	Some additional visual impacts associated with the revised access driveway from Arthur Street, including removal of existing vegetation, provision of additional hardstand surface area and temporary impacts during construction. However, a majority of the views to this site would be limited to immediately adjacent properties, and not visible to the general public.	
Planted trees	- All trees along both sides of High Street from Wansey Road to Clara Street were to be removed. - Majority of trees within High Cross Park would be removed with the exception of approximately seven trees.	- Only seven trees impacted in High Cross Park, resulting in 26 trees no longer impacted - Two additional trees removed along High Street opposite the proposed Randwick terminus stop - Approximately 12 trees removed to accommodate the proposed access lane from Arthur Street.	- Net benefit of 12 trees as a result of no longer impacting 26 trees previously approved to be removed within High Cross Park, however additional 14 trees removed elsewhere as a result of the proposed modification. - No additional mitigation required.
Property and land use	- Construction works affected the amenity of land uses along High Street, namely residents and users of UNSW and the Health Precinct. - Some land acquisition proposed along High Street within proximity to the UNSW High Street stop (UNSW land).	- Decrease to the land use and property impacts on High Cross Park - Modified location of the Randwick terminus stop would provide an opportunity for improved land use integration and amenity (e.g. through the provision of new public plaza(s)). - Additional impacts to existing properties associated with the access lane from Arthur Street. The revised access would require approximately 550 square metres of additional UNSW land between High Street and Arthur Street. - Small area of additional land also required to be acquired at the corner of Wansey Road and High Street. - The new access lane from Arthur Street would require: - the removal of an existing garage structure and swimming pool associated with 10 Arthur Street. - relocation of an existing shed and playhouse structure - relocation of existing fences to maintain safe areas adjacent to the lane.	- Overall increase in private (UNSW) land use impacts - Additional impacts to existing structures and fencing - Additional mitigation required to manage property impacts associated with the new access lane (refer to additional mitigation measures F.4 and F.5 in Chapter 7).



Issue	Summary of approved impacts	Impact of proposed modification	Change in impact / mitigation required
Noise and vibration	- Construction of the UNSW High Street stop resulted in exceedences of NMLs by up to 38 dB for nearest sensitive receivers during day works. - Given the visibility of works and proximity to receivers both fixed and transient, subjective impacts were anticipated to be 'Highly Intrusive' (i.e. average 15 minute noise levels ($L_{Aeq(15\text{minute})}$) more than 30 dB above the existing background levels - Potential impacts resulting from increased road noise - Potential impacts resulting from ground borne vibration. - Airborne noise impacts predicted to exceed the airborne noise trigger levels at a number of properties along High Street, Botany Street, Blenheim Street and Eurimbla Avenue.	- Construction noise impacts on High Street would be consistent with approved Project. - Additional noise impacts to a number of residents and a childcare centre due to the construction of the new access lane. - Day time noise levels for proposed modification to be further exceeded along Arthur Street between Wansey Road and Belmore Road by between 2 and 5 dBA - Day time noise levels for the proposed modification are expected to be further exceeded along Clara Street and Silver Street by between 2 and 3 dBA. - The operation of the proposed access lane off Arthur Street is not expected to cause significant acoustic impact.	- Potential additional noise impacts predicted at four properties (30, 32, 36, 38 High Street) - Potential additional vibration impacts to the medical imaging centre located at 64 High Street - Additional mitigation required (refer to Chapter 7).
Non-Indigenous & Aboriginal heritage	- Where works would require excavation below the current ground surface along High Street, there would be potential impacts on potential archaeological resource in that area. - Neutral impacts to the Randwick Junction Heritage Conservation Area were anticipated as a result of the proposed Randwick stop and terminus. - Major adverse heritage impact were anticipated to the High Cross Reserve and High Cross Heritage Conservation Area resulting from changes to the character of the area and loss of trees. - Minor adverse visual impact to Victorian semi-detached mansions, Corana and Hygeia as a result of the proposed changes to High Cross Park.	- Significantly reduced overall impact on High Cross Park heritage item (visual impact during operation). - Potential additional impacts within High Cross Park due to the proposed relocation of the substation below ground, in particular potential impacts to the remains of an existing World War II air raid trench. - Potential Aboriginal heritage impacts resulting from the excavation of the proposed retaining wall for the new access lane of Arthur Street.	- Overall decrease in potential impact to existing heritage items within High Cross Park. - Additional mitigation required (refer to additional mitigation measure D18 in Chapter 7).

Issue	Summary of approved impacts	Impact of proposed modification	Change in impact / mitigation required
Socio-economic	• Social and economic impacts resulting from general construction impacts such as changes to access and traffic conditions, noise and vibration, reduced amenity of High Cross Park and perceived access to nearby retail and commercial areas. • Negative social and economic impacts resulting from impacts to local amenity and character of the environment, visual impact and loss of parking. • Positive impacts resulting from changes to access to local community services, Prince of Wales Hospital, UNSW, Health and Education Specialised Centre, resulting in potential improved employment opportunities. • Positive impacts resulting from improved infrastructure to encourage walking and cycling.	• Impacts would generally be consistent with approved Project. • Social benefits during the construction of the Project, in particular through the reduced impact that the construction would have on High Cross Park. • Minor additional adverse impact with respect to additional property (UNSW land) required (to accommodate the new access lane) – refer also to land use impacts above.	• The proposed modification is not anticipated to result in any substantial changes to social or economic impacts in comparison to the approved Project. • No additional mitigation required.
Utilities	• A number of services and existing utilities would be required to be protected, modified or relocated during construction.	• Impacts would generally be consistent with approved Project. • The existing Ausgrid electricity kiosk located towards the corner of High Street and Botany Street would be impacted and would need to be relocated.	• The proposed modification is not anticipated to result in any substantial changes to utility or services impacts in comparison to the approved Project. • No additional mitigation required.
Electromagnetic Interference (EMI)	• Potential EMI sources associated with the approved Project were identified as including the 750 volt overhead contact wires, buried cables and to a lesser extent, running rails. The LRVs themselves were also identified as a source of potential EMI. • Potential interaction of the light rail with very sensitive electronic equipment located in buildings near the alignment.	• Impacts would generally be consistent with approved Project. • The relocation of the UNSW High Street stop to the north of the approved location would assist in reducing potential EMI impacts between the Project and critical equipment that has been identified as being in use by the neighbouring UNSW. • The relocation of the Randwick terminus stop from High Cross Park to the eastern end of High Street is not considered to result in any change to EMI impacts to sensitive equipment in the Prince of Wales Hospital in comparison to the approved Project.	• The proposed modification is not anticipated to result in any substantial changes to EMI in comparison to the approved Project. • No additional mitigation required.



6. Administrative changes to Minister's Conditions of Approval

This chapter provides details for the modification to two MCoAs that have been identified as part of the ongoing development and detailed design of the Project.

6.1 Wansey Cottage

6.1.1 Approved Project

The approved Project identified that the light rail alignment and Wansey Road stop would have an adverse impact on the setting of Wansey Cottage. Section 6.11.3 of the CSELR Project Submissions Report (Transport for NSW, 2014a) noted that the approved Project passes within approximately 0.5 metres of the north-eastern corner of Wansey Cottage due to the approved location of the Wansey Road stop. The cycleway and associated boundary retaining wall are the closest elements of the approved Project to Wansey Cottage. The cottage is identified as an element of moderate heritage significance in the Randwick Racecourse Heritage Conservation Area.

In order to reduce or avoid the impact on Wansey Cottage, an environmental management measure was proposed to undertake further investigation of the design of the relocated Wansey Road stop, with the aim of reducing or avoiding impacts on Wansey Cottage. This measure was subsequently included within the approved Project MCoA, specifically MCoA B59 which stated that the project should be designed and constructed to avoid any direct impact to the cottage or impact to the curtilage of the cottage.

6.1.2 Post approval design development

Since project approval, further development and refinement of the detailed construction methodology has been undertaken. As part of this process, construction options were considered with the aim of minimising impacts to Wansey Cottage in line with commitments in MCoA B59. However, this process confirmed that there would be inadequate space to construct the retaining wall structure at this location (to support the light rail tracks and cycleway) whilst ensuring that the retaining wall is constructed in a safe manner and in such a way that it meets specified safety in design and design life requirements (without the need for substantial re-design, i.e. a different route for the CSELR to Randwick). As a result, alternatives were considered for both the design and the construction of the light rail and cycleway in this location.

As a consequence, the refined design would change the overall location of the track and cycleway at this location, resulting in physical impacts and impacts to the curtilage of the Wansey Cottage building (in contravention of MCoA Condition B59).

During the detailed design process, options to avoid impacting the Wansey Cottage building were considered. This included a range of designs for the arrangement of the cycle path and associated retaining wall, including options (and combinations of options) which considered:

- relocation of the approved retaining wall
- provision of a cantilevered cycle path
- alternative construction methods such as in-situ and piled retaining wall options.

A total of eight options were assessed, five of which were deemed to be potentially feasible (i.e. met minimum number of lanes along Alison Road during construction and operations, met minimum footpath and shared path widths, etc.).

Of the five feasible options, all options were identified to result in demolition, partial demolition, or impacts to the curtilage of Wansey Cottage. Options which would result in partial retention of the cottage, or with severe impacts on the visual setting of the building were not considered to be desirable outcomes with respect to heritage. The function of the cottage as a residence is considered to be a major contributor to the heritage significance of the building. Partial demolition and the operation of the light rail in close proximity to the cottage would most likely render the building incompatible for residential use, and therefore affect its heritage significance.

Based on the assessment and potential impacts identified for each option, the only feasible outcome would be to demolish the existing cottage. Additional detail regarding the options assessment undertaken is provided as an attachment to the *Wansey Cottage Heritage Report* (GML, 2015) provided as Appendix E of this Modification Report.

As such, Transport for NSW is seeking, as part of the overall modification considered in this report, to amend the existing MCoA Condition B59 to remove reference to avoiding any direct impact or impacts to Wansey Cottage.

6.1.3 Potential heritage impacts

The proposed demolition of Wansey Cottage would result in the loss of a building which is considered to have moderate heritage significance as part of the overall Royal Randwick Racecourse site. Historically, the building represents the expansion of the racecourse in the early twentieth century and the provision of staff accommodation by the Australian Jockey Club. It currently makes some contribution to the significance of the broader Royal Randwick Racecourse Heritage Conservation Area (HCA) and its demolition would result in a moderate adverse heritage impact.

This assessment of heritage impacts is consistent with that of other elements within the Royal Randwick Racecourse that have been previously approved for demolition as part of the approved Project. The overall impact on the Royal Randwick Racecourse HCA has been previously assessed as being a major adverse heritage impact (GML, 2013). Overall, the demolition of Wansey Cottage would contribute to the cumulative heritage impact on the Royal Randwick Racecourse HCA resulting from the approved Project.

6.1.4 Proposed mitigation

In order to minimise potential impacts associated with the proposed demolition of Wansey Cottage, a series of additional mitigation measures to those previously approved would be implemented. These measures would include:

- the Wansey Cottage would be included in the next phase of interpretation planning for the project. Information on the former cottage would be incorporated into the Wansey Road stop during detailed design
- undertake an archival recording of the building consistent with the requirements of the project prior to work being undertaken. This archival recording would include the interiors of the residence once it is vacated
- during demolition of Wansey Cottage, where practical, salvage and recycle building elements of heritage significance suitable for the repair of other heritage items, including roof tiles, joinery (windows, doors, architraves, skirting) and any other fabric.



6.2 Out-of-hours work

The following condition is proposed to be amended to correct an inconsistency with the approval process for out-of-hours application that is provided in condition B4.

The proposed amendment will allow the Environment Protection Authority to approve out-of-hours works rather than the Secretary of Planning and Environment, in the instance that there is an Environment Protection Licence. The relevant MCoA which is proposed to be amended is MCoA 89 (b). This MCoA is provided below, with the proposed additional wording proposed identified in **bold, underline**:

*a **Construction Noise and Vibration Management Plan** to detail how construction noise and vibration impacts will be managed for the SSI. The Plan shall be consistent with the Interim Construction Noise Guidelines (DECC, 2009) and shall be prepared in consultation with the EPA and Council(s). The Plan shall include, but not be limited to:*

- i) details of construction activities (including site compounds), machinery and an indicative schedule for works that have the potential to generate noise and/ or vibration impacts on surrounding land uses,*
- ii) details of sensitive receivers (including maps showing the location of all potentially affected sensitive receivers, sensitive times (such as during exam periods) and sensitive equipment;*
- iii) the construction noise and vibration criteria according to the Interim Construction Noise Guidelines;*
- iv) details of the reasonable and feasible mitigation and management measures and procedures that will be implemented to control construction noise and vibration impacts, where the criteria are predicted and/or are measured to be exceeded;*
- v) scheduling the noisiest activities associated with night-time works to be completed before midnight and limiting night-time construction works to two consecutive nights followed by two consecutive nights of respite (i.e. no works) unless outlined in the OOHW protocol;*
- vi) impacts from site compounds/construction depots;*
- vii) specific physical and managerial measures for controlling noise and vibration, demonstrating how activities would be managed;*
- viii) identification of noise and vibration generating tasks, duration, and predicted air-borne noise levels and vibration levels;*
- ix) internal compliance audit of all plant and equipment;*
- x) construction timetabling, in particular works outside standard hours, to minimise noise impacts;*
- xi) an out-of-hours work (OOHW) protocol for the assessment, management and approval of works outside of standard construction hours as defined in condition B4 of this approval, including a risk assessment process under which an Environmental Representative may approve out-of-hour construction activities deemed to be of low environmental risk and refer high risk works for the Secretary's approval, **unless otherwise approved through an Environment Protection Licence**. The OOHW protocol must detail standard assessment, mitigation and notification requirements for high and low risk out-of-hour works, and detail a standard protocol for referring applications to the Secretary;*
- xii) details of community consultation processes to be implemented during construction;*
- xiii) procedures for notifying residents and sensitive receivers of construction activities likely to cause exceedances of the noise management levels;*

- xiv) vibration amenity;*
- xv) contingency plans to be implemented in the event of non-compliance and/or noise complaints; and*
- xvi) monitoring measures to assess compliance against the construction noise and vibration objectives, clearly indicating how often this monitoring would be conducted, the locations where monitoring would take place, how the results of this monitoring would be recorded and reported, and if any exceedances are detected how any non-compliance would be rectified.*



7. Environmental management measures

This chapter presents the environmental management measures that are proposed to be implemented to reduce the identified environmental impacts associated with the proposed modification.

7.1 Ministers Conditions of Approval

The project, including all proposed modifications, would be undertaken in accordance with all current MCoA as identified in the consolidated State Significant Infrastructure approval (SSI-6042), granted on 4 June 2014 and subsequently modified in February, March and August 2015. A number of the existing MCoA are considered to be applicable to manage the potential impacts identified associated with the proposed modification described in this report.

Whilst all current MCoA would be applicable to the project, a summary of the specific MCoA which are considered to be relevant to managing the potential impacts are provided below in Table 7.1. Table 7.1 also provides a summary of any existing MCoAs which may be required to be amended to manage the impacts associated with the proposed modification.

Table 7.1 MCoAs with relevance to mitigating impacts associated with the proposed modification

Current MCoA	Relevance of MCoA to proposed modification	Change required to existing MCoA?
B5	Preparation of specific Construction Noise and Vibration Impact Statement(s).	No change required.
B16	Monitoring of construction vibration levels.	No change required.
B17	Pre-operational vibration and electromagnetic field monitoring.	No change required.
B18	Preparation of a Vibration and Electro-Magnetic Management Plan.	No change required.
B24	Preparation of local access plans for individual properties and accesses.	No change required.
B25	Maintenance of access to all properties during construction and operation.	No change required.
B26	Preparation of a Network Management Plan to address traffic capacity increases.	No change required.
B27	MCoA requires consideration to the placement of substations underground.	No change required. Modification specifically responds to existing MCoA (B27(f)(ii)) by locating the substation in High Cross Park underground.
B29	Preparation of a Parking Offsets and Management Strategy to address parking impacts.	No change required.
B30	Maintenance of emergency vehicle access to health facilities at all times.	No change required.

Current MCoA	Relevance of MCoA to proposed modification	Change required to existing MCoA?
B32	Maintenance of parking alongside medical facilities on Belmore Road.	No change required.
B33	Preparation of a Pedestrian and Cyclist Network and Facilities Strategy	No change required.
B42	MCoA requires the design and implementation of a revised taxi rank/ passenger drop off area.	No change required. Modification specifically responds to existing MCoA by providing a revised taxi rank and passenger drop off area at the entry to the Prince of Wales Children's Hospital.
B43	MCoA requires that the design of the project not preclude future pedestrianisation of High Street.	No change required.
B51	Preparation of an Urban Design and Landscape Plan	No change required.
B52	Preparation of a Revegetation Compensation Package.	No change required.
B59	Non-Indigenous and Aboriginal heritage	Amendment to existing MCoA required to remove reference to avoiding any direct impact or impacts to Wansey Cottage (refer to section 6.1).
B61	Archival recording of all heritage items	No change required.
B85	Undertaking consultation with sensitive receivers to minimise impacts to properties and businesses.	No change required.
B89	Preparation of a Construction Environmental Management Plan.	Amendment to existing MCoA (specifically B89(b)) required to correct an inconsistency with the approval process for out-of-hours application that is provided in condition B4 (refer to section 6.2).
C11	Preparation of an Operation Noise and Vibration Management Plan	No change required. When the Operation Noise and Vibration Management Plan is prepared it would include the additional areas identified to be potentially impacted by relative increase of road traffic noise of greater than 2 dB as a result of the proposed modification.
C12	Preparation of an Operational Noise and Vibration Review	No change required.
C13	Operational noise and vibration compliance monitoring.	No change required.
C15	Preparation of an Operational Traffic, Transport and Access Performance Review.	No change required.

Following determination of this modification (if approved), any additional conditions of approval (subsequent to the current conditions of approval for the project) would guide the subsequent phases of the Project. ALTRAC Light Rail, as the appointed construction consortium for the approved Project, would be required to undertake all works in accordance with the specified environmental management measures and conditions of approval.



7.2 Revised environmental management measures

Chapter 8 of the CSELR Project Submission Report (Transport for NSW, 2014a) and Chapter 4 of the CSELR Project Modification Report (Transport for NSW, 2014b) documented a range of environmental management measures to be implemented to reduce the identified environmental and social impacts associated with the construction and operational phases of the Project. All of these management measures would be applied, where relevant, to the proposed modification.

Whilst a majority of the previously identified mitigation measures and existing MCoA would be suitable to manage the potential impacts associated with the proposed modification, a series of additional measures have been identified to manage specific impacts. These measures are intended to complement the existing measures and MCoA and are provided in Table 7.2.

New measures that are proposed have been denoted with underlined text, while any environmental management measure proposed to be removed (or amended to have text deleted from the measure) has been shown with ~~strikethrough text~~.

Table 7.2 Changes to environmental management measures

ID Reference	Environmental management measure – detailed design and pre-construction phase	Impact to management measures
Detailed design		
Traffic and transport		
A.16	To further reduce the extent of queuing on Belmore Road, the final design of the Belmore Road and Avoca Street intersection would be reviewed to determine if an additional short approach lane is required and can be incorporated on Belmore Road to manage traffic at this intersection.	Management measure to be removed
Visual and landscape		
<u>C.14</u>	<u>Urban design opportunities would be investigated to minimise the potential impacts associated with the proposed access lane from Arthur Street. This would include the consideration of appropriate landscaping, surface treatments for the access lane and retaining wall and provision and replacement boundary of fencing which is of a similar style to that currently provided for adjacent properties.</u>	New management measure
Non-indigenous and Aboriginal heritage		
D.12	High Cross Park. Minimise land take and impact on trees. If possible, locate the substation underground. Reinstate remnant landscaping. Make a photographic record before commencing work.	Existing management measure to be replaced by new measure D.18
<u>D.18</u>	<u>The following measures would be implemented for High Cross Park:</u> <u>where feasible, the final location of the substation would be optimised during detailed design to avoid impacts on the heritage fabric of the park and the WWII air raid trenches</u> <u>if an alternative position within the park cannot be determined mitigation measures associated with heritage archaeological management zone 2 (as detailed in the approved CSELR EIS) would be implemented. These would include:</u> <u>archaeological excavation and archival recording of archaeological remains of the WWII air raid shelter would be undertaken</u> <u>investigation of options for WWII air raid shelter interpretive signage following works</u>	New management measure

ID Reference	Environmental management measure – detailed design and pre-construction phase	Impact to management measures
	▸ archival recording of items within the park and significant trees ▸ provision of an exclusion zone surrounding the significant elements of heritage significance within the park ▪ any proposed impacts to the park area would avoid significant trees and the cenotaph area ▪ a photographic archival recording of the reserve would be undertaken prior to works commencing.	
D.19	The Wansey Cottage would be included in the next phase of interpretation planning for the project where feasible. Information on the former cottage would be incorporated into the Wansey Road stop during detailed design.	New management measure
D.20	Archival recording of the Wansey Cottage building would be undertaken consistent with the requirements of the project prior to work being undertaken. This archival recording would include the interiors of the residence once it is vacated.	New management measure
Property and land use		
F.4	The alignment of the existing rear boundary fence to the Tigger's Place Childcare Centre and Honeypot Childcare Centre would be designed to avoid reduction of the outdoor space in order to retain that of the existing licensed area for either childcare centre. The location for the realigned boundary fence would be determined in consultation with UNSW and the childcare centre operators.	New management measure
F.5	Where feasible, opportunities to replace the existing open space area between the proposed access lane and the childcare centre affected by the proposed modification would be investigated. Investigation would include consideration of appropriate vegetation, relocation of the existing shed and playhouse structure, and relocation of an existing vegetable garden currently used by the childcare centre. The final use and layout for this area of land would be determined through consultation with the UNSW and the childcare centre.	New management measure
Planted trees		
N.4	The location of the substation within High Cross Park would ensure that the works would not impact on any significant trees within High Cross Park.	New management measure
Construction		
General environmental management measures		
O.16	The following environmental management measures would be implemented for the High Cross Park construction compound: ▪ The construction compound boundary would minimise impacts to significant trees within High Cross Park that would not already be impacted by the proposed permanent works (i.e. the Randwick stop the High Cross Park substation). Exclusion fencing would be established around the drip lines of each tree to be retained (and with the potential to be adversely affected) to minimise the risk of impact to the viability of the trees. Where impact to the drip line area cannot be avoided (due to space constraints), opportunities to raise construction facilities (e.g. demountable) above the ground level would be investigated so as to avoid impacting on underlying tree roots, in accordance with Australian Standard AS 4970. ▪ Where possible, the construction compound at High Cross Park would be constrained to the northern portion of the park to maintain access to public open space and the war memorial.	Management measure to be amended



ID Reference	Environmental management measure – detailed design and pre-construction phase	Impact to management measures
	- The High Cross Park construction compound would not impact on the war memorial. - The opportunity to remove on-street parking on Belmore Road would be investigated during detailed design to reduce the extent of High Cross Park that would be required for the construction compound.	
Traffic and transport		
Q.50	A single traffic lane would be maintained in each direction along High Street within the Randwick precinct at all times.	Management measure to be removed
Q.54	The Belmore Road intersection works within the Randwick Precinct would be staged during the weekend and nights.	Management measure to be removed
Planted trees		
T.11	The impacts associated with at High Cross Park the Randwick stop would be managed through the development of a detailed landscape strategy for High Cross Park, which would incorporate improvements such as new tree planting, a public plaza and new landscaping. New trees would provide shade and would partly compensate for the loss of existing trees.	Management measure to be amended
Non-indigenous and Aboriginal heritage		
V.22	During demolition of Wansey Cottage, where practical, salvage and recycle building elements of heritage significance suitable for the repair of other heritage items, including roof tiles, joinery (windows, doors, architraves, skirting) and any other fabric.	New management measure
Operation		
Traffic and transport		
AH.6	The following intersections would be signalised as part of the CSELR to manage light rail conflicts with pedestrian and traffic movements: - Devonshire Street/Marlborough Street intersection. - Devonshire Street/Bourke Street intersection. - South Dowling Street southbound and northbound traffic lanes at the CSELR crossing point. - Wansey Road/Alison Road intersection would be signalised (on all arms) to provide pedestrian access from the residential catchments in the north and east to the Wansey Road stop. - High Street/Wansey Road intersection would be signalised to accommodate pedestrians and the light rail turning movements between Wansey Road and High Street. Pedestrian crossings would be provided across Wansey Road and the eastern arm of High Street as a minimum, which would replace the existing zebra crossing on High Street. - High Street/Hospital Road intersection. - High Street/Clara Street intersection. Arthur Street/Botany Street intersection Arthur Street/Belmore Road intersection Botany Street/Barker Street intersection - The existing Nine Ways roundabout would be reconstructed and upgraded to incorporate traffic signals.	Management measure to be amended
AH.22	The following changes to bus stops would be implemented as part of the CSELR to allow for bus services to service the Prince of Wales Hospital, Children's Hospital and University of NSW:	Management measure to be amended

ID Reference	Environmental management measure – detailed design and pre-construction phase	Impact to management measures
	▪ An indented bus bay for westbound buses on High Street would be introduced adjacent to the adult wing of the Prince of Wales Hospital. ▪ The westbound bus stop on High Street adjacent to the Children's Hospital emergency entrance would be relocated to Clara Street, with access to the hospital via a signalised intersection. ▪ An indented bus bay for westbound buses would be provided on High Street between Botany Street and Wansey Road (within the UNSW site).	



8. Statutory context

This chapter provides an overview of the legislative context for the proposed modification.

8.1 Legislation

The EP&A Act provides the statutory framework for the CSELR planning approvals. As described in Chapter 1, the approved Project was declared a Critical State Significant Infrastructure project by the Minister for Planning and Infrastructure (now Minister for Planning) under Part 5.1 of the EP&A Act and accompanying regulation on 23 June 2013.

Pursuant to Section 115ZI of the EP&A Act, Transport for NSW is seeking approval for the modification of the State Significant Infrastructure approval (SSI-6042), granted on 4 June 2014 (and modified accordingly in February 2015 and March 2015).

Section 115ZI of the EP&A Act states as follows:

(1) *In this section:*

Minister's approval means an approval to carry out State significant infrastructure under this Part, and includes an approval granted on the determination of a staged infrastructure application.

modification of an approval means changing the terms of the approval, including revoking or varying a condition of the approval or imposing an additional condition on the approval.

(2) *The proponent may request the Minister to modify the Minister's approval for State significant infrastructure. The Minister's approval for a modification is not required if the infrastructure as modified will be consistent with the existing approval under this Part.*

(3) *The request for the Minister's approval is to be lodged with the Director-General. The Director-General may notify the proponent of environmental assessment requirements with respect to the proposed modification that the proponent must comply with before the matter will be considered by the Minister.*

(4) *The Minister may modify the approval (with or without conditions) or disapprove of the modification.*

8.2 Consultation with the Department of Planning and Environment

Transport for NSW has been consulting with DP&E regarding the proposed modification during preparation of this report. This modification report has been prepared to assist the Minister for Planning in assessing and determining the potential impacts of the proposed modification.

Further discussion regarding consultation undertaken regarding the proposed modification has previously been provided in Chapter 4 of this report.



9. Conclusion

This report has been prepared to support an application by Transport for NSW to modify the existing project approval for the CSELR Project and is intended to assist the Minister for Planning in forming a view as to the merits of the proposed modification.

The proposed modification has been developed as a result of ongoing consultation with stakeholders and ongoing design investigations. The proposed changes to the approved Project, as described in this report, would result in an overall positive outcome in comparison to the approved Project. The improvements over the approved Project would include:

- reduction in traffic impacts at the Avoca Street and Belmore Road intersection due to the reduced construction impacts at this locations as the light rail would no longer needing to cross this intersection
- beneficial visual and landscape character outcome in comparison to the approved Project, in particular as a result of reduced impacts to High Cross Park
- beneficial outcome to planted trees, in particular reduced impacts to High Cross Park
- overall improvement to the retention of the heritage significance of High Cross Park due to the relocation of the Randwick terminus stop to High Street
- improved accessibility to existing businesses and services such as the Randwick town centre and Prince of Wales Hospital
- benefits to electromagnetic interference impacts in comparison to the approved Project, in particular with respect to potentially sensitive equipment associated with the UNSW.

Some potential negative environmental impacts have also been identified as occurring as a result of the proposed design modification. These include:

- traffic and transport changes such as:
 - ▶ modification to existing local traffic movements/network including removal of eastbound traffic between Wansey Road and Botany Street and westbound traffic between Avoca Street and Clara Street
 - ▶ increased delays at some intersections within the Randwick precinct due to expected local traffic movement changes
 - ▶ revised property access to four properties along High Street
 - ▶ removal of a net total of approximately 32 on-street parking spaces
- potential impacts to an identified World War II air raid trench due to subsurface excavation required in High Cross Park to allow for the substation to be placed below ground in High Cross Park
- additional impacts to existing properties to accommodate the rear access lane from Arthur Street

- noise and vibration impacts such as:
 - ▶ additional operational noise impacts during construction for receivers (including residential, educational and a child care centre) along Arthur Street and adjacent to the proposed construction of the access lane from Arthur Street
 - ▶ additional operational noise impacts to up to five additional properties along High Street between Wansey Road and Botany Street due to the change in the alignment at this location further to the north
 - ▶ potential minor additional impacts to the Prince of Wales Hospital due to the decrease in setback distance between the near track and the buildings to accommodate the revised stop platform
 - ▶ vibration impacts to an additional receiver (medical imaging centre) along High Street
 - ▶ road noise impacts resulting from changes to local traffic changes, in particular along Arthur Street.

Based on the above, the proposed modification is considered to be justified and would represent an overall beneficial outcome for the approved Project. The proposed changes would, whilst resulting in some impacts, result in the benefits listed above which would provide an improved outcome in comparison to the approved Project for both the local community within the Randwick Precinct and operation of the overall light rail system.



10. References

Department of Environment, Climate Change and Water 2009, *Interim Construction Noise Guideline*

Department of Environment, Climate Change and Water 2011, *Road Noise Policy*

Enotrac 2014, *Preliminary report on CSELN EMI*, prepared by Enotrac on behalf of Transport for NSW

Environment Protection Authority (EPA) 2013, *NSW Rail Noise Infrastructure Guideline*

GML 2013, *CBD and South East Light Rail Heritage Impact Assessment Report*, prepared for Parsons Brinckerhoff on behalf of Transport for NSW

Randwick City Council 2007, *Register of Significant Trees*

Transport for NSW 2013, *CBD and South East Light Rail Project – Environmental Impact Statement*, Transport for NSW, November 2013

Transport for NSW 2014a, *CBD and South East Light Rail Project – Submissions Report*, Transport for NSW, March 2014

Transport for NSW 2014b, *CBD and South East Light Rail Project – Project Modification Report*, Transport for NSW, December 2014