15. Local impacts: Randwick Precinct

Chapter 15 details the existing character and environment of the Randwick Precinct, as well as the key environmental impacts of the CBD and South East Light Rail Project ('the CSELR proposal' or 'the CSELR') in this precinct. The chapter focuses on the following key environmental issues: local traffic transport and access; local property and land use; noise and vibration; planted trees; visual and landscape character; built and non-Indigenous heritage; and socio-economics. Other regional environmental impacts and other environmental issues are covered in Chapters 9–11 of this Environmental Impact Statement (EIS).

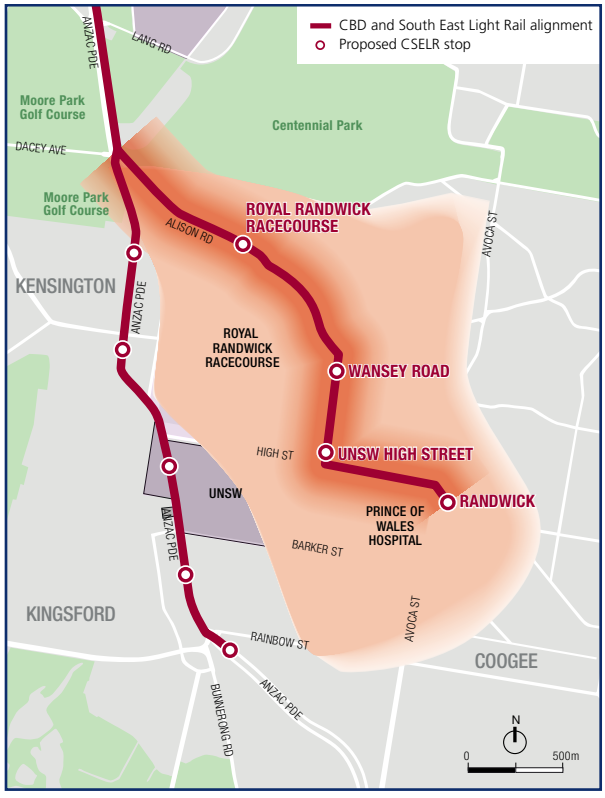
15.1 Key characteristics of the precinct

The Randwick Precinct (refer Figure 15.1) is located in south-eastern Sydney and was Sydney's first suburban municipality. The suburb has undergone a number of phases of development and today the precinct contains a mix of housing with many multi-storey flats and units as well as stately heritage homes. The precinct also has key health, education facilities within its borders, including University of New South Wales (UNSW) and the Randwick health precinct. In line with this medical and educational hub, healthcare, education, and scientific professions are amongst the most popular for residents of the area.

Medical facilities are focused along High Street including the Sydney Children's Hospital, Prince of Wales Hospital, Royal Hospital for Women, Eastern Heart Clinic as well small medical practices, private clinics and other specialist medical services. The UNSW Upper Campus is also located here. Coffee shops and restaurants are dotted along High Street, which serve the medical and education faculties. High Cross Park is a key green space in the area that is well patronised on lunch breaks and weekends and serves as a location for local ANZAC day services.

Randwick is also synonymous with racing and the home of Royal Randwick racecourse, one of Sydney's oldest institutions. It is a major event destination in Sydney offering over 15 indoor and outdoor spaces and hosting events throughout the year, such as the well-known Sydney Racing Carnival.

Figure 15.1 Randwick Precinct



15.2 Key community and stakeholder concerns for the precinct

Based on community consultations to date (refer Chapter 2), key community issues for the Randwick Precinct include:

- *Route selection* — Strong opposition was raised to the selection of Wansey Road as part of the proposed CSELR alignment. Issues raised related to the residential character of the street and the construction and operational impacts caused by CSELR, including loss of parking and access to properties, noise impacts and reduced amenity. An alignment through Royal Randwick racecourse was raised as a preferred alternative.
- *Traffic congestion on Anzac Parade, Alison Road, Wansey Road and at High Cross Park* — In particular it was perceived that the introduction of the CSELR would increase congestion on Alison Road at peak hour, and also at the High Cross Park stop due to light rail vehicles (LRVs) interchanging with buses and a general increase in competition for road space.
- *Loss of parking along Wansey Road, Alison Road and High Street* — Concerns were raised regarding loss of resident and visitor parking as well as safety concerns with regard to access to driveways or garages. Additionally, loss of parking was perceived by some as a potential cause of congestion on the surrounding residential road network where parking is already limited.
- *Removal or significant trimming of trees* — In particular concerns were raised regarding impacts to mature trees on Alison Road, Wansey Road and at High Cross Park to accommodate the introduction of the CSELR. The loss of trees was seen to have a negative impact on visual amenity and environmental impacts for the identified streets and local area. Most people cited environmental impacts generally as an area of concern; however other community members and stakeholders provided specific feedback about the potential impact on the Grey-headed Flying Fox.
- *Noise and vibration* — In particular, concerns were voiced regarding potential vibration damage to homes during construction, as well as impacts of operational noise such as wheel squeal and increased traffic noise in the area from people travelling to light rail stops.

15.3 Local traffic, transport and access

15.3.1 Existing conditions

The following sections provide a summary of the existing traffic, transport and access environment for the Randwick Precinct, based on Technical Paper 1 — *Transport Operations Report* in Volume 2.

Roads

Existing road network

The existing road network within the Randwick Precinct is shown in Figure 15.2a and Figure 15.2b. The key roads within the Randwick Precinct that would be directly affected by the CSELR proposal include Alison Road, Wansey Road and High Street. A summary of the key network characteristics for each of these roads is provided in Table 15.1.

Table 15.1 Road network characteristics – Randwick Precinct

ROAD	KEY CHARACTERISTICS
Alison Road	Alison Road is a divided two-way collector road under the control of Randwick City Council. Alison Road currently operates with three traffic lanes in each direction between Doncaster Avenue and Darley Road; while in the remaining sections, parking is permitted on the kerbside lanes. Traffic on Alison Road is mainly generated by land uses such as Royal Randwick racecourse, Randwick TAFE, the Prince of Wales Hospital and UNSW, as well as the residential dwellings and apartments within the Randwick Precinct.
Wansey Road	Wansey Road is a two-way local road (with a single traffic lane in each direction) under the control of Randwick City Council. Traffic on Wansey Road is mainly generated by the adjacent residential properties, UNSW campus and traffic accessing the Prince of Wales Hospital. Side road accesses along Wansey Road are priority controlled.
High Street	High Street, between Wansey Road and Belmore Road, is a two-way local road with a single lane in each direction. High Street provides a connection for cross regional bus and general traffic between Randwick and UNSW / Anzac Parade. The general traffic along this corridor is associated with the Prince of Wales Hospital, Children's Hospital emergency department and UNSW. Access to the Adult and Children's hospitals is currently via two separate accesses from High Street.

Source: *Adapted from Table 2-40 of Technical Paper 1 – Transport Operations Report, Volume 2*

Existing traffic operating patterns

Alison Road is a major link connecting the eastern suburbs road network to the Sydney road network and currently operates at capacity during weekday peak travel periods. Recent data describes average vehicular travel speeds of 21 kilometres per hour for Alison Road during the morning peak period. A separated busway is in operation on the northern side, which runs in parallel to Alison Road. The connection to the busway is provided via the Doncaster Avenue intersection.

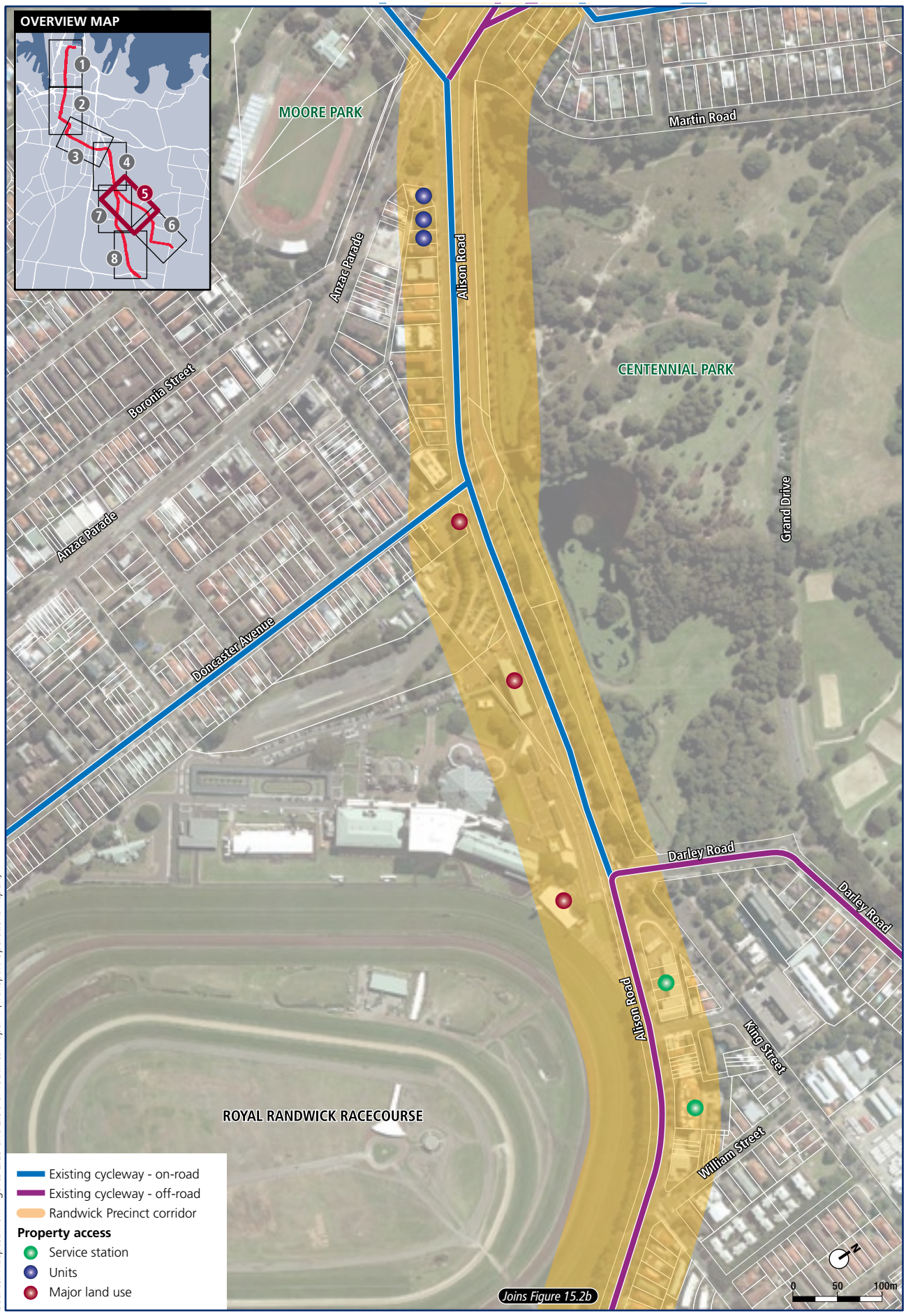
The intersection of Alison Road and Doncaster Avenue caters for traffic entering Alison Road from Doncaster Avenue as well as the bus movements between Alison Road and the busway. This intersection accommodates approximately 4,800 vehicle movements during the average peak hour (7.30 am to 8.30 am). In addition to these peak hour commuter flows, this intersection is located adjacent to the Royal Randwick racecourse, which generates large crowds during special events, usually held during public holidays and weekends.

The peak season for events at the racecourse, based on 2013 scheduled events, is between the months of September to December with one or two events scheduled per month for the remainder of the year. Another key time period is the Autumn Racing Carnival when racecourse activity would generate additional traffic on the local network.

The peak traffic movements during weekdays occur mainly during the morning and afternoon peak periods, whereas during the weekend, peak flows occur in the afternoon period. Total weekend flows represent approximately 90 per cent of the weekday traffic (as shown in Figure 4-48 of Technical Paper 2).

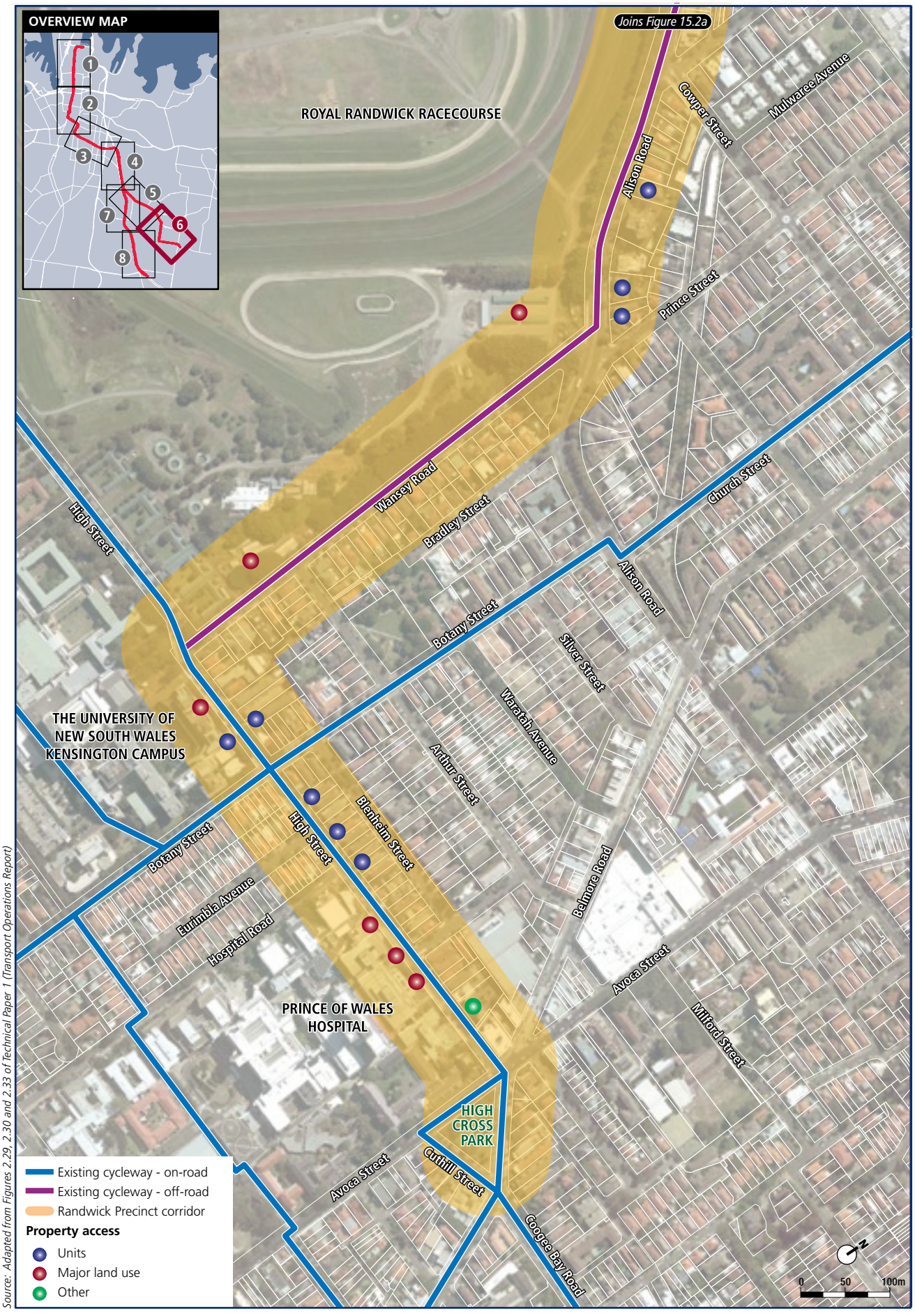
The intersection of High Street, Belmore Road and Avoca Street is a five arm intersection that provides access to the main commercial precinct of Randwick as well as the major north-south corridor of Avoca Street and the major developments along High Street. As per the surrounding road network, the peak traffic movements at the intersection occur mainly during the morning and afternoon peak periods during weekdays, whereas during the weekend, peak flows occurs in the afternoon period with approximately 90 per cent of the weekday traffic (as shown in Figure 4-49 of Technical Paper 2).

Figure 15.2a Randwick Precinct – Existing traffic, transport and access



Source: Adapted from Figures 2.29 and 2.30 of Technical Paper 1 (Transport Operations Report)

Figure 15.2b Randwick Precinct – Existing traffic, transport and access



Source: Adapted from Figures 2.29, 2.30 and 2.33 of Technical Paper 1 (Transport Operations Report)

Existing peak hour traffic volumes and composition

A summary of the peak traffic volumes travelling along Alison Road and High Street is provided in Table 15.2. The composition of the traffic (i.e. types of vehicles) on these roads is outlined in Figure 2-31 of Technical Paper 1. Light vehicles make up the majority of vehicles travelling along Alison Road and High Street.

Table 15.2 Average weekday morning and afternoon peak traffic volumes – Randwick Precinct

INTERSECTION	MORNING PEAK TRAFFIC (AVERAGE NUMBER OF VEHICLES)			AFTERNOON PEAK (AVERAGE NUMBER OF VEHICLES)		
	CITY-BOUND	OUTBOUND[1]	PEAK DIRECTION SPLIT	CITY-BOUND	OUTBOUND[1]	PEAK DIRECTION SPLIT
Alison Road (near High Street)	2,880	1,987	59% citybound	2,114	3,114	60% outbound[1]
High Street (near Belmore Road)	409	357	53% citybound	258	523	67% outbound[1]

Source: *Adapted from Table 2-42 of Technical Paper 1 – Transport Operations Report, Volume 2*

Note 1: *Outbound refers to vehicle movements occurring away from the Sydney CBD*

Existing intersection performance

A summary of available information on the performance of key intersections along Alison Road and High Street is provided in Table 15.3. Intersection performance in Table 15.3 is measured using the following indicators:

- *Level of Service (LoS)* — A basic performance parameter used to describe the operation of an intersection. LoS ranges from A (indicating good intersection operation) to F (indicating over-saturated conditions with long delays and queues).
- *Degree of Saturation (DoS)* — The ratio of demand flow to capacity. As DoS approaches 1.0, extensive queues and delays can be expected.
- *Delay* — This represents the number of seconds a vehicle is delayed at an intersection.

The High Street/Belmore Road/Avoca Street intersection currently has a low level of performance with average delays greater than 60 seconds during both the morning and afternoon peaks.

Table 15.3 Existing intersection performance – Randwick Precinct

INTERSECTION	PEAK HOUR	EXISTING INTERSECTION PERFORMANCE		
		LOS	DOS	AVERAGE DELAY (SECONDS)
Alison Road/Darley Road[1]	PM	B	0.86	25.0
High Street/Belmore Road/ Avoca Street	AM	E	1.00	68.0
	PM	F	1.00	82.9

Source: *Adapted from Table 2-43 of Technical Paper 1 – Transport Operations Report, Volume 2*

Note 1: *Afternoon peak data only available for this intersection*

Parking and kerbside access

Existing parking supply on the CSELR corridor – Randwick Precinct

Limited on-street parking is provided on Alison Road between Anzac Parade and Darley Road. On-street parking around Royal Randwick racecourse is located predominantly on the eastern edge of Alison Road. Bus stops and on-street parking are common along the rest of the corridor.

The number of existing parking spaces and other kerbside access zones along the proposed CSELR alignment within the Randwick Precinct are outlined in Table 15.4. The distribution of these spaces within the study area is shown in Figure 2-32 of Technical Paper 1.

Table 15.4 Existing special kerbside uses and parking supply on the CSELR corridor – in the Randwick Precinct

KERBSIDE RESTRICTION	SPECIAL KERBSIDE USES AND PARKING SUPPLY WITHIN THE RANDWICK PRECINCT BY TIME PERIOD		
	PRE-MORNING PEAK[1]	INTERPEAK[1]	POST-AFTERNOON PEAK[1]
Car share, hospital, mail zone	3	3	3
Disability parking	2	2	2
Loading zone	1	1	1
Taxi zone	1	1	1
Total – Special Kerbside Uses	**7**	**7**	**7**
Short stay parking (≤ 1P)	70	64	64
Long-stay parking (restricted)	45	45	45
Long-stay parking (unrestricted)	187	193	193
Total – General Parking	**302**	**302**	**302**

Source: *Table 2-44 of Technical Paper 1 – Transport Operations Report, Volume 2*

Note 1: *Pre-morning peak = before 7.30 am; Interpeak = 10.00 am to 2.00 pm; Post-afternoon peak = after 6.30 pm*

Parking supply, demand and occupancy in the broader Randwick Precinct

The distribution of unrestricted and time restricted parking spaces within the broader Randwick Precinct is shown in Figures 6-35 and 6-37 of Technical Paper 1.

A parking occupancy survey was undertaken for the Randwick Precinct during May 2013. The survey extent is shown in Figures 15.3 to 15.5 and includes the proposed CSELR corridor as well as streets parallel to the corridor and within a potential walking catchment of the light rail stops, the corridor itself and the major land uses in the precincts surrounding the corridor. The surveys recorded parking occupancy during three distinct time periods:

- pre-morning peak — before 7.30 am
- interpeak — between 10.00 am and 2.00 pm
- post-afternoon peak — after 6.30 pm.

The precinct was divided into four zones — as shown in Figures 15.3 to 15.5 — to develop summary measures for parking demand and turnover for sub-precinct precinct zones individually, as well as at the overall precinct level.

The occupancy survey results for the Randwick Precinct are illustrated in Figures 15.3 to 15.5, with summary data outlined in Table 15.5. The key trends from the parking occupancy analysis of the existing Randwick network include:

- General parking supply remains relatively consistent within the Randwick Precinct for the three time periods surveyed.
- The pre-morning peak (before 7.30 am) occupancy rates were higher within zones 1 (82 per cent) and 2 (88 per cent); these zones contain a high proportion of unrestricted parking.
- Average occupancy rates during the interpeak (between 10.00 am and 2.00 pm) were generally 90 per cent; with the exception of sub-precinct zone 2 (adjacent to UNSW and Wansey Road), where a 98 per cent occupancy rate was recorded.
- Sub-precinct zones 3 and 4 had slightly slower overall occupancy; however, these zones also recorded the greatest proportion of high turnover demand (i.e. vehicles present in either the interpeak survey or post-afternoon peak survey periods only, as discussed in section 6.3.1 of Technical Paper 1), with 45 per cent and 41 per cent respectively.

Table 15.5 Parking supply, demand and occupancy – Randwick Precinct

ZONE	PRE-MORNING PEAK[1,2]			INTERPEAK[1,2]			POST-AFTERNOON PEAK[1,2]			DAILY
	DEMAND	SUPPLY	OCCUPANCY	DEMAND	SUPPLY	OCCUPANCY	DEMAND	SUPPLY	OCCUPANCY	% HIGH TURNOVER
Zone 1	661	804	82%	734	804	91%	656	804	82%	32%
Zone 2	275	313	88%	308	313	98%	201	313	64%	26%
Zone 3	414	530	78%	530	630	84%	457	528	87%	45%
Zone 4	412	587	70%	547	633	86%	523	607	86%	41%
Total	**1,762**	**2,234**	**79%**	**2,119**	**2,380**	**89%**	**1,837**	**2,252**	**82%**	**37%**

Source: *Table 6-14 of Technical Paper 1 – Transport Operations Report, Volume 2*

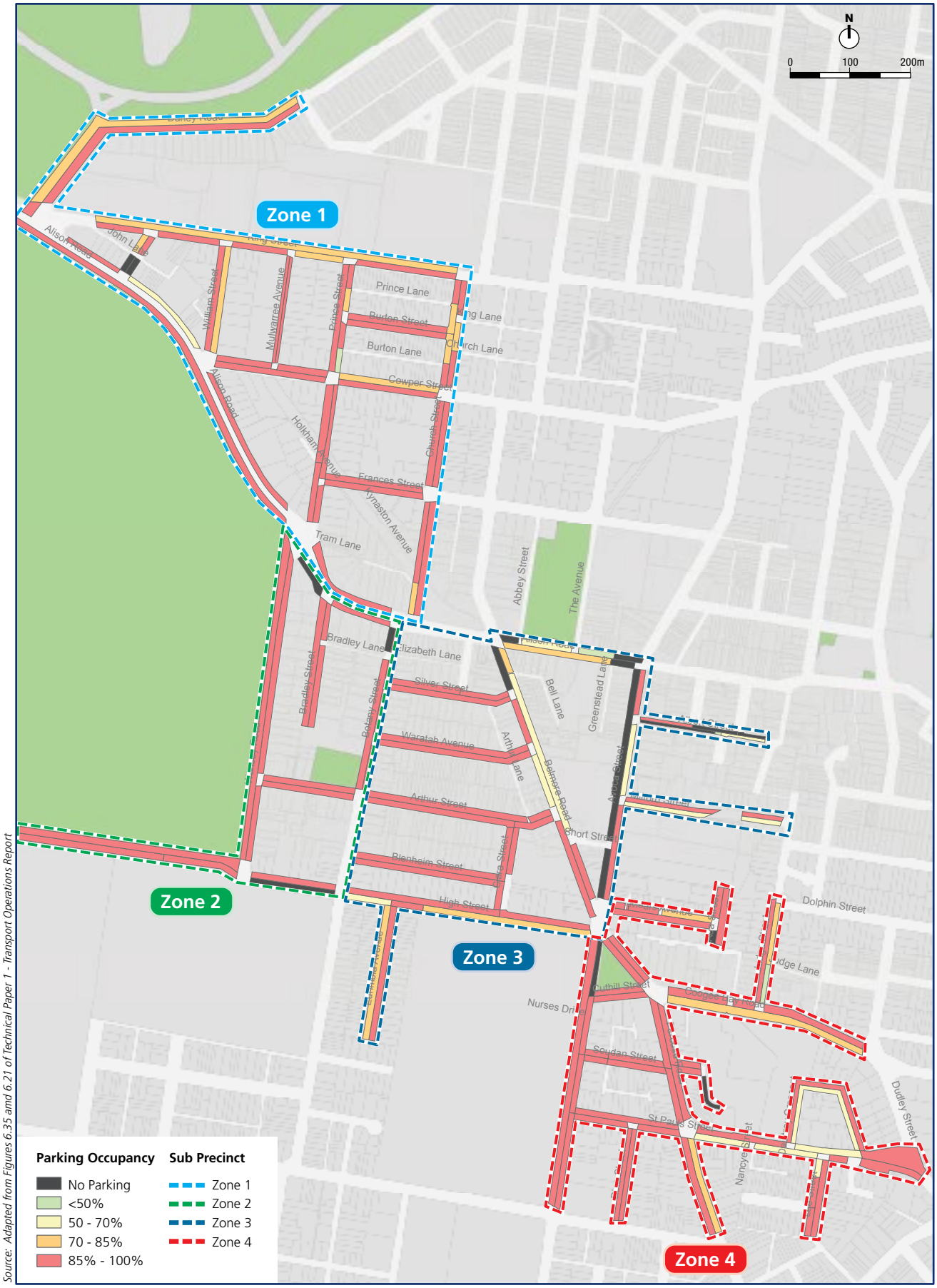
Note 1: *Supply and demand includes time restricted and non-restricted parking only*

Note 2: *Pre-morning peak = before 7.30 am; Interpeak = 10.00 am to 2.00 pm; Post-afternoon peak = after 6.30 pm*

Figure 15.3 Average pre-morning peak (before 7.30 am) parking occupancy and parking survey zones – Randwick Precinct

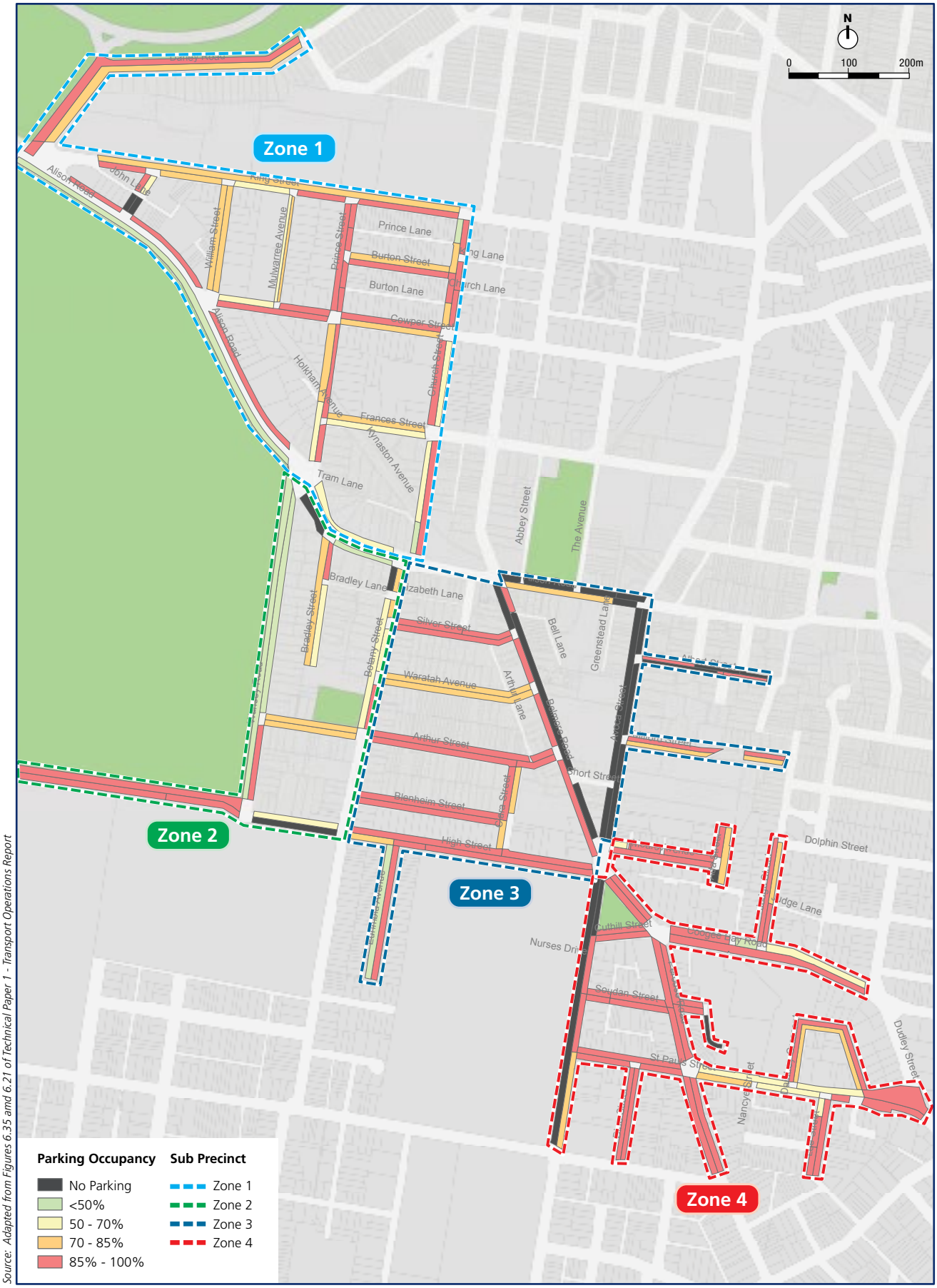
Source: Adapted from Figures 6.35 amd 6.21 of Technical Paper 1 - Transport Operations Report

Figure 15.4 Average interpeak (10 am–2 pm) parking occupancy and parking survey zones – Randwick Precinct



Source: Adapted from Figures 6.35 amd 6.21 of Technical Paper 1 - Transport Operations Report

Figure 15.5 Average post-afternoon peak (after 6.30 pm) parking occupancy and parking survey zones – Randwick Precinct



Source: Adapted from Figures 6.35 and 6.21 of Technical Paper 1 - Transport Operations Report

Property access

The locations of property accesses within the Randwick Precinct are shown in Figure 15.2a and Figure 15.2b. Driveways predominantly provide access to private residential properties, which are generally located at regular intervals along the proposed CSELR alignment.

Alison Road accesses are predominantly related to the Royal Randwick racecourse (four access points) and residential driveways (six access points). The racecourse's main entrance is accessed off Alison Road and includes a short right turn bay for vehicles approaching from the west. Access to the racecourse for buses during event days is via the four-way intersection with Darley Road (entry only) and by a left-out only access further west along Alison Road. The area experiences significant congestion when events are hosted at the racecourse, particularly around the peak entry and exit periods when there is a heavy demand on these main access points. Two service stations are also located on the northern side of Alison Road between Darley and Cowper streets.

Wansey Road driveways are predominantly associated with the low-density housing along the eastern side. In addition, the racecourse has a further two accesses on the western side to service the horse stables, which attract activity throughout the working day.

High Street has a number of major driveway accesses related to the predominant land uses of UNSW and Prince of Wales Hospital. Gate 9 to UNSW acts as a secondary access to the University's Botany Street parking station and is located to the east of the Wansey Road intersection. Three separate hospital accesses are provided, including emergency vehicle access to the Sydney Children's Hospital that requires efficient access 24-hours a day.

Bus services

Existing bus services and facilities operating within the Randwick Precinct comprise the following:

- *Alison Road* — A separated busway is in operation on the eastern side, which runs parallel to Alison Road. The connection to the busway is provided via the Doncaster Avenue intersection. Services operating on Alison Road include routes 339, 372, 373, 374, 376, 377, X39, X73, X74 and X77. In total, approximately 90 services operate on Alison Road citybound in the one hour peak.
- *Wansey Road* — Wansey Road is not an official bus route identified in the eastern region bus route map. However, the 891 UNSW bus service currently utilises this corridor when out of service.
- *High Street* — High Street provides an important east-west connection for 10 different bus routes, including university express services. Services operating on High Street include the M50, 348, 357, 370, 400, 410, 890, 891 and 892, totalling approximately 77 services eastbound during the morning peak hour.

All regular route services in the Randwick Precinct are operated by Sydney Buses.

Cyclists

There are several networks of on-road and off-road cycleways in the vicinity of the proposed CSELR. These bicycle networks are shown in Figure 15.2a and Figure 15.2b and described in Table 15.6. The cyclist facilities consist of designated pathways across Centennial Park and off-road routes along Alison Road, Darley Road and Wansey Road.

Table 15.6 Existing cyclist facilities within the Randwick Precinct

ROAD	LOCATION	DESCRIPTION
Alison Road	On-road and off-road cycleway	An off-road pedestrian cycle path runs along the corridor from Anzac Road to Wansey Road. Between Anzac Road and Darley Road, the route runs on the north side of Alison Road. Between Darley Road and Wansey Road, the route runs on the south side. A signalised crossing at Darley Road enables cyclists to cross from one side of Alison Road to the other.
Wansey Road	Off-road cycleway	The Randwick City Council bicycle route map designates Wansey Road as an off-road pedestrian/bicycle route, which runs along the eastern side of the corridor.
Botany Street/ Church Street	On-road	Between Darley Road and Barker Street, Randwick City Council identifies Botany Street and Church Street as on-road cycle routes.
High Street	On-road	The Randwick City Council bicycle route map designates High Street as an in-road route.
UNSW	On-road	An on-road cycle route through UNSW (comprising the University Mall, Library Road, Library Walk and Samuels Avenue) provides an east-west connection between Botany Street and Anzac Parade.

Source: Adapted from Table 2-46 of Technical Paper 1 – Transport Operations Report, Volume 2

Pedestrians

Existing pedestrian access within the Randwick Precinct is facilitated by footpaths, marked and signalised pedestrian crossings and kerb ramps. Existing pedestrian access types along the CSELR alignment are summarised in Table 15.7.

Table 15.7 Existing pedestrian access within the Randwick Precinct

ROAD	DESCRIPTION	PEDESTRIAN ACCESS TYPE
Alison Road	Pedestrians are mainly generated by the Prince of Wales Hospital, the UNSW, Royal Randwick racecourse, hotels and residential properties.	Sealed footpaths, pedestrian crossings at three signalised intersections and kerb ramps are provided to facilitate pedestrian movements across Alison Road.
Wansey Road	Pedestrians within Wansey Road are mainly generated by local residential properties, recreational activities and UNSW.	Pedestrian facilities (such as sealed shared path on eastern side, footpath on western side and kerb ramps) are provided to facilitate pedestrian movements across Wansey Road.
High Street	Pedestrian activity associated with High Street is highly influenced by the trips made to UNSW, hospitals and residential properties within the area. Two signalised intersections and two marked pedestrian crossing are located within this section of the High Street.	Two signalised intersections and two marked pedestrian crossings are located within the High Street corridor. Other pedestrian facilities such as sealed footpaths and kerb ramps are also provided to facilitate pedestrian movements across High Street.

Source: Adapted from Table 2-45 of Technical Paper 1 – Transport Operations Report, Volume 2

15.3.2 Impacts during operation

A detailed operational traffic and transport assessment for the CSELR proposal was undertaken by Booz & Company and AECOM. A comprehensive technical report is available as Technical Paper 1 — *Transport Operations Report* in Volume 2. Key findings for the Randwick Precinct are summarised below.

Integration with the existing road network

The CSELR proposal would be integrated within the existing surface street environment and, as such, would require a number of substantial changes to be made to the way in which the road network is designed and operated.

The key functional changes and high level operational characteristics proposed within the Randwick Precinct as part of the CSELR proposal are shown in Figures 15.6a and b and described in section 5.3.5 of Technical Paper 1.

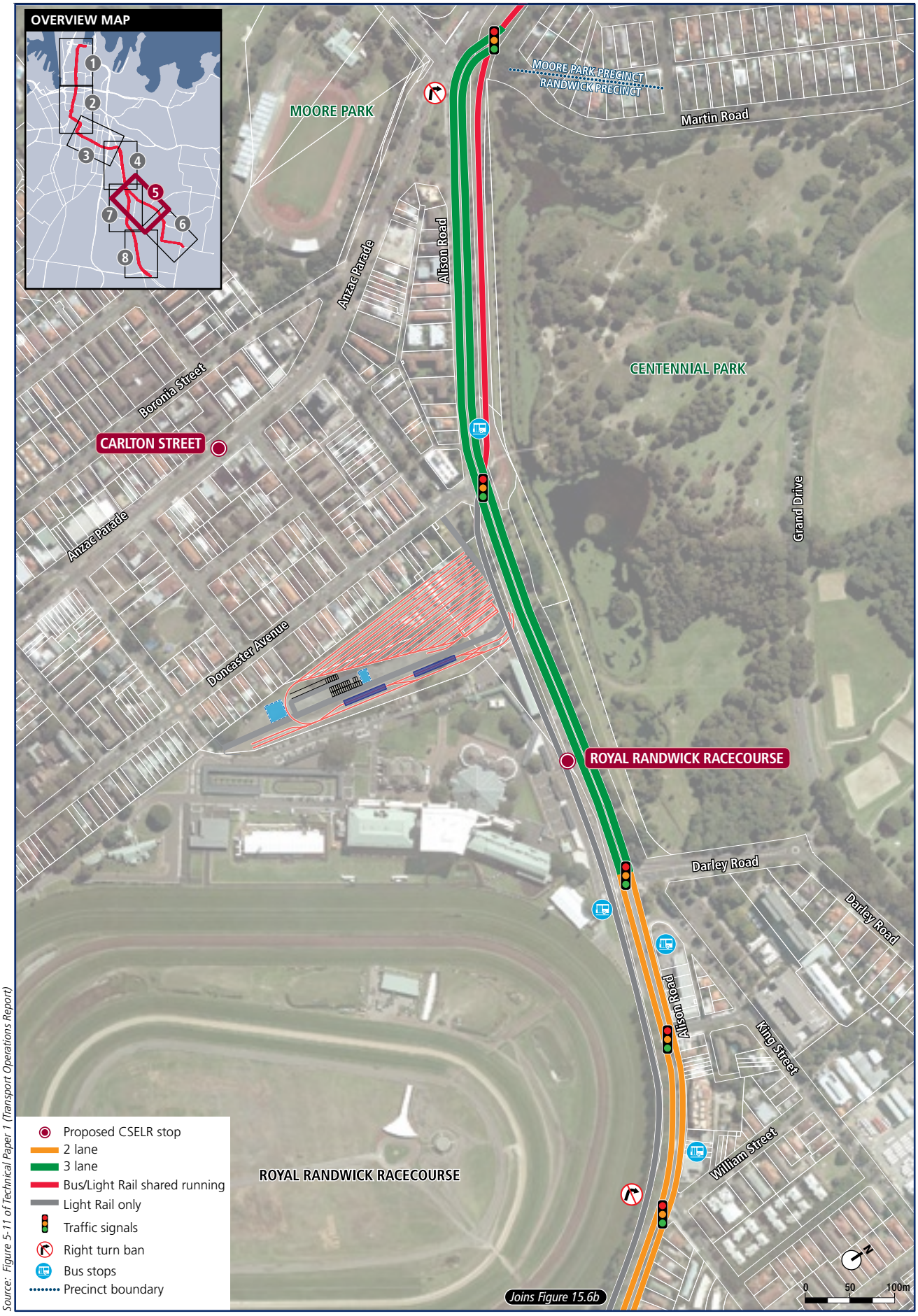
The key features of the road conditions proposed along Wansey Road comprise the following:

- Two-way traffic would be retained.
- No provision for on-street parking would be provided due to the reduced road cross-section.
- The shared cycleway and footpath would be retained on the western side of Wansey Road.
- The Wansey Road/Alison Road intersection would be signalised (with crossing points on all arms) to provide pedestrian access from the residential catchments in the north and east to the Wansey Road stop.
- The 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.

The key changes to road conditions proposed along High Street comprise the following:

- Traffic signal control would be introduced at the High Street/Hospital Road intersection.
- Traffic signal control would be introduced at the High Street/Clara Street intersection.
- Access to Eurimbla Avenue would be restricted to left-in left-out.
- 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 adjacent to the Sydney 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).

Figure 15.6a Randwick Precinct (North) – Functional changes to the road network



Source: Figure 5-11 of Technical Paper 1 (Transport Operations Report)

Figure 15.6b Randwick Precinct (South) –Functional changes to the road network

Source: Figure 5-17 of Technical Paper 1 (Transport Operations Report)

Operational impacts on property access

An overview of the operational impacts of the CSELR proposal on property accesses along key roads is provided in Table 15.8.

Table 15.8 Impacts on property access during the operation of the CSELR proposal – Randwick Precinct

ROAD	IMPACTS ON PROPERTY ACCESS
Alison Road	Property accesses located on the eastern side of Alison Road would be unaffected by the CSELR proposal; however, the existing gate access to Royal Randwick racecourse may be subject to restrictions or controls. This gate provides access to Royal Randwick racecourse, Randwick TAFE, UNSW Randwick campus, and a works depot utilised by the Centennial Park and Moore Park Trust. The private property affected by the proposed Randwick stabling facility would be acquired by Transport for NSW.
Wansey Road	The CSELR proposal would directly impact two existing driveway accesses to Royal Randwick racecourse, located on the western side of Wansey Road. These accesses would need to be closed to vehicle traffic with vehicles directed to use the alternate access points located along High Street. Although this would increase the travel distance and time, the existing internal roads within the racecourse would maintain accessibility to the buildings currently serviced via Wansey Road and Alison Road.
High Street	Most property access arrangements would be restricted to left-in-left-out operation with the exception of the right turn accesses into the hospital, which would be maintained. This would require the reconfiguration of existing access arrangements.
Belmore Road	Accesses to properties on Belmore Road would be retained as left-in-left-out movements.

Source: *Adapted from Tables 5-9 to 5-12 of Technical Paper 1 – Transport Operations Report, Volume 2*

The introduction of signal control at Hospital Road and Clara Street would enable right-turn movements into and out of the side roads to be maintained. The signals would ensure traffic movements in conflict with the proposed CSELR are controlled. Access to Eurimbla Avenue and driveways along High Street would be restricted to left-in left-out only.

The consolidation of accesses along the High Street corridor would be necessary to minimise turning vehicle conflicts with LRVs, thus addressing a significant safety and reliability issue for CSELR operations. Essential accesses to the Prince of Wales Hospital from High Street would be maintained through the following provisions:

- The *porte cochere* (pick-up and drop-off) entrance to the adult wing of the Prince of Wales Hospital would be modified and integrated with a four-way signalised intersection at Clara Street. The design would also provide an indented westbound bus bay on High Street.
- The operation of the *porte cochere* entrance to the Sydney Children's Hospital would be reversed to provide entry via Hospital Road. Exit would be limited to a left-turn only onto High Street.
- Emergency vehicle access to the Sydney Children's Hospital would be retained.

Right-turn movements off High Street at the signalised intersections with Wansey Road, Botany Street, Hospital Road, Clara Street and Belmore Road/Avoca Street would be undertaken from a short shared section of the CSELR alignment on approach to each of these intersections. At the Belmore Road/Avoca Street intersection, these right-turn movements would be restricted to buses only.

Operational traffic generation from the proposed Randwick stabling facility

The Randwick stabling facility would be located on a site adjacent to Royal Randwick racecourse, which backs onto properties on Doncaster Avenue. This facility is anticipated to provide approximately 100–120 car parking spaces for staff and visitors. An internal road network would cater for independent heavy vehicle movement and would be designed to NSW Roads and Maritime Services (RMS) and Australian Standards and guidelines.

Vehicle access to the facility would be via an existing vehicular access located at a roundabout intersection at Ascot Street. The exit point would be on the eastern side of Doncaster Avenue, south of the intersection with Alison Road. The current morning peak hour traffic volume at the intersection of Anzac Parade/Doncaster Avenue is approximately 3,700 vehicles and at Alison Road/Doncaster Avenue is approximately 4,800 vehicles, with both intersections operating at an LoS of C or better during the peak hours. This traffic is mainly generated by local land uses but also consists of some through-traffic avoiding the congested Anzac Parade/Alison Road intersection. At present, parking is permitted along both sides of the Doncaster Avenue. The Randwick City Council bicycle route map designates Doncaster Avenue as an existing signed on-road bicycle route. This route connects with a segregated cycle path running along the northern side of Alison Road.

The existing vehicular crossings at Doncaster Avenue could be adapted for use during operation of the Randwick stabling facility. During the operation of the stabling facility, peak traffic generation would be attributable to periods of shift changeovers where staff vehicles would be entering and exiting the site. The 100-120 parking spaces proposed on-site would be sufficient to accommodate all traffic associated with each shift of the maintenance facility; therefore, the impact on adjacent on-street parking provisions would be minimal. It is assumed that the shift change over period would be outside peak periods for the road network and, as such, is unlikely to impact existing intersection performance and traffic conditions.

The impact of the additional traffic generated by the Randwick stabling facility is considered to be low for the following reasons:

- Peak movements to the site associated with the shift changeover period would likely occur outside of the network peak.
- Existing accesses are proposed to be used with no anticipated requirement for significant upgrade.
- Entry and exit arrangements to the facility through existing separate vehicular access points would reduce vehicle conflicts.

Operational impacts on cyclists

An overview of the operational impacts of the CSELR proposal on cyclists travelling along key roads is provided in Table 15.9. Overall, no significant impacts on cyclists are expected.

Table 15.9 Impacts on cyclists during the operation of the CSELR proposal – Randwick Precinct

ROAD	IMPACTS ON CYCLISTS
Alison Road	Between Darley Road and Wansey Road, the CSELR would run on the southern side of Alison Road. As a result, the off-road cycle route would be realigned between the CSELR corridor and Royal Randwick racecourse. At the signalised intersection of Alison Road and Darley Road, cyclists would still be able to move between off-road cycle routes; however, they would also need to cross the CSELR tracks.
Wansey Road	The existing off-road cycle route on Wansey Road would be reinstated between the CSELR tracks and Royal Randwick racecourse. This would be consistent with the treatment of the Alison Road off-road cycleway, ensuring the route remains connected and segregated from vehicular traffic between Darley Road and High Street. A signalised intersection with pedestrian crossings at Wansey Road and High Street would improve connections to UNSW.
High Street	The CSELR would run on High Street between Wansey Road and the Randwick stop. High Street is currently identified as an on-road cycle route, linking Belmore Road and Anzac Parade. Future CSELR operations on High Street would be incompatible with an on-road cycle route. Therefore, in order to maintain cyclist access to the Randwick town centre, Arthur Street would 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 CSELR alignment and Wansey Road to access Arthur Street. Arthur Street connects with Belmore Road, providing cyclists with access to on-road cycle routes to the south and east.
Avoca Street/ High Street/ Belmore Road	Improved crossing facilities would be provided at the Avoca Street/High Street/Belmore Road intersection.

Source: Adapted from Tables 5-9 to 5-12 of Technical Paper 1 – Transport Operations Report, Volume 2

Operational impacts on pedestrians

An overview of the operational impacts of the CSELR proposal on pedestrians travelling along key roads CSELR proposal is provided in Table 15.10. Overall, no significant impacts on pedestrians are expected.

Table 15.10 Impacts on pedestrians during the operation of the CSELR proposal – Randwick Precinct

ROAD	IMPACTS ON PEDESTRIANS
Alison Road	The existing off-road shared path running along the northern side of Alison Road would be retained. The off-road shared path between Darley Road and Wansey Road would be reinstated between the proposed CSELR alignment and Royal Randwick racecourse. The proposed Royal Randwick racecourse stop location within existing Australian Turf Club land would ensure a safe and direct connection into the racecourse, particularly during special events. The proposed CSELR alignment along Alison Road would encroach upon the western side of Tay Reserve (existing parkland), which would require the relocation of the existing pedestrian footpath on that side. This footpath could be relocated to the eastern side of the track within the park, and the park could be re-designed to tie-in with the future light rail track.
Wansey Road	The shared cycleway and footpath between Alison Road and High Street would be reinstated between the CSELR tracks and Royal Randwick racecourse
High Street	Pedestrian crossing facilities would be provided at the new signalised intersections with Wansey Road, Hospital Road, Clara Street and Belmore Road. Existing zebra crossings would be replaced by the proposed new signalised pedestrian crossings.
Avoca Street/ High Street/ Belmore Road	Improved crossing facilities would be provided at the Avoca Street/High Street/Belmore Road intersection.

Source: Adapted from Tables 5-9 to 5-12 of Technical Paper 1 – Transport Operations Report, Volume 2

Operational impacts on buses

An overview of the operational impacts of the CSELR proposal on bus operations along key roads is provided in Table 15.11 and described in the following sections.

Table 15.11 Impacts on bus operations during the operation of the CSELR proposal – Randwick Precinct

ROAD	IMPACTS ON BUS OPERATIONS
Alison Road	An existing bus stop on the southern side of Alison Road adjacent to Darley Road would be displaced by the proposed CSELR Passengers would be expected to utilise the stop to the west.
Wansey Road	No impact to bus operations.
High Street	Right-turn movements out of Clara Street would be under signal control. 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 adjacent to the Sydney 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). 800 metre spacing would be implemented between eastbound bus stops utilised by routes 370 and 372, which would comprise an increase of approximately 500 metres, relative to the existing situation. The revised bus stop locations would be located on High Street between Wansey Road and Botany Street, as well as on Clara Street.
Avoca Street/ High Street/ Belmore Road	No impact to bus operations.

Source: Adapted from Tables 5-9 to 5-12 of Technical Paper 1 – Transport Operations Report, Volume 2

Shared busway between Anzac Parade and Doncaster Avenue

It is proposed that, due to the constrained width of the corridor, buses and light rail would share road space between Anzac Parade and Doncaster Avenue. This would enable buses from the Randwick-Coogee area to continue to access the Moore Park (Anzac Parade) busway roadway in advance of the Anzac Parade and Alison Road intersection, thereby avoiding delays.

High Street bus stops

The CSELR proposal would require the relocation of existing bus stops along High Street. Currently, stops are provided at the following locations along the proposed CSELR alignment on High Street:

- outside UNSW frontage (westbound only)
- west of Botany Street (eastbound only)
- west of Clara Street (eastbound and westbound).

The current westbound UNSW stop would be replaced by an indented bay within UNSW land. It is anticipated that the bay would be required to accommodate two buses due to the forecast bus numbers.

The bus stop west of Botany Street would not be retained due to the need to provide an unimpeded traffic lane at this location. It is anticipated that passengers currently utilising this stop would be required to use the stop west of Wansey Road.

Outside the hospital, the eastbound bus stop on High Street would not be retained due to the limited cross-sectional area available on High Street. The stop location would, therefore, be reconfigured along Clara Street as shown in Figure 15.7. The stops relocated within Clara Street would benefit from safe pedestrian access to the hospital via the newly signalised Clara Street intersection. However, this would require those customers on bus routes that continue along High Street, to access their bus services at the Randwick light rail stop (and bus interchange). The requirement for suitable eastbound alternative bus stop locations would be investigated further with Randwick City Council and the Prince of Wales Hospital. No bus services would need to be re-routed as part of the bus stop relocation. Bus routes 400 and 410 already pass this location. Customers on 370 would need to alight further away from the hospital than they currently do.

Figure 15.7 Proposed bus stop locations outside the Prince of Wales Hospital – Randwick Precinct

Source: Figure 5-23 of Technical Paper 1 – Transport Operations Report

Operational impacts on parking and kerbside access

The CSELR proposal would require the removal of existing on-street parking at the following locations within the Randwick Precinct:

- all existing on-street parking along the southern side of Alison Road, between Darley Road and Wansey Road
- all existing on-street parking along Wansey Road
- all existing on-street parking along High Street, between Wansey Road and Belmore Road (which includes existing taxi and loading/unloading zones); although parking on High Street for loading/unloading could be provided outside of CSELR operation hours
- on-street parking on Belmore Road during peak hours; however, existing parking controls on Cuthill Street would be retained.

Parking spaces that would be impacted by the CSELR proposal along each of these roads are detailed in Table 15.12. The impact to long stay parking (unrestricted) would primarily be confined to the Alison Road and Wansey Road corridors.

Table 15.12 On-street special kerbside uses and parking supply impacted by the CSELR proposal operations – Randwick Precinct

KERBSIDE RESTRICTION	SPECIAL KERBSIDE USES AND PARKING SUPPLY IMPACTED WITHIN THE RANDWICK PRECINCT BY TIME PERIOD					
	PRE-MORNING PEAK[1]		INTERPEAK[1]		POST-AFTERNOON PEAK[1]	
	NUMBER OF SPACES IMPACTED	NUMBER OF SPACES RETAINED	NUMBER OF SPACES IMPACTED	NUMBER OF SPACES RETAINED	NUMBER OF SPACES IMPACTED	NUMBER OF SPACES RETAINED
Car share, hospital, mail zone	3	0	3	0	3	0
Disability parking	2	0	2	0	2	0
Loading zone	1	0	1	0	1	0
Taxi zone	1	0	1	0	1	0
Total – Special Kerbside Uses	**7**	**0**	**7**	**0**	**7**	**0**
Short stay parking (≤1P)	69	1	63	1	63	1
Long stay parking (restricted)	41	4	41	4	41	4
Long stay parking (unrestricted	187	0	193	0	193	0
Total – General Parking	**297**	**5**	**297**	**5**	**297**	**5**

Source: Adapted from Table 6-9 of Technical Paper 1 – Transport Operations Report, Volume 2

The existing demand for parking in the proposed CSELR corridor that would be directly impacted by the CSELR proposal varies throughout the day between 201 and 278 spaces. This demand can be broken down as follows (refer Figures 15.3 to 15.5 for zones):

- Zone 1 includes impacted parking along Alison Road from Darley Road through to Wansey Road. Demand on this section of the corridor is between 62 and 76 vehicles.
- Zone 2 includes impacted parking along Wansey Road between Alison Road and High Street. Demand on this section of the corridor is between 65 and 135 vehicles.
- Zone 3 includes impacted parking along High Street between Botany Street and Belmore Road. Demand on this section of the corridor is between 38 and 52 vehicles.
- Zone 4 includes impacted parking along Belmore Road between High Street and Perouse Road. Demand on this section of the corridor is approximately 20 vehicles.

The assessment of the operational impacts of the CSELR proposal on the Randwick precinct is set out below:

- A reduction in general parking supply of 297 spaces.
- Available general parking capacity of 261 spaces during the existing peak period demand.

If existing parking demand levels remain unchanged in the future with no modal shift as a result of the CSELR proposal, then there would be the potential for demand to outstrip supply. However, this does not take account of any potential change in travel patterns as a result of implementation of the CSELR proposal. This is particularly relevant to the major land uses in the precinct which would be served by the CSELR proposal, including the TAFE, Prince of Wales Hospital and UNSW.

Further investigation of the location of parking demand and utilisation reveals:

- Zones 1 and 3 are likely to have sufficient capacity within the local area surrounding the CSELR proposal corridor in the morning peak to accommodate any displaced demand; however, effective capacity could potentially be reached in the interpeak and afternoon peak.
- Zone 2 is likely to have sufficient capacity within the local area surrounding the CSELR proposal corridor in the afternoon peak to accommodate any displaced demand; however, effective capacity could potentially be reached in the morning and interpeak.
- Zone 4 has sufficient capacity to accommodate the existing demand within the local area surrounding the CSELR proposal corridor.

Transport for NSW would work with Randwick City Council to identify any parking management measures that would be required to manage kerbside activity, including disability parking, servicing and loading, short stay parking for local business and long stay parking for residents.

As discussed above, the proposed Randwick stabling facility would be established adjacent to Royal Randwick racecourse, backing onto properties facing Doncaster Avenue. The stabling facility site would provide an extensive car parking facility of 100-120 spaces for employees. Therefore, there would be no requirement for CSELR employees to use existing on-street parking during the operational phase of the CSELR proposal.

Operational impacts on special events at Royal Randwick racecourse

Historically, Royal Randwick racecourse has only been heavily used by major events on designated race days. However, there is a growing trend toward hosting significant non-racing events at the racecourse (for example, UNSW bi-annual examinations, new developments and conferences, and the annual Future Music festival). It is expected this trend would continue following operation of the CSELR.

The potential changes to traffic, transport and access at Royal Randwick racecourse during special events has been considered at a regional scale (rather than at a local precinct level) due to the large number of trips that this venue generates, as well as its large area of influence. That is, patrons accessing Royal Randwick racecourse would travel through multiple precincts — for example, to catch special event buses — which would affect the wider transport network.

Discussion on potential changes to traffic, transport and access at Royal Randwick racecourse during the operational phase of the CSELR proposal is provided in section 9.2.2.

15.3.3 Impacts during construction

A detailed construction traffic and transport assessment for the CSELR proposal was undertaken by Booz & Company and AECOM. A comprehensive technical report is available as Technical Paper 2 — *Construction Traffic and Transport Management Plan* in Volume 2.

Construction traffic management

The Randwick Precinct contains three major traffic generating developments — Royal Randwick racecourse, UNSW and the Randwick health precinct. Of these developments, the Sydney Children's Hospital is dependent on convenient access to and from High Street, at all times, for its emergency vehicles as well as general emergency visitations.

High Street has a number of major driveway accesses related to the predominant land uses of UNSW and Prince of Wales Hospital. Gate 9 to UNSW acts as a secondary access to the University's Botany Street parking station and is located to the east of the Wansey Road intersection. Three separate hospital accesses are provided, including emergency vehicle access to the Sydney Children's Hospital that requires efficient access 24-hours a day.

The proposed construction traffic management strategies that would be adopted for key roads directly impacted by the construction of the CSELR proposal are outlined in Table 15.13.

Table 15.13 Proposed traffic management for key roads directly impacted by the construction of the CSELR proposal – Randwick Precinct

ROAD	PROPOSED TRAFFIC MANAGEMENT
Doncaster Avenue	To reduce the duration of potential disruption to traffic during weekday peak periods, the staged intersection works would occur during those weekends when no events are scheduled at the racecourse. The construction of the CSELR across Alison Road would be undertaken in stages to maintain a minimum of two lanes of travel in each direction during each works stage. It is estimated that the total disruption to the intersection would be approximately 10 weeks. The proposed staging across the intersection is contained in Appendix B.9 of Technical Paper 2.
High Street	High Street currently accommodates access to multiple developments with numerous off-street parking spaces. To minimise impacts to these developments, construction works along High Street would be segmental hand-work. This construction methodology is proposed to minimise the disruption for the property access as well as to maintain vehicle access to the hospitals. Intersection works at Wansey Road and Botany Street would be undertaken by staged hand-work as the work progresses along High Street, and works would be undertaken during off-peak periods, either during weeknights and/or weekends. Traffic access would be maintained to facilitate traffic movements along High Street.
Belmore Road	To minimise the impact on peak hour movements, the Belmore Road intersection works would be staged during the weekend. During the majority of the works stages, traffic on Avoca Street south of the intersection would be reduced to a single lane in both directions. This is due to the configuration of the intersection and the alignment of the light rail crossing into High Cross Park. The intersection cross-over would be undertaken over three stages over six weekends. The intersection staging plans are illustrated in Appendix B.10 of Technical Paper 2.

Generally, the lane configurations to be implemented during the construction phase would complement the final road layouts along Alison Road, Wansey Road and High Street (i.e. the proposed functional changes to the road network, as described in section 15.3.2). High Street in particular would maintain a single traffic lane in each direction at all times. Similarly, a single lane in each direction would be maintained along Wansey Road and a minimum of two lanes in each direction would be maintained along Alison Road, adjacent to the worksites, during construction.

A site south of the proposed Randwick stabling facility has been identified as one of two potential worksites to be used as the site office for the south-east corridor of the CSELR construction, with an area of 600 square metres for a site compound and 3,200 square metres for parking and laydown (refer to Figure 6.2e). With established access from Doncaster Avenue, the work-site compound could operate independently of the racecourse operations, subject to agreement from the Australian Turf Club.

Construction impacts on property access

Royal Randwick racecourse

Royal Randwick racecourse has multiple access points, with three of the main access points located on Alison Road, Ascot Street and High Street (between Anzac Parade and Wansey Road).

The construction of the proposed CSELR along the southern side of Alison Road (between Doncaster Avenue and Wansey Road) would impact on the main access point to the racecourse on Alison Road. It is understood that the Alison Road access is utilised as a secondary access point for the racecourse during scheduled events, with the majority of vehicles and taxis utilising the Ascot Street entrance. Furthermore, public parking within the in-field area of the racecourse is accessed only via the High Street access point.

With an internal road network within the racecourse providing connections between all the major access points, the closure of the Alison Road entry point during construction would not sever access to any area of Royal Randwick racecourse. The Alison Road access to Royal Randwick racecourse would only be affected for the duration of construction works being undertaken directly outside the entry point. Once these construction works are complete, the access would be opened temporarily during scheduled events at the racecourse. To minimise disruptions to Royal Randwick racecourse, construction activities would be reviewed for special events so as to not significantly impact on the roundabout operation at the intersection of Ascot Street and Doncaster Avenue.

High Street developments

As outlined in section 15.3.1, the UNSW and Randwick hospitals are both accessible via High Street. High Street also provides access to a number of high density residential apartments, medical practices and retail stores with off-street parking provisions. With an existing road width of 12.5 metres, the kerb and guttering would require realigning to satisfy the minimum lane widths for the operational phase of the CSELR proposal. To minimise the impact to properties, and in particular the hospital emergency access points, the CSELR construction works are proposed to be undertaken in segments and stages using 'hand-work' methods within small work zones. This would allow traffic to pass around the worksites and minimise the occupation of High Street and, in the case of the Prince of Wales Hospital, to maintain vehicle access at all times.

Construction impacts on parking

The impact on on-street parking within the Randwick Precinct during the construction of the CSELR proposal would generally be consistent with that proposed during the operational phase. During construction, the parking supply would reduce by 209 general parking spaces between Darley Road and High Cross Park. Based on these numbers, there would be a shortfall in parking capacity within the precinct; however, through the proposed tightening of parking controls and restrictions, parking demand can be reduced to meet the practical capacity available. Discussion on the parking impacts associated with the operational phase CSELR proposal is provided in section 15.3.2.

As outlined in the sub-section entitled 'Impacts on special events buses and coach access to Royal Randwick racecourse' in section 15.3.3, the existing on-street angle parking provisions along Darley Road would need to be revised during events scheduled at Royal Randwick racecourse to allow for the extension of the existing bus zones to facilitate a temporary set-down and pick-up zone. These bus zones would only be required during events scheduled at the racecourse and wardens would be installed within the bus zones to provide directions to visitors and manage the buses.

Construction impacts on existing bus services

Normal bus operations

Normal bus operations would generally continue to operate along Alison Road and High Street, as traffic lanes on these roads would be maintained for the duration of construction. The only exceptions would be the closure of the busway between Anzac Parade and Doncaster Avenue. As outlined in section 15.3.2, the CSELR is proposed to share the existing bus-way corridor. Therefore, it would not be possible to accommodate bus operations along this corridor during construction.

With construction activities occupying the southern side of Alison Road between Doncaster Avenue and Wansey Road, pedestrian access to this section of road would be prohibited. The affected section of road currently contains one bus stop located on the approach to Darley Road and another located adjacent to the main kerbside entrance to Royal Randwick racecourse.

While the existing bus stop adjacent to the racecourse's main entrance could be maintained during construction, the bus stop located to the east of Darley Road would not be maintained. This eastern bus stop is serviced by the bus routes 372, 373, 374, 376 and 377, which could be serviced by the bus stop outside the racecourse.

As the express buses (X73, X74 and X77) do not service these stops, removal of the bus stop (and use of the western bus stop) would not impact on the operation of any remaining express bus routes. This removal, however, would increase the walking distances of the bus route patrons within the region, including students from the TAFE Randwick Campus.

The current configuration of the Clara Street/High Street intersection would not accommodate buses turning between High Street west and Clara Street during construction of the CSELR. Therefore, a bus diversion via Blenheim Street would be required for the bus routes 357, 400 and 410, as shown in Figure 15.8. This diversion would require the temporary relocation of the High Street bus stops to Clara Street, north of Blenheim Street. As there is only one bus stop between Botany Street and Clara Street (where the route diversion is proposed), the impact of the bus diversion would be minimal.

Figure 15.8 Proposed Blenheim Street bus diversion – Randwick Precinct

Source: Figure 4-51 of Technical Paper 2 (Construction Traffic and Transport Management Plan)

The proposed CSELR corridor would share the busway, located north of Alison Road within Moore Park. As such, buses would not be able to access this portion of the busway during construction and would be required to travel within the Alison Road traffic lanes. This would increase the travel time for buses through the intersection of Alison Road and Anzac Parade and impact on reliability of the services. Potential mitigation measures would be developed to allow bus priority lanes in the peak direction during peak hours together with bus priority measures at the intersection of Anzac Parade and Alison Road. These priority measures would be explored as part of the Traffic Management Plans in consultation with the bus operators and the relevant Road Authority.

University express services 890, 891 and 892

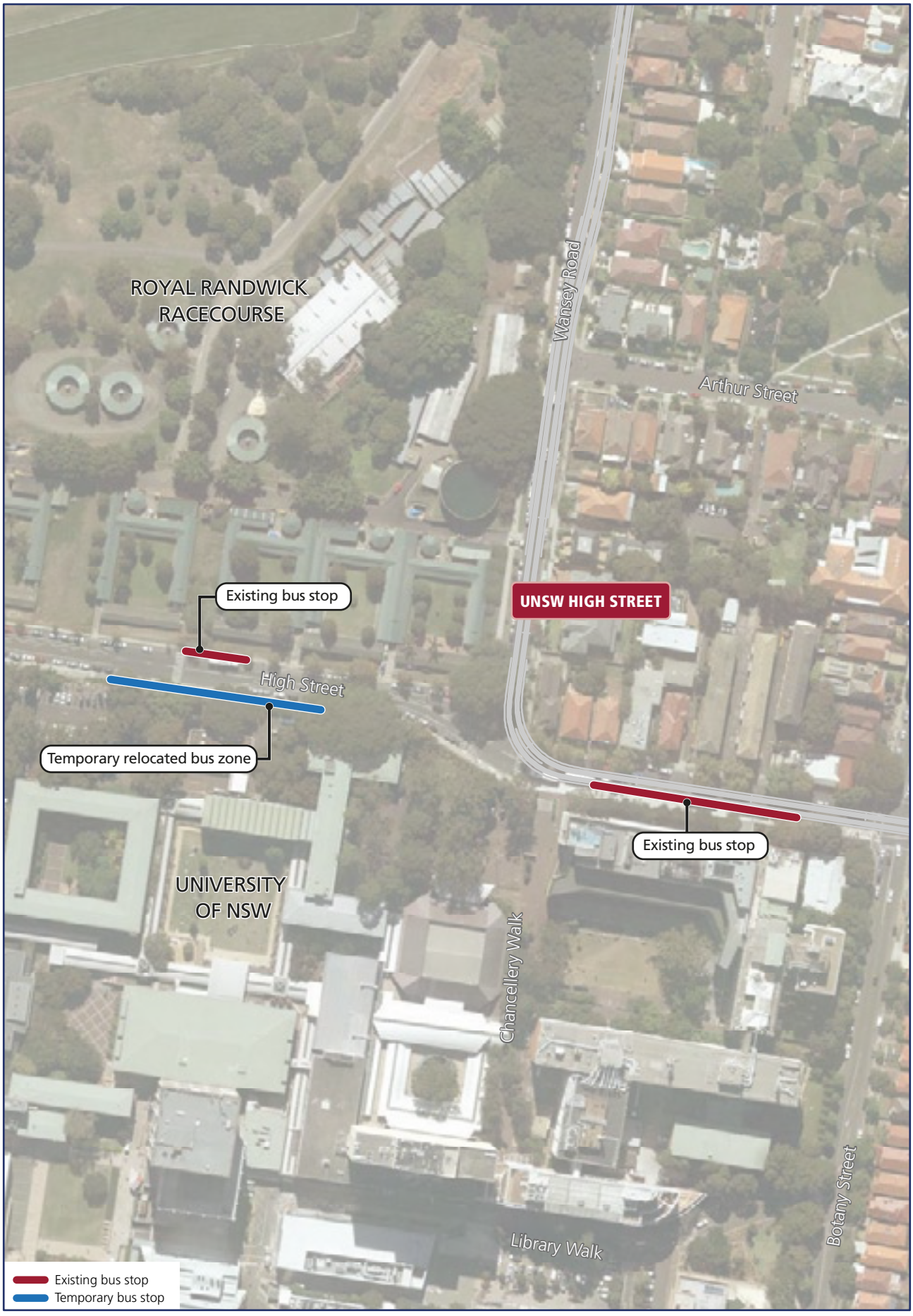
Throughout the construction phase, the university express services 890, 891 and 892 would continue to service the UNSW via Central Railway Station and Circular Quay. The intersection of High Street and Anzac Parade would accommodate existing bus operations during peak periods. The intersection works at this location would be limited to weekend periods which would limit the manoeuvrability of vehicles. However, the university express services only operate during weekday peak periods.

Construction activities along High Street would be contained between Wansey Road and Belmore Road with a minimum of one traffic lane in each direction maintained for the majority of the construction. Construction activities at the signalised intersection of Botany Road and High Street would occur outside of peak periods to minimise the impact on the university express buses.

At present, the bus stops outside the UNSW, adjacent to Gate 9, are utilised by numerous regular bus services as well as university express services. With the operation of the UNSW, an indented bus bay would be provided for the westbound services, adjacent to the existing bus stop, and the eastbound bus stop would be removed. During construction a westbound bus stop is proposed west of Wansey Road to reduce any conflict between the bus operations and construction activities as shown in Figure 15.9.

The existing bus stops located adjacent to the heavy rail stations currently servicing the university express services would remain operational throughout the construction phase.

Figure 15.9 UNSW High Street bus relocation – Randwick Precinct



Source: Figure 4-53 of Technical Paper 2 (Construction Traffic and Transport Management Plan)

Impacts on special events buses and coach access to Royal Randwick racecourse

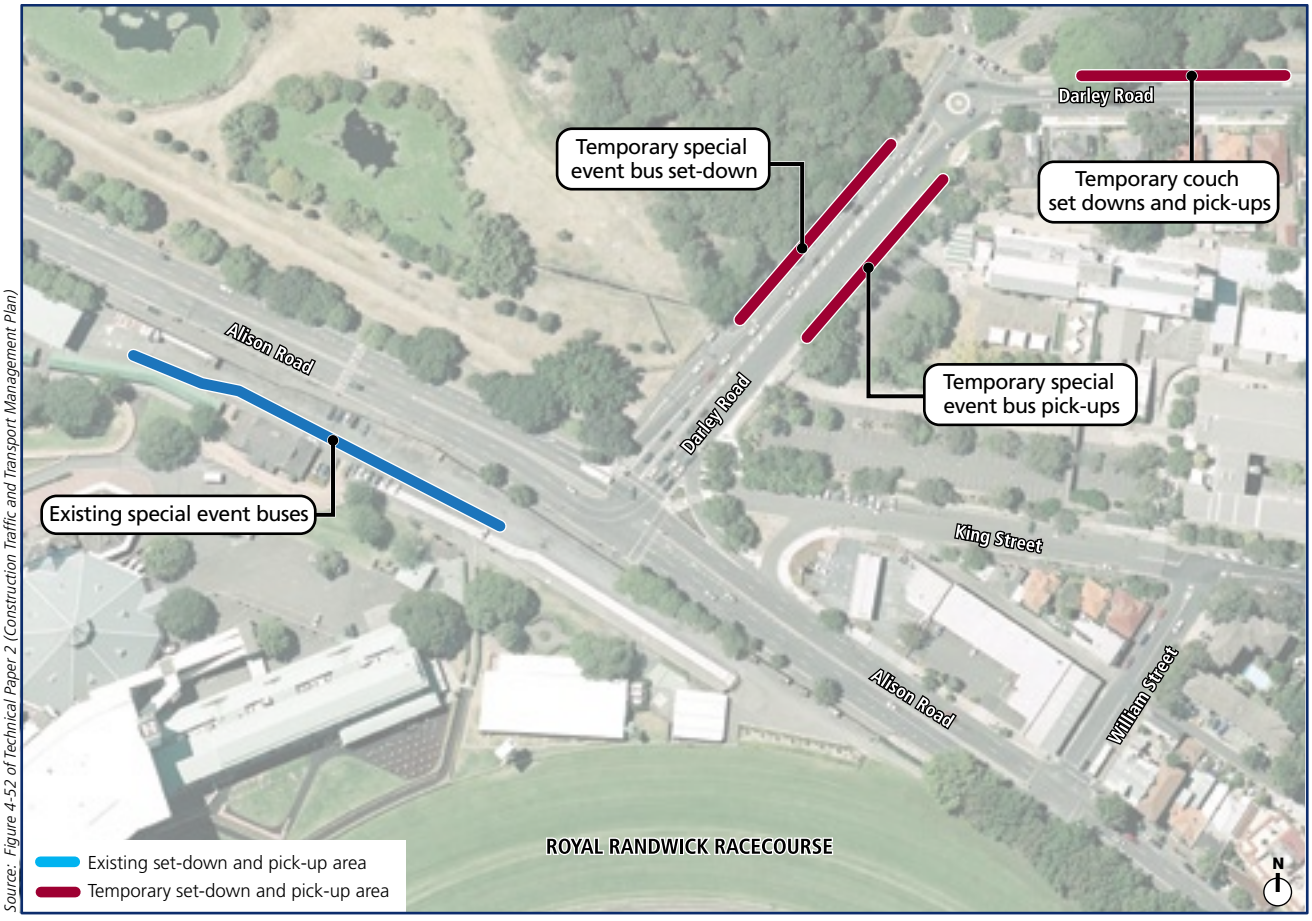
During major events at Royal Randwick racecourse, special event buses operate to transfer visitors between Central Railway Station and the racecourse. These services operate via the passenger drop off zone located within the racecourse grounds along Alison Road. Similarly, private coaches utilise the kerbside amenities to set-down and pick-up passengers along Alison Road between Darley Road and Wansey Road.

With the Alison Road frontage of the racecourse to be designated as a works zone for the entirety of the construction phase, alternate passenger set-down and pick-up areas would be required. The temporary locations for special event buses and coaches during construction would be along Darley Road adjacent to the TAFE Randwick campus, as shown in Figure 15.10.

To facilitate the set-down and pick-up zone along Darley Road, the existing on-street angle parking provisions along Darley Road would need to be revised to allow the extension of the existing bus zones. It is noted that these bus zones would only be required during events scheduled at the racecourse and that wardens would be installed within the bus zones to provide directions to visitors and manage the buses.

Given the crowds generated during the events, the temporary relocation of the bus zones would require the retention of the existing pedestrian crossing at the intersection of Alison Road and Darley Road or an alternate facility to safely cross Alison Road, such as police/traffic controllers to manage the large crowds. During events scheduled at the racecourse, construction activities adjacent to the main entrance to the racecourse would be managed so as to maintain safe pedestrian access across the worksites.

Figure 15.10 Proposed temporary Royal Randwick racecourse special events bus set-down and pick-up zone – Randwick Precinct



Source: Figure 4-52 of Technical Paper 2 (Construction Traffic and Transport Management Plan)

Construction impacts on pedestrian and cyclists

The existing shared pedestrian and cycle path along the Royal Randwick racecourse frontages of Alison Road and Wansey Road would be closed for the duration of construction. During this time, pedestrians would be directed to use the opposite footpaths on Wansey Road and Alison Road. To facilitate the movement of pedestrians in the region, the signalisation of the Wansey Road and Alison Road intersection would need to be implemented as part of the early works so that pedestrians can safely cross Alison Road during the construction phase.

With combined factors of steep road gradient, high traffic volumes during peak hours and reduced lane capacities, Alison Road would be a desirable on-road cycle route during construction. Alternate on-road cycle routes would be signposted during the construction phase to maintain suitable cycle access to UNSW and the southern Randwick Precinct.

Existing Randwick City Council on-road cycle routes would be encouraged through signposting and line marking. Potential cycle routes that service the north-south connection include:

- Botany Street, Church Street and King Street
- Botany Street, Church Street, and Dangar Street
- Church Street, Frances Street, Cook Street, and Belmore Road
- University Mall, Day Avenue, Doncaster Avenue.

The majority of these streets are currently designated by Randwick City Council as on-road cycle routes.

In addition to the north-south connection, the designated High Street on-road cycle route would be affected for the duration of construction. During this time, cyclists would be directed to alternative east-west routes, including the parallel Arthur Street connection to Belmore Road.

Although these routes may extend the distance of cycle trips, the traffic volumes through these roads are considerably lower than Alison Road during peak hours, contributing to an improved cycling environment. The alternate routes are shown in Figure 15.11.

Line marking and signs would be installed along the temporary route to notify drivers of the presence of cyclists on the road. Furthermore, directional signs would be installed at key locations to direct cyclists to the cycle route.

For the majority of the alignment, the existing pedestrian footpaths would be maintained, except during kerb realignments and services relocations where the footpaths would be narrowed and localised diversions would be in place to protect the pedestrians from the road activities.

Pedestrian crossing opportunities would be maintained during intersection works at Botany Street and Belmore Road either by maintaining the existing pedestrian facilities or providing alternate crossing opportunities at adjacent locations.

Construction impacts on emergency vehicle access

No special access provisions would be provided for emergency vehicles adjacent to construction worksites within the Randwick Precinct. It is assumed that emergency services would travel via the general traffic lanes along Alison Road, Wansey Road, High Street, and the surrounding roads when responding to emergencies. When responding to emergencies within the worksites it is intended that the emergency vehicles would utilise the construction vehicle paths on approach to the block and the adjacent traffic lanes would form the key access point.

Construction impacts on taxis

There is one taxi zone located on High Street, outside the Prince of Wales Hospital. This taxi zone would be permanently relocated at the commencement of construction to Clara Street, opposite the existing taxi zone and adjacent to the bus stops.

Figure 15.11 Proposed temporary alternative cycle route – Randwick Precinct

Source: Figure 4-54 of Technical Paper 2 (Construction Traffic and Transport Management Plan)

15.3.4 Management and mitigation

Operation

As discussed in section 9.2.4, a network management plan would be developed for the CSELR proposal during detailed design to identify key management measures that would be implemented to minimise impacts to journey times and congestion levels.

Overarching traffic, transport and access management strategies that would be adopted during the operational phase of the CSELR proposal are described in section 9.2.4. The following additional management and mitigation measures would be implemented to further minimise traffic, transport and access impacts within the Randwick Precinct during the operation of the CSELR:

- Transport for NSW would continue to work with Randwick City Council to mitigate the local traffic impacts and potential increased traffic flows that may occur on local roads as a result of the CSELR proposal.
- Two-way traffic along Wansey Road would be retained, along with the shared cycleway and footpath on the western side of Wansey Road.
- The 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.
- The 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.
- A minimum single traffic lane would be maintained along High Street in each direction (consistent with the existing traffic operation).
- Traffic signal control would be provided at the intersections of High Street with Hospital Road and Clara Street where general traffic movements would be permitted to cross the proposed CSELR alignment.
- Access to Eurimbla Avenue from High Street would be restricted to left-in left-out.
- Emergency vehicle access to the Sydney Children's Hospital would be retained.
- An intended 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 Sydney 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).
- Accesses to properties on Belmore Road would be retained as left-in-left-out movements.
- The off-road shared pedestrian and cyclist path between Darley Road and Wansey Road would be reinstated between the proposed CSELR alignment and Royal Randwick racecourse.
- Transport for NSW would work with Randwick City Council to identify any parking management measures that would be required to manage kerbside activity within the Randwick Precinct.
- Parking permit schemes would be considered, particularly in predominately residential precincts surrounding the CSELR corridor. These would be designed to afford priority to local residents to park in the vicinity of their home with an allowance for short-term parking for visitors and for vehicle access to commercial land uses and other short stay trip generators.
- Opportunities to relocate existing disabled parking space on High Street (between Clara Street and Hospital Road) to Clara Street (at the intersection with High Street) would be investigated during detailed design, in consultation with Randwick City Council.
- Sufficient car parking provisions would be provided at the proposed Randwick stabling facility, so there would be no requirement for CSELR employees to use existing on-street parking when accessing this facility.
- The key actions specified in the detailed access plans for each of the proposed light rail stops, included in section 7.3 of Technical Paper 1 — *Transport Operations Report* (addressing potential multimodal access, customer safety, or to improvements to access) would be further considered during detailed design.

Construction

As discussed in section 9.2.4, a construction network management plan would be developed during detailed design to identify appropriate construction traffic management measures and establish a framework for coordinating their implementation during the construction of the CSELR proposal. The construction network management plan would identify key measures that would be implemented during construction to minimise impacts to journey times and congestion levels.

Overarching traffic, transport and access management strategies proposed during the construction of the CSELR proposal are described in sections 6.10 and 9.2.4 of the EIS. The following additional management and mitigation measures would be implemented to further minimise construction traffic, transport and access impacts within the Randwick Precinct:

- A single traffic lane would be maintained in each direction along High Street and Wansey Road at all times.
- The construction of the CSELR across Alison Road would be undertaken in stages to maintain a minimum of two lanes of travel in each direction during each works stage.
- Construction works at the Alison Road/Doncaster Avenue intersection would be staged, with works scheduled to occur during weekends when no events are planned at Royal Randwick racecourse.
- Works at the intersections of High Street with Wansey Road and Botany Street would be undertaken in stages during off-peak periods (i.e. either during weeknights and/or weekends). Traffic access would be maintained to facilitate traffic movements along High Street.
- The Belmore Road intersection works would be staged during the weekend.
- Where possible, only on-street parking spaces that would be permanently removed to accommodate the CSELR proposal would be impacted during the construction phase (other than those spaces required for construction compounds).
- Bus priority measures would be explored during detailed design at the intersection of Anzac Parade and Alison Road.
- A permanent bus diversion would be established for the bus routes 357, 400 and 410 via Blenheim Street, as shown in Figure 15.8. As part of this diversion, the affected High Street bus stops would be relocated to Clara Street (north of Blenheim Street), consistent with the changes proposed as part of the operational phase of the CSELR proposal.
- Temporary passenger set-down and pick-up areas for special event buses and coaches accessing Royal Randwick racecourse would be established along Darley Road, adjacent to the TAFE Randwick campus, as shown in Figure 15.10, or nearby as feasible.
- During events scheduled at Royal Randwick racecourse, construction activities adjacent to the main entrance to the racecourse on Alison Road would be reviewed for special events so as to not significantly impact on the roundabout operation at the intersection of Ascot Street and Doncaster Avenue.
- During events scheduled at Royal Randwick racecourse, construction activities adjacent to the main entrance to the racecourse would be managed so as to maintain safe pedestrian access across the worksites.
- The proposed signalisation of the Wansey Road/Alison Road intersection would be implemented as part of the early works so that pedestrians can safely cross Alison Road during the construction phase.
- Potential mitigation measures would be developed to allow bus priority lanes in the peak direction during peak hours together with bus priority measures at the intersection of Anzac Parade and Alison Road. These priority measures would be explored as part of the traffic management plans in consultation with the bus operators and the relevant road authority.
- During construction, to reduce any conflict between the bus operations associated with the bus stops outside the UNSW (adjacent to Gate 9), and construction activities, a westbound bus stop would be provided west of Wansey Road, as shown in Figure 15.9.
- The existing bus stops located adjacent to the heavy rail stations currently servicing the university express services would remain operational throughout the construction phase.
- Alternate on-road cycle routes would be signposted during the construction phase to maintain suitable cycle access to UNSW and the southern Randwick Precinct. Existing Randwick City Council on-road cycle routes would be encouraged through signposting and line marking.

- Line marking and signs would be installed along the temporary cycle routes to notify drivers of the presence of cyclists on the road. Furthermore, directional signs would be installed at key locations to direct cyclists to the cycle routes.
- For the majority of the CSELR alignment, the existing pedestrian footpaths would be maintained, except during kerb realignments and services relocations where the footpaths would be narrowed and localised diversions would be in place to protect the pedestrians from the road activities.
- Pedestrian crossing opportunities would be maintained during intersection works at Botany Street and Belmore Road either by maintaining the existing pedestrian facilities or providing alternate crossing opportunities at adjacent locations.
- The existing taxi zone on High Street (outside of Prince of Wales Hospital) would be relocated to Clara Street, opposite the existing taxi zone (and adjacent to the bus stops), in consultation with Randwick City Council.

15.4 Local property and land use

15.4.1 Existing conditions

Existing land use patterns, land use features and an overview of the potential future developments within the Randwick Precinct area are described below. Figures 15.12a and Figure 15.12b identify the major existing land uses in the Randwick Precinct adjacent to the proposal.

Existing property and land uses within the vicinity of the proposal

The western end of the Randwick Precinct is characterised by two dominant land uses. These land uses comprise the open space regions of the Centennial Parklands and the Royal Randwick racecourse located on the northern and southern sides of Alison Road respectively. A small area of open space (Tay Reserve) is also located on the southern side of the intersection of Anzac Parade and Alison Road. To the east of these open space land uses, the precinct generally comprises low and medium density residential land uses, with the medium density land uses typically located adjacent to the main roadway of Alison Road with lower density residential located towards the northern boundary of the precinct.

The eastern end of the precinct generally encompasses High Street and Wansey Road. High Street north of UNSW is characterised by four-storey walk up apartment buildings on the northern side of the road and single-storey detached dwellings, which generally mirrors the existing land use zoning within the Randwick Precinct. The south-eastern end of the precinct is dominated by the Randwick hospitals, including the Prince of Wales Hospital and Sydney Children's Hospital fronting High Street.

A series of educational land uses are located throughout the precinct including The Sydney Institute (TAFE) – Randwick College, UNSW upper campus and a number of other schools including Our Lady of the Sacred Heart School, Brigidine College and Randwick Girls High School. A range of shopping, commercial and community facility land uses are also provided around the Belmore Road/Avoca Street/ High Street intersection, which represents the main retail and commercial centre of the Randwick town centre.

Photographs of the typical land uses within the Randwick Precinct are shown in Figure 15.13 to Figure 15.17.

Figure 15.12a Randwick Precinct (North) – Land use and property

Figure 15.12b Randwick Precinct (South) – Land use and property

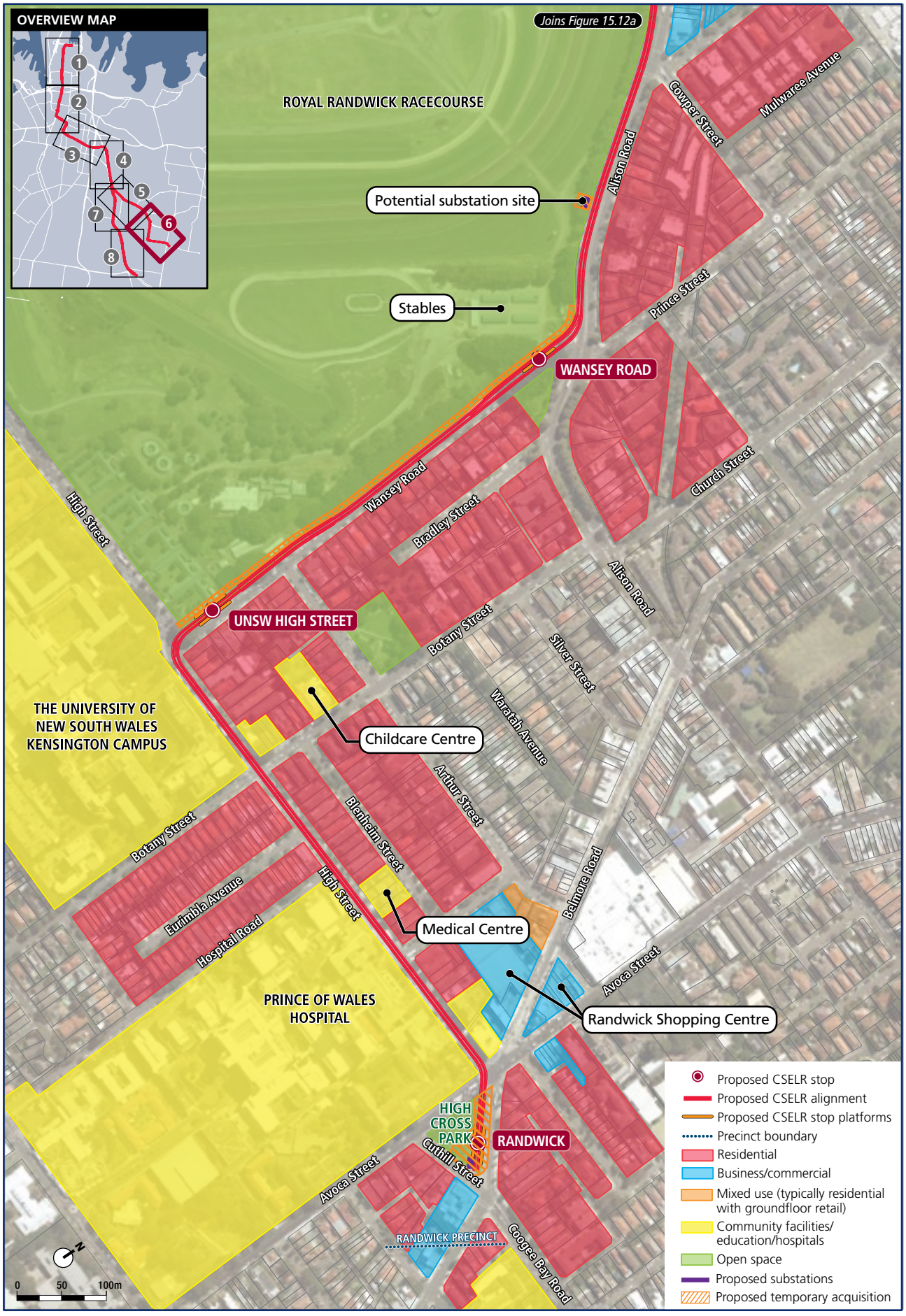


Figure 15.13 Photographs of the existing land uses along Alison Road including typical residential densities (top), commercial uses (centre) and the Royal Randwick racecourse (bottom)

Source: Parsons Brinckerhoff 2013

Figure 15.14 Photograph of the existing pathway along Wansey Road looking towards the proposed Wansey Road stop

Source: Parsons Brinckerhoff 2013

Figure 15.15 Photograph of the existing land uses along High Street looking east

Source: Parsons Brinckerhoff 2013

Figure 15.16 Photograph of the Sydney Children's Hospital on High Street, Randwick

Source: Parsons Brinckerhoff 2013

Figure 15.17 Photograph of High Cross Park looking towards the proposed location of the Randwick stop

Source: Parsons Brinckerhoff 2013

Planning controls

The *Randwick Local Environmental Plan 2012* (Randwick LEP) describes the land use zoning within the Randwick Precinct (refer to Figure 15.18a and Figure 15.18b). The land within the Randwick Precinct generally aligns with the land uses described above comprising five main zones including: R2 – Low Density Residential'; R3 – Medium Density Residential; 'B2 – Local Centre' along the main alignment of Belmore Road; 'SP2 – Infrastructure' zone for UNSW and the Randwick hospitals and 'RE1 – Public Recreation' providing for the Centennial Parklands and Royal Randwick racecourse. Small areas of 'RE1 – Public Recreation' are also located throughout the precinct, providing for small parks in addition to a range of smaller 'SP2 – Infrastructure' zones typically representing local public schools and places of worship towards the north of the CSELR alignment.

The areas of medium-density housing are generally three to four storeys in height, which is consistent with building heights permitted under the Randwick LEPs which generally allows for heights between 9.5 metres and 12 metres. Based on existing land uses, the building heights permitted under the Randwick LEP indicate limited potential for increased densities across the precinct, with redevelopment likely to be at a similar scale to the existing built form of the precinct. Some potential for higher density developments may occur as part of the ongoing development of the Randwick Urban Activation Precinct (UAP) (discussed below).

Potential future land uses within the vicinity of the proposal

An overview of the planned future development in the wider Sydney region is described in Chapter 9. As shown in Figure 9.15, a series of future urban land uses have been identified within the vicinity of the Randwick Precinct. The major developments that are currently underway or are proposed to be developed that would impact on the existing land use within the Randwick Precinct are described below.

Royal Randwick Master Plan

The Australian Turf Club (ATC) has recently invested approximately $150 million on a new grandstand and amphitheatre at Royal Randwick racecourse which opened in early 2013. The facilities increase the seating capacity of the venue, provide additional facilities, and aim to modernise the race day experience.

The ATC has also developed a Royal Randwick Master Plan which was integrated into the *Randwick Comprehensive Development Control Plan 2013* (Randwick DCP) in June 2013. The master plan includes the redevelopment of the existing spectator precinct, a new stabling complex, and convention facilities. The master plan also provides for construction of a new eight-storey, 170-room hotel and associated restaurant, bar, restaurant, conference facilities and basement parking along the northern boundary of the site. An EIS for this development has been submitted and is currently under assessment by the Department of Planning and Infrastructure (DP&I). The proposed new facilities are expected to enhance the experience of racegoers and expand the scope of events held at the Royal Randwick racecourse.

Figure 15.18a Randwick Precinct (North) – Existing land use zoning

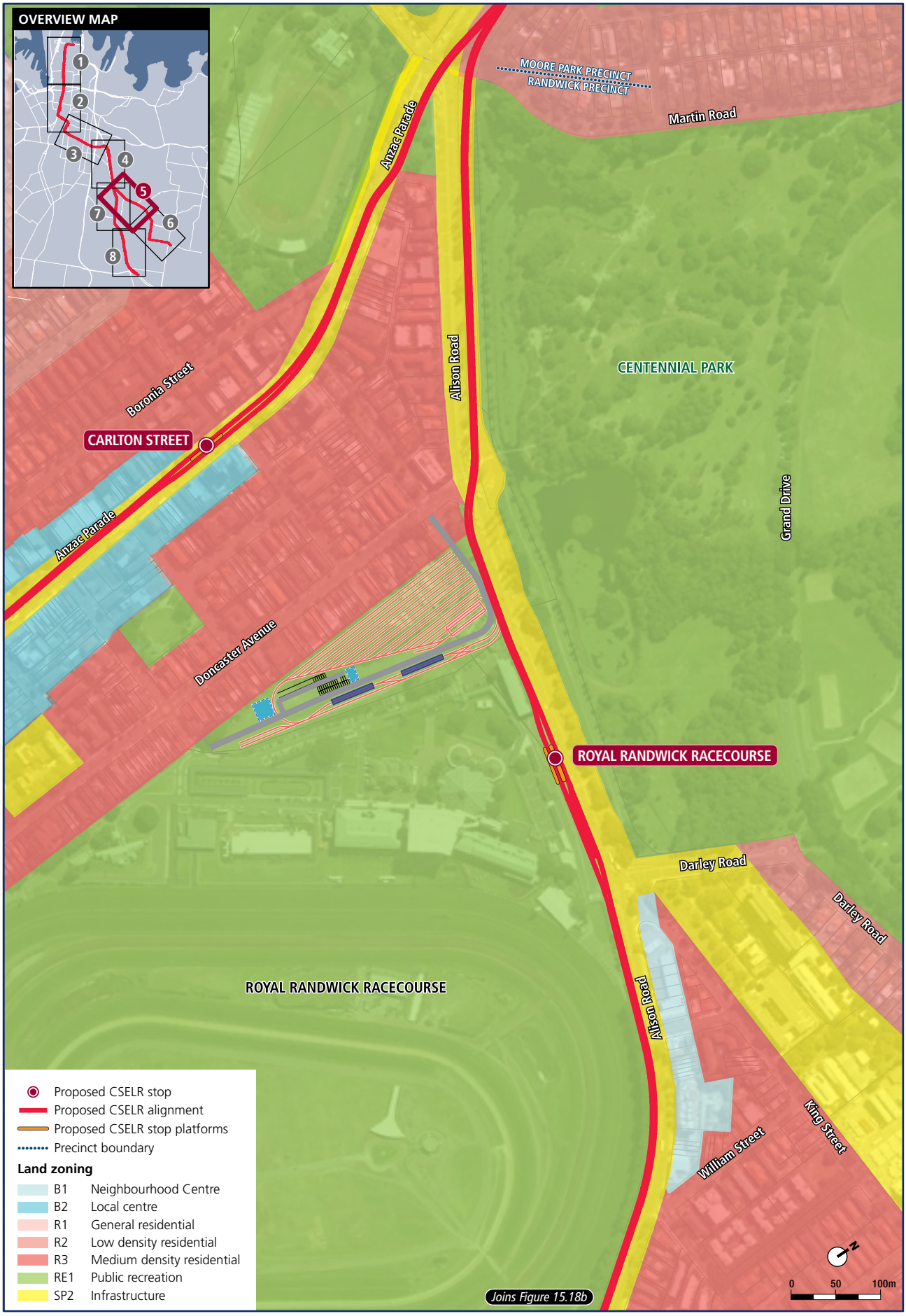
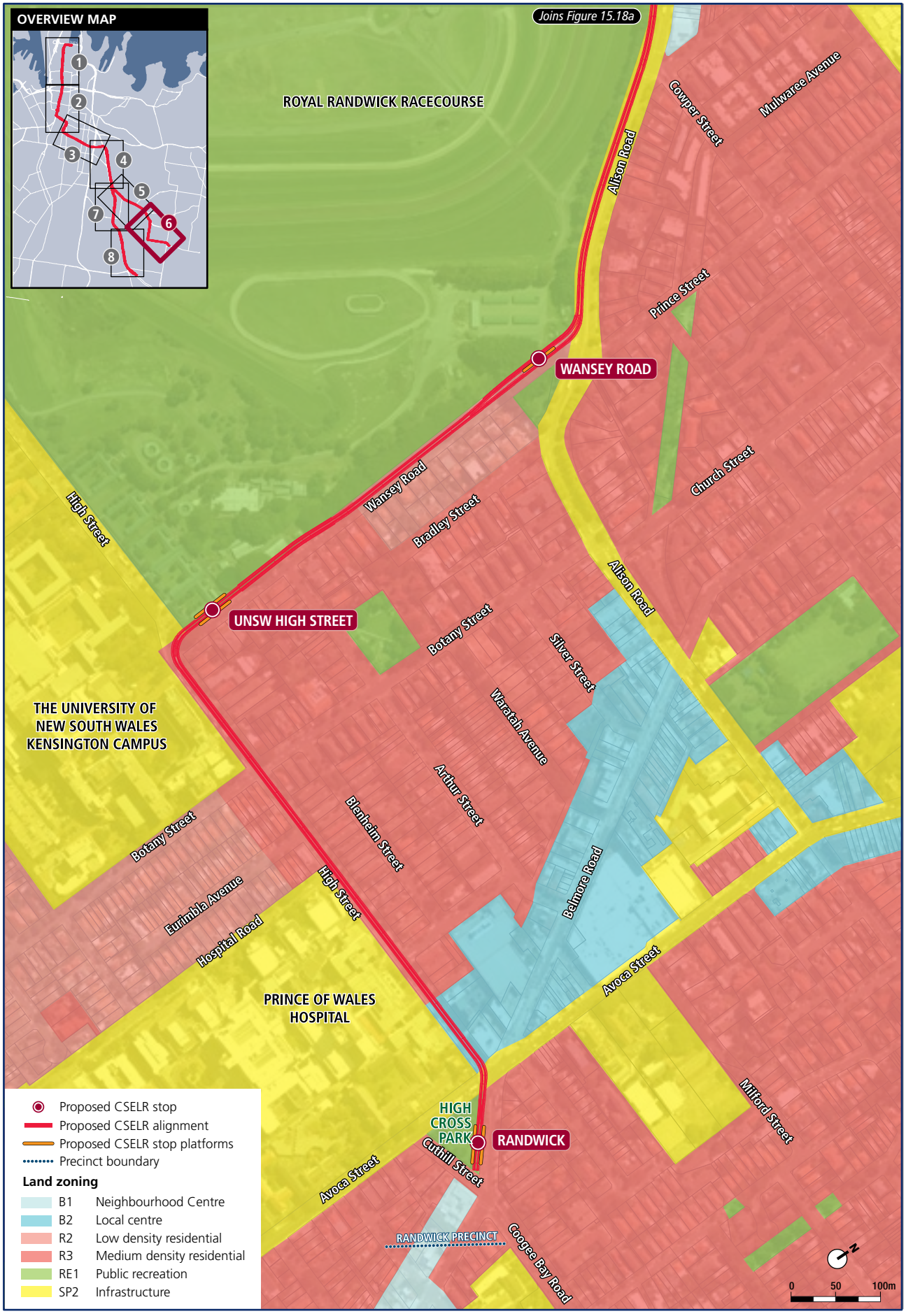


Figure 15.18b Randwick Precinct (South) – Existing land use zoning



The Randwick Urban Activation Precinct

As identified in section 9.3.3, the NSW Government announced in March 2013 the Urban Activation Precincts (UAP) program in conjunction with the Draft *Metropolitan Strategy for Sydney 2013.* UAPs are important areas that the NSW Government considers to have a wider social, economic, or environmental significance for the community, or that have redevelopment significance of a scale that is important to implementing the State's planning objectives such as housing and employment targets.

Citing the introduction of light rail as a catalyst for urban renewal, the NSW Government identified the Randwick UAP to take advantage of improved access from the CSELR proposal. The study area pertaining to the Randwick UAP is shown on Figure 9.15. The study area boundary would be within a five to ten minute walk from each of the proposed CSELR stops. Not all parts of the study area will necessarily be included in future changes to planning.

Potential opportunities for growth are being investigated within the Randwick UAP to make the maximum use of the opportunities available from the proposed new CSELR transport infrastructure. Investigations within the Randwick UAP would typically centre on the proposed light rail stops, such as at Randwick Racecourse, Wansey Road and the UNSW High Street stop.

A series of community forums were held in July and August to allow for community input into the UAP development. The potential development options for the Randwick UAP are currently being developed and are anticipated proposed to be exhibited in late 2013.

Randwick Hospitals Campus Master Plan

The Randwick Hospitals Campus is a major site within the wider Randwick Education and Health Specialised Centre. The Randwick Hospitals Campus comprises four major hospitals being: the Prince of Wales Hospital, Sydney Children's Hospital, Royal Women's Hospital and Prince of Wales Private Hospital. In addition to health care, these hospitals provide for a range of teaching and research facilities. The Randwick Hospitals Campus comprises a single land parcel of approximately 13.26 hectares, bordered by High Street, Avoca Street, Barker Street and Hospital Road in Randwick.

A master plan for the redevelopment of the Randwick Hospital Campus was commenced in 2008 and was integrated into the Randwick DCP in June 2013. The master plan aims to consolidate incremental development that has occurred within the hospital campus, whilst providing the opportunity for expansion to accommodate short, medium and long-term needs.

Approved residential development (proposed Randwick stabling facility site)

In November 2010, a development application was approved on the site of the proposed Randwick stabling facility. The approved development application for a residential development comprises:

- construction of 53 three-storey town houses
- a six storey building containing 29 dwellings
- a community centre
- public parks, associated site works, landscaping, utility services, car parking and vehicular access.

In July 2013, an application to modify the approved development was submitted to the Randwick City Council. The key elements of the modification including modification of the proposed 53 three-storey town houses to four-storey residential buildings within the same site. The modification would result in an increase in potential dwellings on the site from 82 (an approximate residential population of 245 people) to 159 dwellings (an approximate residential population of 325 people). The proposed modification would also increase some parking on the site and would slightly increase open space in comparison to the approved development.

Determination of the proposed modification has not yet been completed and development of the site has not yet commenced.

15.4.2 Impacts during operation

Direct impacts on land use and property

The permanent footprint of the CSELR proposal within the Randwick Precinct would be largely within the existing road corridor along Alison Road, Wansey Road and High Street. Whilst the proposal would result in a change in the composition of transport uses along this street and an overall reduction in the width of these streets, the primary land use would be maintained.

As identified in section 5.3 and on Figure 15.12a and Figure 15.12b, some portions of land would be required to be permanently acquired as a result of the proposal. For the Randwick Precinct, these comprise:

- acquisition of land between the Royal Randwick racecourse and Doncaster Avenue to allow for the Randwick stabling facility
- acquisition of a series of strips of land currently owned by the ATC along Alison Road and Wansey Road to allow for the following:
  - the CSELR alignment
  - Royal Randwick racecourse stop, Wansey Road stop and High Street stop
  - the Royal Randwick racecourse substation
- acquisition of a portion of High Cross Park to allow for the Randwick stop.

Land use integration and amenity

The implementation of the CSELR proposal may lead to some changes in the environment of Alison Road and High Street. Reduced traffic volumes (as a result of decreased bus services and anticipated transport mode changes from private vehicles to the CSELR) would generally improve the amenity of the existing environment for those residents and commercial premises immediately adjacent to the route of the CSELR proposal, in particular along High Street. This has the potential to widen the range of activities in the immediate area, and improve access to community services.

Improvements to air quality (reduced vehicle emissions) and noise levels (reduced bus and private vehicle levels) are also anticipated at street level including some general benefit to the surrounding area from reduced air pollution (refer to section 10.7). This improvement in amenity may result in an increased use of the existing pedestrian areas for additional retail and commercial uses such as cafes and other outdoor uses. Further benefit may be derived from the CSELR proposal through increased security and passive surveillance on High Street associated with the late night and early morning operation of the proposal and the potential increased pedestrian activity associated with improved commercial and residential opportunities.

The retention of the combined pedestrian and cycleway along Alison Road and Wansey Road between the Royal Randwick racecourse and the UNSW High Street stop would continue to provide a link between these locations. The pedestrian pathway to the west of the Royal Randwick racecourse stop and along High Street would be maintained during operation.

Some noise and visual amenity impacts may occur to some properties along Doncaster Avenue as a result of the proposed Randwick stabling facility, located between Doncaster Avenue and the Royal Randwick racecourse. Additional visual impacts may also occur as a result of the proposed tree removal, in particular along Alison Road and Wansey Road. Noise and visual amenity impacts are discussed in greater detail in section 15.5 and section 15.7 respectively.

No property severance impacts are anticipated to occur within the Randwick Precinct and access to existing services from the surrounding area is not anticipated to be impacted by the proposal. Access between both sides of Alison Road, Wansey Road and High Street would continue in a similar manner as currently exists.

It is considered that the stabling facility would not substantially impact on the surrounding residential and open space land uses given the proposed mitigation measures identified throughout this chapter, including proposed noise and visual mitigation measures identified in sections 15.5 and 15.7 respectively.

Impacts on future land uses and developments

The CSELR proposal would provide a catalyst for potentially influencing changes to the character, demographics and land uses within the Randwick Precinct. There is the potential for a greater diversity of commercial and retail activity in the area, in particular towards the eastern end of the precinct within the Randwick town centre. However, the intensification of the current scale of development may be limited in the short term by existing land use and zoning controls (refer to section 15.4.1). Future land use planning by Randwick City Council, in conjunction with the current UAP process that aims to identify potential urban renewal sites within the vicinity of the CSELR proposal, may provide the opportunity for growth of transit-orientated developments, in particular around the Randwick town centre.

Additionally, the ongoing future development of the UNSW campus (described in section 16.4.1) and the development of the Randwick UAP are anticipated to integrate positively with the CSELR by providing an opportunity for increased student capacities through improved travel to and from the university.

All future developments along the CSELR proposal corridor that have not yet commenced, and in particular developments proposed for sensitive land uses, would be required to consider the potential impacts of the CSELR proposal on that development and the potential impacts of that development on the CSELR proposal.

15.4.3 Impacts during construction

Direct impacts on land use and property

Construction of the proposal would require the temporary use of land outside of the permanent proposal footprint, but within the identified construction footprint (as identified in Chapter 6 and Figures 6.2a to 6.2h) for a range of activities. Within the Randwick Precinct, these areas of temporary land take for proposed construction compound sites would comprise:

- a strip of land currently owned by the ATC along Wansey Road to allow for the construction of the Wansey Road stop
- a strip of owned by the ATC along Wansey Road to allow for the construction of the UNSW High Street stop.

The locations of these temporary land uses are shown on Figure 15.12a and Figure 15.12b. The use of these sites would be subject to consultation with the ATC as the owner of this land.

Amenity impacts on existing land uses within the vicinity of the proposal

The proposed works within the Randwick Precinct may affect the amenity of land uses within the Randwick Precinct during the construction period, resulting from a combination of the local impacts of construction noise, dust, general disturbance and disruption to access arrangements to properties affected by the construction activities. These impacts would generally have an adverse effect on adjoining residential land uses and those land uses that rely heavily on pedestrian traffic, such as retail outlets and cafes located towards the southern end of the precinct centred around High Street, Belmore Road and Avoca Street, or those which otherwise rely on outdoor activities, such as the Royal Randwick racecourse.

The amenity of UNSW and the Randwick Hospitals Campus (i.e. Prince of Wales Hospital and the Sydney Children's Hospital) would also be potentially affected by the construction of the proposal. Residents within the Randwick Precinct would also experience disturbance from construction activities, particularly those undertaken at night (where required).

Although amenity within the Randwick Precinct would be affected by the construction activities, this is unlikely to influence land use changes in the short or long-term. The construction sequencing for the works within the Randwick Precinct outlined in Chapter 6 would also provide opportunities to undertake potentially adverse construction activities (such as activities that generate a substantial amount of noise) during appropriate times of the day to minimise impacts to surrounding land uses and to ensure that access to retail, educational and medical uses throughout the Randwick Precinct are maintained during construction.

Further details regarding the potential amenity impacts resulting from the construction of the CSELR proposal are discussed as part of the socio-economic assessment of the Randwick Precinct in section 15.9.

15.4.4 Management and mitigation

To minimise the land use and property impacts of the CSELR proposal within the Randwick Precinct, consultation would occur with the surrounding businesses, the community and commuters advising them in advance of proposed works and any temporary access arrangements that may be required.

Consultation would also be undertaken with agencies such as Randwick City Council, utilities providers and other potential stakeholders such as the ATC, the UNSW and the Prince of Wales Hospital throughout construction of the proposal to minimise ongoing impacts to existing land uses. Consultation with the current owners of the proposed Randwick stabling facility regarding the use and potential ongoing development of this site would also be required.

As discussed in section 15.4.1, there is some potential for higher density developments to occur as part of the ongoing development of the Randwick UAP. Further consultation with the DP&I, Randwick City Council and other relevant stakeholders would be undertaken during the ongoing development of the Randwick UAP to identify and address any land use co-ordination issues that may arise between the CSELR proposal and the Randwick UAP.

Additionally, the overall construction footprint would be refined during detailed design to identify areas where the proposal footprint can be minimised to reduce impacts on existing land uses. Detailed staging of the proposal would also be determined during detailed design and would aim to minimise the time that affected land uses are impacted during construction.

15.5 Noise and vibration

Technical Paper 11 – *Noise and Vibration Impact Assessment* in Volume 6 of the EIS includes a full noise and vibration assessment of the CSELR proposal, prepared by SLR. This section provides a summary of the findings of this assessment for the Randwick Precinct.

15.5.1 Existing noise conditions

Within the Randwick Precinct, the proposed CSELR alignment passes through the suburb of Randwick, alongside the established road transport corridor of Alison Road, and the local streets of Wansey Road and High Street. The Randwick Precinct also includes the proposed Randwick stabling facility at the corner of Doncaster Avenue and Alison Road. Road traffic noise is the primary influence in this area.

To outline the existing noise environment and determine likely impacts, noise catchment areas (NCAs) were defined. Figures 15.19a and 15.19b summarise the extent of NCAs considered for the Randwick Precinct, as well as noise monitoring locations (BG07, BG08 and BG09). The Randwick Precinct includes four NCAs as shown in Figures 15.19a to 15.19b. Noise and vibration sensitive receptors within the Randwick Precinct include residences, commercial premises, and numerous other special uses such as horse stables at Royal Randwick racecourse, parks (including Centennial Parklands and High Cross Park), a place of worship, major educational facilities (including UNSW and TAFE Randwick Campus), medical/health clinics and the Randwick health precinct. A list of these receptors is presented in Table 3 of Technical Report 11.

Table 15.14 presents results of the unattended and attended background noise monitoring at locations BG07, BG08 and BG09. The unattended monitoring results are presented in the form of the Rating Background Level (RBL) and averaged (L_{Aeq}) noise levels for the day, evening and night-time periods. These noise levels display a diurnal trend, with noise levels at night lower than during the day and evening periods, which is mainly associated with the decrease in traffic volumes.

Figure 15.19a Randwick Precinct (North) – noise catchment areas and noise monitoring locations

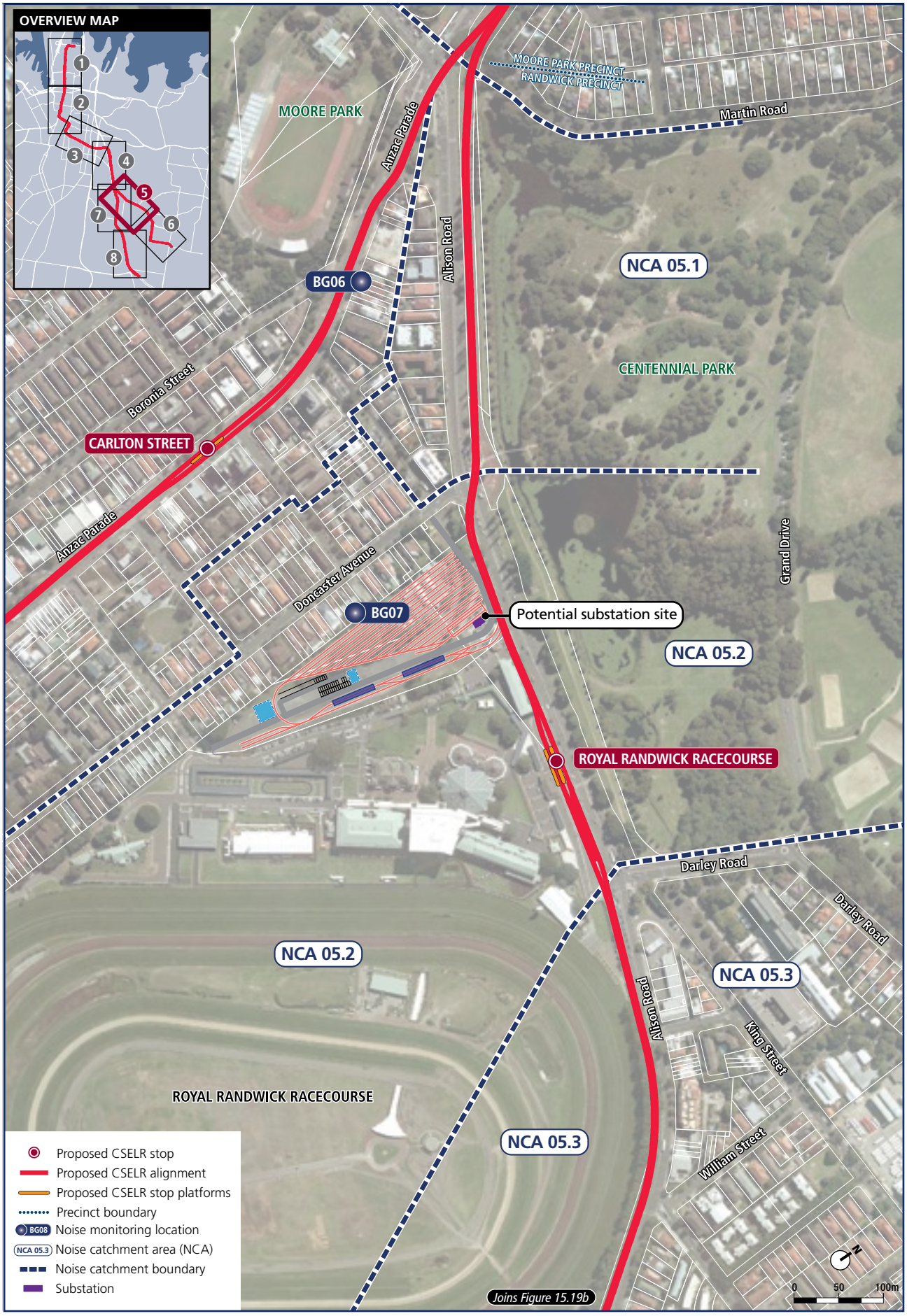


Figure 15.19b Randwick Precinct (South) – noise catchment areas and noise monitoring locations

Table 15.14 Unattended noise monitoring results – Randwick Precinct

NOISE MONITORING LOCATION (REFER FIGURES 15.19A AND B)	NOISE LEVEL (dBA)					
	DAYTIME (7 AM TO 6 PM)		EVENING (6 PM TO 10 PM)		NIGHT-TIME (10 PM TO 7 AM)	
	RBL	L_{Aeq}	RBL	L_{Aeq}	RBL	L_{Aeq}
BG07	44	54	44	52	38	46
BG08	47	62	45	59	39	56
BG09	56	66	52	65	43	61

Source: *Table 5 in Technical Paper 11 – Noise and Vibration Impact Assessment, Volume 6*

Note: *dBA = A-weighted decibels*

Attended noise monitoring was also undertaken to characterise noise in the existing environment. The results confirmed the influence of road traffic, horns, birds, aeroplanes, construction works, pedestrians and the racecourse on noise levels within the Randwick Precinct. The highest maximum (L_{Amax}) levels were observed for road traffic (up to 82 dBA), horns (up to 83 dBA) and aeroplanes (up to 71 dBA).

15.5.2 Impacts during operation

Potential noise and vibration impacts in the Randwick Precinct were assessed in relation to the following:

- airborne operational noise (i.e. audible noise generated through the normal operation of the CSELR)
- operational vibration (i.e. vibration caused through the normal operation of the CSELR)
- ground-borne operational noise (i.e. low frequency noise causing vibration of building walls or other structures, heard as a low rumbling)
- noise from operation of the proposed Randwick stabling facility
- operational noise from substations and stops.

These issues are discussed in turn in the following subsections.

In regard to potential changes in operational road traffic noise as a consequence of the CSELR, only minor operational road traffic changes are proposed within the Randwick Precinct. These changes would not be expected to increase traffic numbers or road traffic noise impacts. The noise impacts of any changes to bus routes and daily bus movements that may be proposed in the Randwick Precinct are outside the scope of this assessment, as explained in Chapter 1 of this EIS.

Predicted airborne operational noise impacts

Airborne operational noise is noise that propagates through the air. It would be created by light rail operations on the surface track, originating from the wheel-rail interface, as well as operation of warning bells and auxiliaries such as air-conditioning units and power converters.

Noise from the operation of the CSELR has been assessed in accordance with guidance provided by the NSW Environment Protection Authority (EPA) in the *Rail Infrastructure Noise Policy* (RING) (EPA, 2013). To assess and manage potential noise from light rail proposals, the guideline provides non-mandatory airborne noise triggers for residential and other sensitive receptors. Where rail noise levels are above the noise triggers the noise assessment is required to identify feasible and reasonable mitigation to achieve a desired objective of airborne noise within the trigger levels.

Noise from stops and electrical substations has been assessed in accordance with the *NSW Industrial Noise Policy* (INP) with guidance on sleep disturbance criteria taken from the online Application Notes to the INP.

Residential receptors

Predicted noise levels at residential receptors in the Randwick Precinct that would experience the highest airborne noise levels during a regular daily service are summarised in Table 15.15 for the following two scenarios, without noise mitigation:

- 2021 scenario (at opening)
- 2036 scenario (future operations, 15 years after opening).

This table is intended to indicate worst-case noise levels at the facades of residential receptors nearest to the alignment. Where the receptor is a multi-storey building, the predicted noise levels are representative of the most affected storey. At all locations, the worst-case noise levels are due to the close proximity of the alignment to adjacent receptors on straight sections of track between stops where the LRVs would be operating at their highest speeds.

The predicted noise levels demonstrate that night-time and maximum rail noise levels would not be expected to change between the at-opening 2021 and future 2036 operating scenarios. Furthermore, the daytime rail noise levels between 2021 and 2036 are predicted to increase by no more than 1 dB.

Where exceedances of the average and maximum (L_{Aeq} and L_{Amax}) RING noise trigger levels are predicted, they are indicated in Table 15.15 in bold.

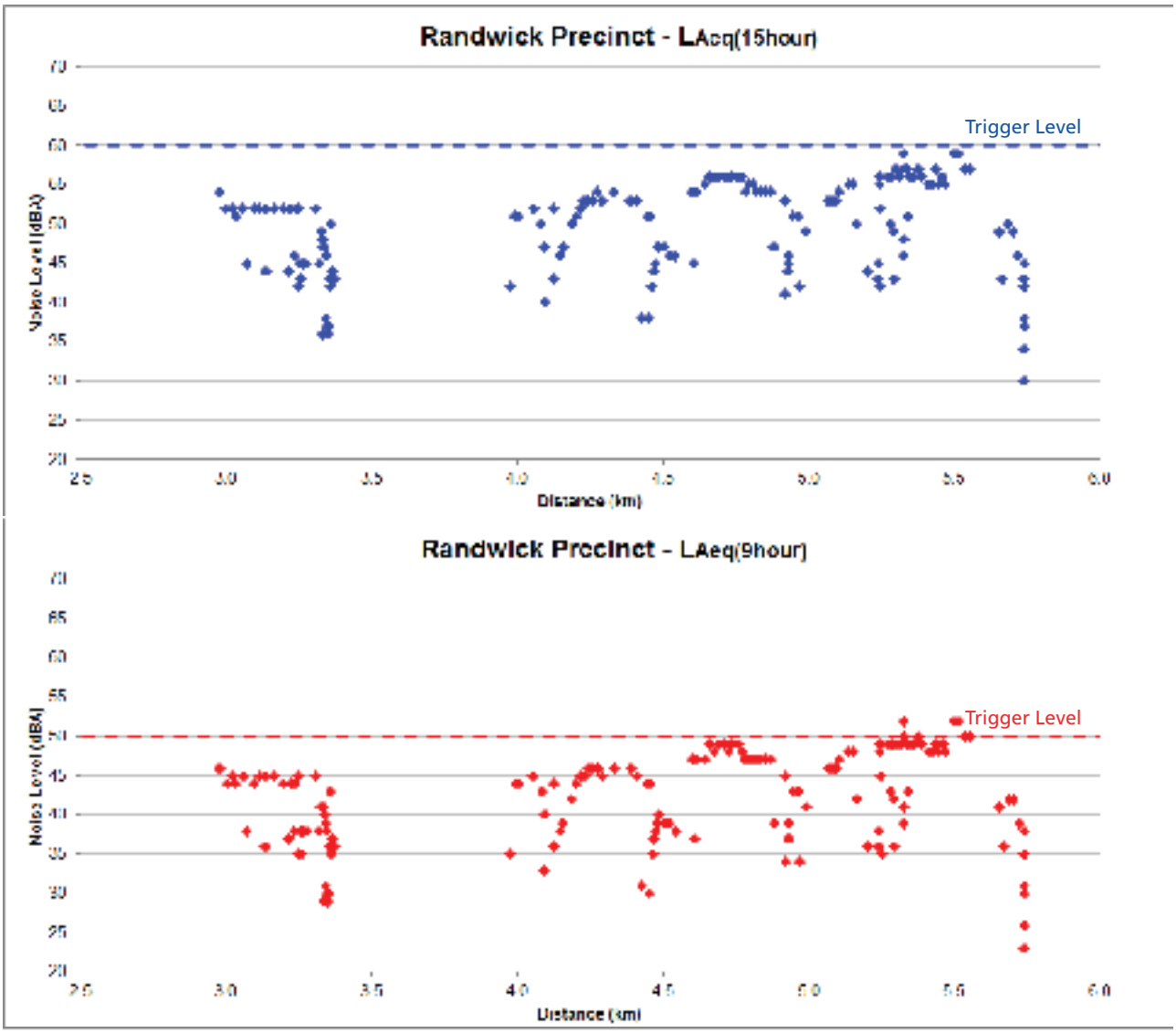
Table 15.15 Predicted worst-case airborne operational noise levels at residential receptors – without mitigation

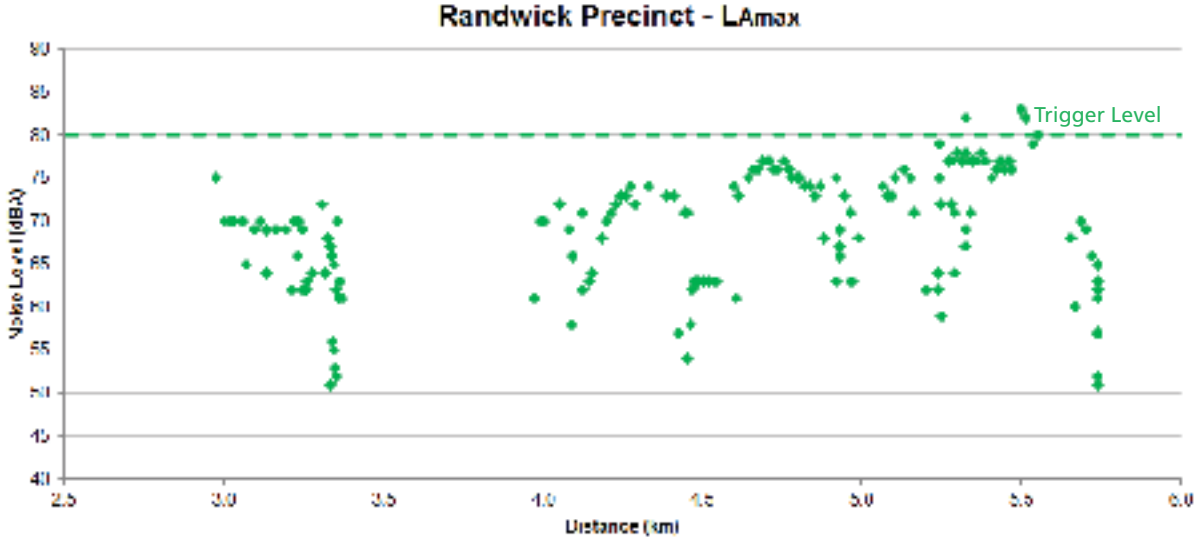
NCA (REFER FIGURES 15.19A AND 15.19B)	WORST-CASE PREDICTED NOISE LEVEL (dBA)					
	2021 AT-OPENING SCENARIO			2036 FUTURE SCENARIO		
	DAYTIME $L_{Aeq(15hr)}$	NIGHT-TIME $L_{Aeq(9hr)}$	L_{Amax}	DAYTIME $L_{Aeq(15hr)}$	NIGHT-TIME $L_{Aeq(9hr)}$	L_{Amax}
RING trigger level (dBA)	60	50	80	60	50	80
NCA05.1	53	46	75	54	46	75
NCA05.2	49	43	70	50	43	70
NCA05.3	55	49	77	56	49	77
NCA05.4	58	**52**	**83**	59	**52**	**83**

Source: Table 12 in Technical Paper 11 – Noise and Vibration Impact Assessment, Volume 6

These results are shown graphically for the 2036 future scenario in Figure 15.20, where the dashed line indicates the applicable noise criterion and the dots represent individual residential receptors. Chainage (kilometres) is distance along the proposed CSELR alignment from Central Railway Station. More detailed noise contour plots for the 2036 future scenario are included in Appendix D of Technical Paper 11 in Volume 6.

Figure 15.20 Plots of predicted residential operational airborne noise for the 2036 future scenario (without mitigation)





Source: Figure 11 in Technical Paper 11 - Noise and Vibration Impact Assessment

As indicated in Table 15.15 and Figure 15.20 above, airborne operational noise is predicted to comply with the adopted noise criteria at the majority of the assessed receptors in the Randwick Precinct. Predicted exceedances of the adopted noise criteria were limited to 2 dBA exceedances of the L_{Aeq} 9hr criterion at three individual receptors in High Street, Randwick (within NCA05), during the night-time and for maximum noise levels during passby events (L_{Amax}) by 3 dBA. The particular residences at which these exceedances were predicted are located at individual residences in Eurimbla Avenue (High Street façade) and Clara Street (two apartment buildings).

While noise monitoring was not undertaken on this section of High Street, this area is exposed to road traffic noise (including from buses) at levels likely to be well above the predicted light rail noise levels. While some reduction in bus numbers along High Street is expected with the CSELR, other road traffic is not expected to decrease.

Other noise sensitive receptors

Noise levels have also been predicted for all other identified noise sensitive receptor locations adjacent to the proposed CSELR alignment. For the majority of the receptors, compliance with the external noise trigger levels has been predicted. The only other noise sensitive receptor location where the predicted noise levels exceed the adopted trigger levels is identified in Table 15.16. The predicted exceedance of the noise trigger level are shown in bold.

Table 15.16 Predicted airborne operational noise trigger level exceedances at other sensitive receptors – without mitigation

SENSITIVE RECEPTOR	TYPE	EXTERNAL NOISE TRIGGER LEVEL (dBA)	MAXIMUM PREDICTED NOISE LEVEL (dBA)	
			2021 AT-OPENING SCENARIO	2036 FUTURE SCENARIO
		$L_{Aeq(1HR)}$	$L_{Aeq(1HR)}$	$L_{Aeq(1HR)}$
UNSW - Lowy Building	Educational	50	**54**	**54**

Source: *Table 14 in Technical Paper 11 – Noise and Vibration Impact Assessment, Volume 6*

Note : *Noise levels at other sensitive (non-residential) receptors are predicted to comply with the noise goals.*

Noise levels in Table 15.16 indicate the adopted noise criterion is predicted to be exceeded at the UNSW Lowy Building. The exceedance may result from the conservative assumption that receptors outside of the CBD would have open windows and hence an outside-to-inside attenuation of only 10 dB. Given the proposed CSELR alignment is along or adjacent to existing roads, the above identified location may have fixed glazing and provision of alternative ventilation such as air-conditioning.

Furthermore, the existing ambient noise levels at this location are likely to be similar to or higher than the predicted light rail noise levels.

Special event services

Special event services would typically be provided once or twice a week, as required to meet demand during events at the Moore Park sports and entertainment complex and Royal Randwick racecourse. An increased frequency of service would be required prior to the start of events as well as after, with the greatest load occurring at the end of events as crowds are dispersing. Special event services would typically be required during the evening on weekends, but could sometimes occur on weekdays. Special event services may sometimes extend into the night-time period if events finish after 10.00 pm.

Approximately two-thirds of all special events would be serviced by 45 metre LRVs at an increased frequency of up to every 2.5 minutes, while about one-third of all events would attract crowds of sufficient size to require 90 metre LRVs (two joined 45 metre vehicles) to clear crowds within the target of one hour after an event.

The noise impact of special event services would vary depending on the timing of operation of the special event services, and the duration of increased service. The duration of increased service would vary with attendance numbers at the event.

There would be no change in maximum noise levels during special events, but the increase in the number of LRV passbys would increase the average (L_{Aeq}) noise levels. On days when a special event service operates with 45 metre LRVs for up to two hours during the daytime, the daytime average ($L_{Aeq(15hour)}$) noise levels would be within 0.5 dB of the levels on days without special events. If the special event service frequency occurs for one hour after 10.00 pm with 45 metre LRVs, the night-time average ($L_{Aeq(9hour)}$) noise levels would be up to 2.0 dB higher than the level on nights without special events.

The perceived noise impacts are likely to be due to the noticeable increased frequency of noise events from LRV passbys on special event nights, rather than the increase in night-time average (L_{Aeq}) noise levels.

The noise impacts of special event services are considered acceptable in the context of the short duration of special event services, typically on one or two occasions each week.

Light rail noise within the existing environment

Based on the baseline noise survey and the current road transport adjacent to the CSELR alignment, the existing noise in the Randwick Precinct is already generally above the predicted average and maximum light rail noise levels. Whilst the CSELR would introduce a new noise source to the environment, the potential noise impacts would be limited to whether the light rail noise would be audible above road traffic noise and other localised noise sources.

The RING noise trigger levels take into account that existing roadways can be turned into light rail routes. Consequently, where the CSELR is designed and operated to comply with the RING, the proposal is considered to be managing light rail noise to:

- preserve the long-term amenity at receptors adjacent to an existing transportation corridor
- minimise the potential influence of CSELR on total transportation noise.

Noise from warning bells

LRVs are fitted with warning bells. For the CSELR, the warning bells would only be used in the event of emergencies or where the driver considers there is a danger to public safety. The use of warning bells would not form part of normal rail operations (i.e. they would not be used on approach or departure from stations, or at level crossings). The RING does not require assessment of warning bells where their use is infrequent and only in emergency situations.

Notwithstanding this, warning bells are directional and can give rise to maximum noise levels up to 77 dBA at 10 metres immediately in front of the LRV. At locations to the side of the LRV the maximum noise levels would generally be less than 70 dBA.

Whilst the noise from warning bells is distinctive in character and is likely to be noticeable at receptors in locations immediately adjacent to where a bell is sounded, the infrequent use of warning bells would most likely result in negligible noise impacts.

Predicted operational vibration impacts

Operational vibration from the CSELR proposal was assessed in relation to the human disturbance criteria in *Assessing Vibration: a technical guideline* (Department of Environment and Conservation, DEC 2006). Where vibration levels are within the human disturbance criteria they would also comply with criteria for limiting damage to buildings and structures. Additional assessment was undertaken in relation to potential impacts on vibration sensitive equipment.

Indicative predictions of vibration dose value (VDV) are detailed for each precinct in Technical paper 11 (refer Table 19). No exceedances of the human comfort VDV criteria were predicted adjacent to the CSELR alignment. For the Randwick Precinct, the maximum VDV is estimated to be 0.02 metres per second$^{1.75}$ which is well below the VDV criterion of 0.1 metres per second$^{1.75}$.

Some potential exceedances of the 82 dBV screening criterion were predicted for locations in the Randwick Precinct with potential vibration sensitive equipment, as shown in Table 15.17. These locations would be consulted further during the detailed design phase of the proposal to confirm the nature of any vibration-sensitive equipment, and the form of mitigation required to avoid vibration impacts (refer mitigation discussion in section 15.5.4).

Table 15.17 Randwick Precinct - potential exceedances of screening criteria for vibration sensitive equipment

ADDRESS	DESCRIPTION	MAXIMUM 1/3 OCTAVE BAND FACADE VIBRATION LEVEL[1] (dB RE 10–9 METRES PER SECOND)
38 Botany Street, Randwick	UNSW Lifestyle Clinic	86
50 High Street, Randwick	Lee Lincoln Cardiac Clinic	84
151 Belmore Road, Randwick	Sydney Dental Practice - SDP	83
High Street, Randwick	Randwick hospital precinct	85
Corner of Avoca Street and High Street, Randwick	Randwick hospital precinct, Medical Superintendent's Cottage – proposed linear accelerator	80
High Street, Randwick	UNSW Wallace Wurth Building	82
High Street, Randwick	UNSW Lowy Cancer Research Centre	82

Source: *Table 20 in Technical Paper 11– Noise and Vibration Impact Assessment, Volume 6*

Note 1: *Above values assume use of resilient track forms. Predicted vibration levels include nominal 5dB attenuation for use of resilient track forms near sensitive receptors. Greater attenuation could be achieved using floating slab track forms if required.*

Predicted operational ground-borne noise impacts

Ground-borne operational noise is explained in Chapter 12 (section 12.5.2). The CSELR alignment in the Randwick Precinct would be largely on or adjacent to existing roads which, along with airborne noise from the LRVs, are expected to generate airborne noise that would mask ground-borne noise at many receptors.

Where necessary, ground-borne noise is controlled by specifying trackforms that incorporate vibration-isolating components. This approach would be applied to the CSELR (at detailed design stage) and was assumed in the ground-borne noise modelling undertaken. In the Randwick Precinct, the assessment assumed standard track would be used along Alison Road and high-resilience trackform in other areas. The ground-borne noise modelling did not identify any potential ground-borne noise impacts or criteria exceedances within the Randwick Precinct.

Randwick stabling facility operational noise

Proposed operations at the Randwick stabling facility are described in Chapter 5 and section 8 of Technical Paper 11 in Volume 6. Impacts were assessed in accordance with the *NSW Industrial Noise Policy* (INP), with guidance on sleep disturbance criteria taken from the online Application Notes to the INP.

At the nearest sensitive receptors to the Randwick stabling facility, the most significant contributors to the LAeq noise levels would be those associated with the LRV stabling operations. These would include the power converters, air-conditioning, bell tests and track brake tests, as well as on-site vehicle movements for receptors in the vicinity of the site entry, exit and car park.

Noise modelling for the purposes of the EIS has confirmed that without any noise mitigation, a large number of residential properties in the vicinity of the stabling facility would experience noise levels in exceedance of the applicable noise goals under the INP (refer section 8 of Technical Paper 11). Considering this, noise levels were also predicted assuming the implementation of two mitigation options:

- a six metre high noise barrier on the western site boundary
- a six metre high noise barrier on the western site boundary and an acoustic shed with a roof and enclosed on the western façade (encompassing the entire site).

The modelling confirmed that a six metre high noise barrier alone would reduce the number of affected receivers by more than half from the unmitigated design, but would not be sufficient to adequately mitigate night-time noise impacts or daytime and evening noise impacts on upper floor receptors.

Table 15.18 summarises results of the noise modelling for operational noise with a six metre high barrier and an acoustic shed over the site. Various operational scenarios were modelled – as explained in section 8.5.3 of Technical Paper 11.

Table 15.18 Randwick stabling facility predicted noise levels – with acoustic shed enclosed on western façade and roof

SCENARIO	PREDICTED NOISE LEVEL – MOST AFFECTED RECEPTOR (dBA)			OPERATIONAL NOISE GOAL	TOTAL NUMBER OF PROPERTY EXCEEDANCES[1]
	GROUND FLOOR	FLOOR 1	FLOOR 2+		
Daytime operations – 4 LRVs departing (stabled west, south or north-east)	47	45–47	45–47	49 dBA $L_{Aeq(15min)}$	0
Evening operations – 3 LRVs returning (stabled west, south or north-east)	43–45	42–45	42–45	49 dBA $L_{Aeq(15min)}$	0
Night-time operations – 4 LRVs departing (stabled west, south or north-east)	44–46	43–46	43–46	43 dBA $L_{Aeq(15min)}$	1-5
Maximum noise emissions	50	45	49	53 dBA $L_{A1(60sec)}$	0

Note 1: *Total number of property exceedances – each floor of each modelled building is counted as a separate receptor for this purpose.*

Source: *Summarised from Table 35 in Technical Paper 11 – Noise and Vibration Impact Assessment, Volume 6*

With the inclusion of an acoustic shed, compliance with the noise criteria would be achieved at all receptors during the daytime or evening periods. However, up to five receptors were predicted to experience noise criteria exceedances during the night-time period, even with this mitigation in place. These five receptors are located in two buildings adjacent to the site exit. Staff cars leaving the site would be the primary source of the predicted noise. However, both of these properties are also close to Alison Road, which would mask the noise of staff cars leaving the site.

No exceedances of the sleep disturbance screening criterion were predicted. Proposed mitigation for operational noise from the stabling facility is further outlined in section 15.5.4.

Noise from operation of substations

Two electricity substations are proposed within the Randwick Precinct, as summarised in Table 15.19 below and shown on Figures 15.19a and 15.19b. A substation would also be constructed at the Randwick stabling facility. The noise impacts of these substations have been assessed as part of the overall industrial noise emissions of these sites. Table 15.19 also indicates the associated noise sensitive receptors, controlling noise goals and predicted average noise levels from the substation operations.

The results confirm that the predicted noise levels comply with the applicable noise goals, with the exception of a marginal potential exceedance of 1 dB of the night-time intrusiveness noise goal for the Royal Randwick racecourse substation. The substation at this location could be readily designed to meet the noise goals by provision of shielding or an enclosure of the noise source. This mitigation is further discussed in section 15.5.4.

Table 15.19 Predicted noise levels from substation operations – Randwick Precinct

SUBSTATION	RECEPTOR TYPE	OPERATIONAL NOISE (DBA)		COMMENTS
		L_{Aeq} CONTROLLING NOISE GOAL[1]	PREDICTED L_{Aeq} NOISE LEVEL	
Royal Randwick racecourse (Alison Road)	Residential	44	45	Marginal exceedance
Randwick stop (High Street)	Residential	48	48	Complies with the noise goal

Note 1: *Under NSW Industrial Noise Policy*

Source: *Table 41 in Technical Paper 11 – Noise and Vibration Impact Assessment, Volume 6*

Operational noise at light rail stops

As discussed in Chapter 12 (section 12.5.2), the proposed public address (PA) systems would be the only notable operational noise source at light rail stops. These systems can and would be designed to comply with the INP (EPA 2000) intrusiveness and sleep disturbance noise criteria. Notwithstanding likely compliance with the INP criteria, PA systems at stops have the potential to cause annoyance to nearby residents, depending on the frequency and time of day of announcements. Passenger announcements from PA systems at the various stops would be infrequent and limited to emergency situations or where notable disruptions in service occur.

Potential subjective noise impacts associated with this potential annoyance are summarised in Table 15.20 for the proposed light rail stops in the Randwick Precinct.

Table 15.20 Potential subjective noise impacts from PA systems at light rail stops – Randwick Precinct

STOP	COMMENTS ON SUBJECTIVE NOISE IMPACTS
Royal Randwick racecourse stop	The nearest residential receptors are more than 250 metres away from this proposed stop, such that PA systems could operate without adverse noise impacts.
Wansey Road stop	The nearest residential receptors are around 20 metres from these proposed stops. There is potential for annoyance if the noise from PA systems is audible inside residences. The subjective impacts are however likely to be minimal given the low frequency of announcements.
UNSW High Street stop	
Randwick stop	

Source: *Table 44 in Technical Paper 11 – Noise and Vibration Impact Assessment, Volume 6*

Proposed mitigation to address the issue of subjective noise impacts from PA systems at the Wansey Road, UNSW High Street and Randwick stops is outlined in section 15.5.4.

15.5.3 Impacts during construction

Section 12.5.3 in Chapter 12 provides an overview of potential construction noise impacts of the CSELR, which also applies to the Randwick Precinct.

Potential noise and vibration impacts in the Randwick Precinct were assessed in relation to the following:

- construction airborne noise (general CSELR alignment, stops, structures and Randwick stabling facility)
- construction road traffic noise
- construction ground-borne noise
- construction vibration.

These issues are discussed in turn in the following subsections.

Predicted construction airborne noise

Construction noise has been assessed in accordance with the Interim Construction Noise Guideline (ICNG). Airborne construction noise was predicted for the likely construction activity categories and scenarios (without mitigation), as detailed in Table 15.21 for the Randwick Precinct.

Table 15.21 Summary of airborne noise scenarios considered – Randwick Precinct

CONSTRUCTION ACTIVITY	SCENARIOS	SCENARIO SOUND POWER LEVEL (dB)	APPROXIMATE DURATION OF WORKS AT ANY LOCALITY[1]
Construction compounds	Establishment of construction compounds and worksites	105	Intermittent activity, up to 3 years at some locations
	Deliveries of demountable office facilities	105	
	Installation of temporary boundary fencing	99	
	Establishing stockpiles and materials storage areas	111	
	Delivery of construction plant and equipment	111	
Substation installation	Excavation	118	8 months[3]
	Foundation preparation	110	
	Delivery and placement of substation	105	
Mainline works	Excavation	118	2 weeks
	Base preparation and blinding	108	2–3 weeks
	Reinforcement placement	103	2 weeks
	Concrete and baseplate placement	110	6–7 weeks[2]
	Track, welds and topping slab	110	5–6 weeks
	Overhead wiring footing excavation	114	1–2 weeks
	Overhead wiring footing placement and post erection	109	1–2 weeks

Table 15.21 cont

CONSTRUCTION ACTIVITY	SCENARIOS	SCENARIO SOUND POWER LEVEL (dB)	APPROXIMATE DURATION OF WORKS AT ANY LOCALITY[1]
Structures – stops	Excavation of existing pavement	119	1 week
	Formwork and reinforcement	109	2–3 weeks
	Footings	105	2 weeks
	Concreting	109	1 week
	Finishing works	115	2–3 weeks
	Street reconfiguration	113	3–4 weeks
Structures – Wansey Road retaining wall	Construction of retaining walls, including earthworks and piling works.	112	6 months[3]
Randwick stabling facility works	Site remediation, clearing and grubbing	113	18–24 months[3]
	Building demolition at discrete locations	118	
	Excavation	106	
	Forming, reinforcing and concreting	110	
	General mechanical and electrical works	105	
	Construction of acoustic shed	103	

Note 1: *Work estimate assumes one shift per day and based on typical 200 metre length of corridor and with a 2 x platform stop, and may not be over consecutive days (i.e. shorter periods of work adding up to total duration specified).*

Note 2: *Work estimate assumes Appitrack machine not used for this work. Appitrack would be anticipated to reduce duration to around 1-2 weeks at each location.*

Note 3: *Limited information is available on this activity at this phase of the proposal, and hence, the key activities determined have only had high level assumptions made with respect to proposed duration.*

Source: *Table 55 in Technical Paper 11 – Noise and Vibration Impact Assessment, Volume 6*

The majority of works would be completed during the standard daytime construction hours of Monday to Friday 7.00 am to 6.00 pm and Saturdays 8.00 am to 1.00 pm; however some evening and night work would be required in areas around road intersections.

At this early stage in the proposal, out of hours works are included in the assessment for all proposed works in order to inform the scheduling of construction activity and management of noise during the detailed design phase. It is anticipated that the finalised requirements for out of hours works would be determined at a later design stage.

The predicted construction airborne noise impacts in the Randwick Precinct (exceedances of the adopted noise management levels or NMLs) associated with the activities and scenarios in Table 15.21 are summarised in Table 15.22 below.

Table 15.22 Summary of airborne construction noise level exceedances of NMLs – Randwick Precinct

PRECINCT AREA	RECEPTOR TYPE	WORST-CASE NML EXCEEDANCE AT NEARBY RECEPTORS (dB) (LEAST NOISE INTENSIVE SCENARIO – MOST NOISE INTENSIVE SCENARIO)	
		STANDARD CONSTRUCTION HOURS	OUT OF HOURS WORKS
Randwick Precinct (general)	Residential	4–33	2–46
	Commercial	15–32	15–32
	Other sensitive receptors	1–38	3–38
Randwick stabling facility	Residential	15–30	4–41
	Commercial	0–10	0–10
	Other sensitive receptors	–	–

Source: *Table 56 in Technical Paper 11 – Noise and Vibration Impact Assessment, Volume 6*

Due to the close vicinity of the works, high exceedances of the NMLs were predicted at the nearest residences to the work during standard construction hours (exceedances up to 33 dB) and out of hours work (exceedances of up to 46 dB). Commercial and other sensitive receptors were also predicted to be subject to high NML exceedances of over 20 dB.

Within the Randwick Precinct, the most noise intensive works would be road excavation activities which are anticipated to require use of a rockbreaker. These activities are not expected to last for longer than a total of two weeks at any single receptor during the mainline construction works. Receptors near to the proposed stop locations would also be likely to be impacted by additional excavation activities, which are expected to last for no longer than one week during stop construction.

Predicted $L_{A1(1minute)}$ noise levels at the nearest noise sensitive receptors (refer Appendix E of Technical Paper 11) indicate that the sleep disturbance screening criterion is likely to be exceeded when night works are occurring adjacent to residential receptors for the majority of works scenarios. This level of noise is typical for construction works using noise intensive equipment in built up areas. The applicable guideline (the ICNG) only requires the proposal to consider maximum noise levels where construction works are planned to extend over more than two consecutive nights.

As discussed further in section 15.5.4, various mitigation measures are proposed to minimise the predicted NML exceedances, including sleep disturbance.

Predicted construction road traffic noise

This section provides an assessment of the construction related traffic on the public road network. Additional heavy construction vehicle movements on public roads would predominantly be required during daytime hours. Within the Randwick Precinct, a number of roads are proposed to be used as construction haulage and access routes, as described in Chapter 6 and Table 65 in Technical Paper 11. The additional traffic is not predicted to create a discernible increase in road traffic noise at any locations in the Randwick Precinct, as the increases would all be well under 2 dB, and would comply with the applicable noise criteria under the applicable guideline (the *NSW Roads Noise Policy,* DECCW 2011).

Additional assessment for night-time truck movements on public roads would be undertaken at the detailed design stage when the finalised traffic plan is determined. The maximum noise levels would be expected to be comparable with existing heavy vehicles using sub-arterial roads like Alison Road.

Predicted construction ground-borne noise

Ground-borne construction noise is likely to be audible during rockbreaker activities at the nearest residential and commercial buildings to the works; however airborne noise levels associated with the rock-breaker works are likely to be much higher than the ground-borne noise levels and, therefore, more prominent. For this reason, further assessment of ground-borne noise at these receptors is not considered warranted.

Predicted construction vibration

Potential construction vibration impacts from the CSELR proposal are discussed in Chapter 12 (section 12.5.3) for the whole CSELR alignment, including the Randwick Precinct. In summary, most works would be expected to comply with the relevant construction vibration guidelines.

Construction vibration is expected to be below the cosmetic damage criteria, although some items of construction equipment have the potential to be operated within the recommended safe working distances. Mitigation and management measures to address potential impacts of this are discussed in section 15.5.4. Ground-borne vibration generated during use of the heaviest plant is likely to be perceptible at times. Additionally, there is the potential for ground vibration levels to exceed the human comfort criteria depending on the duration and nature of the construction activity. Any exceedances would be expected to be of short duration. Mitigation and management measures to address potential impacts of this are discussed in section 15.5.4.

Under the British Standard (BS7385), heritage buildings are assessed in the same way as other buildings (unless they are structurally unsound). Therefore the above assessment also applies to heritage buildings along the CSELR alignment.

15.5.4 Management and mitigation

Airborne operational noise

As described in section 15.5.2, some minor exceedances of the residential receptor noise trigger levels under the RING were predicted in the Randwick Precinct. Acceptance of any exceedances of the noise trigger levels of 2 dB or less is proposed at locations where road traffic noise dominates and is unlikely to decrease. This approach is proposed in the Randwick Precinct, which is exposed to high levels of road traffic noise not related to the CSELR proposal.

An exceedance was also predicted for one ‘other sensitive’ receptor in the precinct, the Lowy Cancer Research Centre. Exceedances of the noise trigger levels for other sensitive receivers outside the City Centre arise from the assumption that the windows may be open with an outside to inside attenuation of only 10 dB. In the event that the affected facades have fixed glazing and do not rely on open windows for ventilation, exceedances of the internal noise goals would not be predicted to occur. This would be verified in the detailed design stage. Furthermore, the ambient noise environment at all the affected locations is affected by existing traffic noise. While measurements of existing road traffic noise at this specific location has not been taken, it is likely that the existing road traffic noise is higher than the predicted light rail noise level. For these reasons, mitigation of light rail noise at other sensitive receiver locations is not considered reasonable or necessary.

The noise impacts of special event services are considered acceptable in the context of the short duration of these services.

The predicted noise levels in this assessment and the determination of as-required noise mitigation would be verified during the detailed design phase of the proposal.

Ground-borne operational noise and vibration

Some potential exceedances of ground-borne operational vibration criteria have been identified at locations with vibration sensitive equipment, including a number of sites associated with the UNSW (Lowy Building) and the wider Randwick health precinct. Ongoing consultation and collaboration with the owners and operators of vibration sensitive equipment would be required throughout the detailed design stage to achieve appropriate vibration outcomes at these facilities.

Standard trackform would be employed at locations removed from particularly sensitive receptors. High-resilience trackforms would be required to minimise ground-borne noise impacts at locations where sensitive receptors line the route. Very high attenuation track may be required at some locations near the Randwick health precinct.

All vibration and ground-borne noise levels and recommended mitigation measures in this assessment would be verified during the detailed design phase.

Operational noise from substations and stops

Noise from new electrical substations would be controlled by inclusion of shielding or enclosures to comply with the INP at all locations.

Noise from PA systems at the stops can be controlled to minimise potential impacts at the nearest receptors to the stops. The detailed design of the PA systems would include noise mitigation measures. The need for announcements at stops in residential areas would also be reviewed, particularly during the more sensitive night-time periods.

Operational noise from the Randwick stabling facility

The Randwick stabling facility would be located close to residential areas. In the absence of noise mitigation measures at this site there would be exceedances of the INP noise criteria at a large number of residential receptors during the night-time period.

Construction of an acoustic shed at the site (which was modelled as a potential mitigation measure for the Randwick stabling facility) represents one possible method for meeting the INP criteria at this site. Construction of a shed across the full extent of the site has implications for cost, visual impact and potentially overshadowing of adjacent residences. Potential alternatives to a full enclosure include:

- operational measures such as changes to pre-start practices (e.g. not turning on air conditioning)
- changes to times of use of areas/noise sources such as the wash plant (for example)
- increased noise attenuation targeting particular sources such as the wash plant (for example)
- use of barriers within the site (not just at the site boundary), for example between stabling roads or nearer to other noise sources such as the site access roads, wash plant and sand plant
- use of a partial roof enclosure, potentially in conjunction with a combination of other options.

During the detailed design stage, alternative noise mitigation options would be investigated for feasibility before determining the final solution to meet the INP noise criteria.

Construction noise and vibration

A construction noise and vibration management plan (CNVP) would be developed to document all necessary measures to manage and mitigation potential noise and vibration levels during standard day time and out of hours construction activities. The typical coverage of the plan and other construction noise and vibration measures are described in section 12.5.4.

The site specific CNVPs described in section 12.5.4 would also be prepared for the Randwick Precinct. Within the Randwick Precinct, the CNVMP would include communication with the owners of the horse stables near the proposed works to clearly explain the timing, duration and likely noise levels for the works.

The additional noise mitigation measures described in the Transport for NSW *Construction Noise Strategy* (and summarised in section 12.5.4) would be considered in the development of these CNVPs in the event of predicted exceedances of the noise goals, particularly during out of hours works. In regard to offers of alternative accommodation, these would only be considered in the Randwick Precinct in the event that more than two consecutive nights of highly intrusive noise works are required in any particular location. This is consistent with the requirements of the ICNG, which requires sleep disturbance impacts to be assessed only for works planned to extend over more than two consecutive nights.

The other noise mitigation considerations, construction vibration measures and construction work hours measures listed in section 12.5.4 would also apply to the Randwick Precinct.

Further assessment

Additional assessment of construction road traffic noise impacts of night-time truck movements (if required) would be undertaken at detailed design stage when the finalised traffic plan is determined.

15.6 Planted trees

This section provides a summary of the existing planted trees within the Randwick Precinct, based on Technical Paper 9 — *Preliminary Tree Assessment* in Volume 5 of this EIS. This section also provides an indicative estimate of the number of planted trees that would be directly affected by the construction of the CSELR proposal, as well as environmental management measures that would be implemented to further reduce such impacts.

15.6.1 Existing conditions

The Randwick Precinct contains approximately 400 planted trees within the 'tree study area' (refer Figures 15.21a and b), which predominantly comprise Hills Weeping Figs, Plane Trees, Norfolk Island Pines, Cook Pines, Eucalypt species, Paperbarks, Moreton Bay Figs, evergreen Brush Boxes and street tree plantings of semi-mature Chinese Tallow.

As outlined in Chapter 8, the tree study area was defined as the area that would be directly affected by the CSELR proposal, which includes any physical works (e.g. light rail tracks, stops, overhead wires, substations and the maintenance and stabling facilities), construction compounds, access roads and any other areas that would be physically disturbed during the construction of the proposal.

The distribution of the trees throughout the precinct is shown in Figures 15.21a and b, and generally occurs at the following locations:

- adjacent to the northern side of Alison Road and the associated busway (between Anzac Parade and Doncaster Avenue)
- adjacent to the southern side of Alison Road between Doncaster Avenue and Wansey Road
- adjacent to both the eastern and western sides of Wansey Road
- along High Street
- within High Cross Park
- within the proposed Randwick stabling facility site.

Discussion on the key characteristics of the trees throughout the precinct is provided in Table 15.23. A full assessment of each tree within the tree study area — in terms of their key characteristics (i.e. species, condition, health and structure), 'safe useful life expectancies' and 'landscape visual rating' — is provided in Technical Paper 9.

Table 15.23 Overview of planted trees within the Randwick Precinct

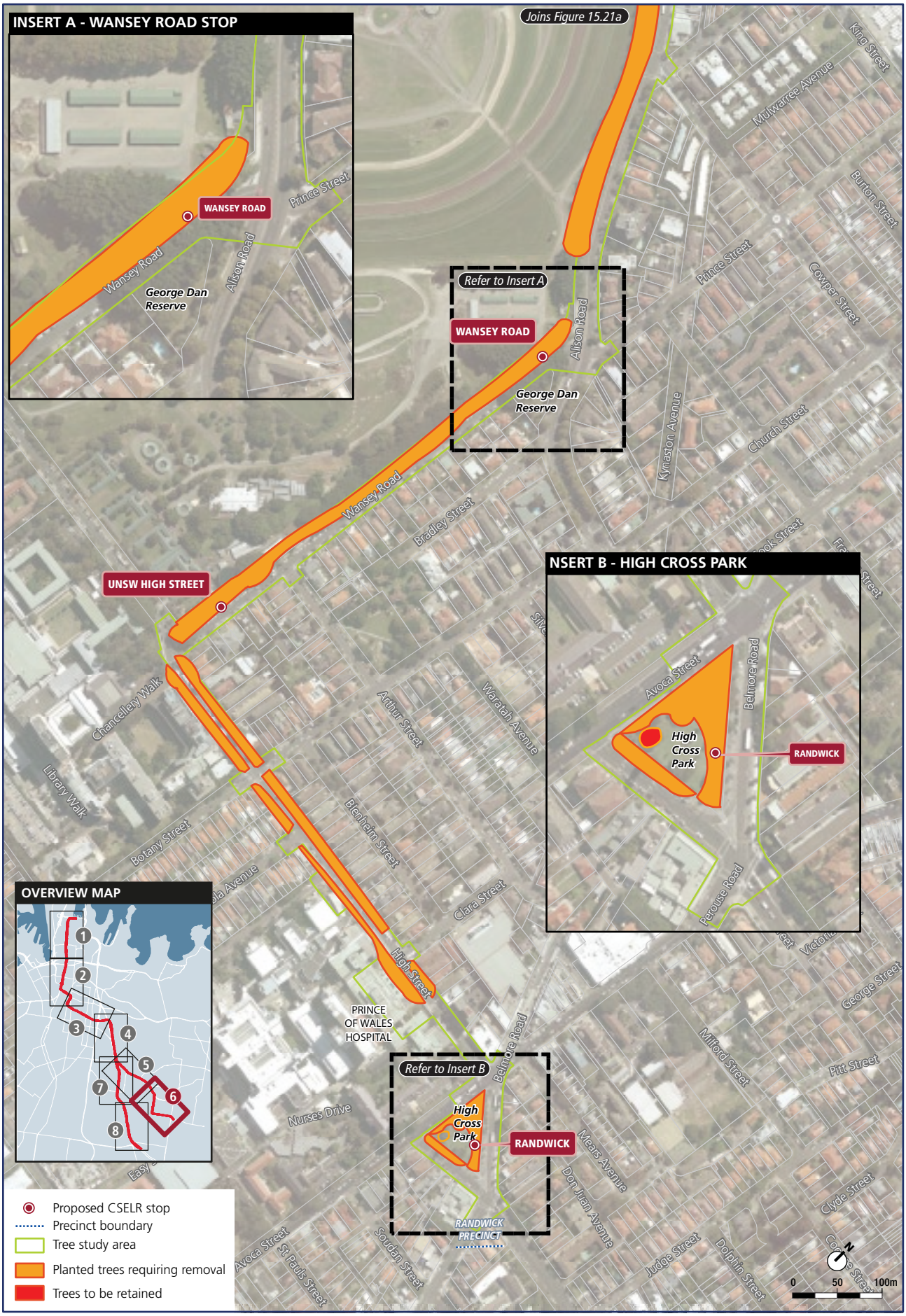
AREA	OVERVIEW OF PLANTED TREES
Alison Road	Alison Road contains approximately 125 trees within the tree study area, which typically comprise mature Hills Weeping Figs and Plane Trees adjacent to Royal Randwick racecourse; amenity plantings of juvenile Norfolk Island Pines and shrubs along the car park entrance to Alison Road; and a large Live Oak tree adjacent to the busway crossing of Alison Road, opposite the Doncaster Avenue intersection. The mature Hills Weeping Figs and Plane Trees are located on racecourse land; however, the broad canopies of the majority of these trees overhang Alison Road, providing clearances as low as four metres in some locations. The trees are in good condition; although many of the trees display modified structures and forms as a result of previous pruning activities. The Fig trees provide a substantial contribution to visual amenity of the racecourse, and screening of Alison Road from within the racecourse. They also act to define the boundary of the racecourse site. As discussed in section 15.8.2, a number of the trees located within the Royal Randwick racecourse site are listed on Randwick City Council's (2007) *Register of Significant Trees*, which include: • Group A: High Street boundary, south-eastern slope and eastern flat grassed area (four Woody Pears and one Bangalay) • Group H: Eastern boundary adjoining Wansey Road including north-east corner (20 Moreton Bay Figs, nine Hills Weeping Figs). The large Live Oak adjacent to the busway is in good health and condition, displaying a well formed structure, and is a dominant landmark tree within the locality.
Wansey Road	Wansey Road contains approximately 110 trees within the tree study area, which typically comprise Moreton Bay Figs (within the Royal Randwick racecourse site) and Hills Figs (within George Dan Reserve). The Fig trees located within Royal Randwick racecourse site are generally in good condition, displaying characteristics typical of aging figs; although, many of the trees display modified structures and forms as a result of previous pruning activities. The bases of the Fig trees are located below the level of Wansey Road, close to an existing embankment wall. As a result, a number of large branches are located at a similar height as the existing footpath which extends along the western side of Wansey Road. A number of the Fig trees also overhang Wansey Road and, due to the difference in ground levels between Wansey Road and the racecourse site, large tree branches have limited clearances (as low as three metres in some areas). The Fig trees provide a substantial contribution to visual amenity of the racecourse and adjacent residential properties on the eastern side of Wansey Road. There are also a number of large mature Figs located on the eastern side of Wansey Road, within George Dan Reserve. These Figs are in good condition, displaying characteristics typical of aging Figs; although, many of the trees display modified structures and forms as a result of previous pruning activities. George Dan Reserve also contains five Washington Palms and nine Canary date palms, which are listed on Randwick City Council's (2007) *Register of Significant Trees* (as discussed in section 15.8.2).
High Street	High Street contains approximately 60 trees within the tree study area, which typically comprise mature evergreen Brush Boxes, deciduous Plane Trees and semi-mature Bottle Brushes. The mature trees are considered to be in good condition, displaying healthy crowns typical of their species. A number of private properties fronting onto High Street also contain large mature trees, such as behind the bus stop outside UNSW and adjacent areas of the UNSW site. These trees also contribute to the visual amenity of the public domain along High Street.
High Cross Park	High Cross Park contains approximately 55 trees, which comprise a diversity of mature trees, including Cook Pines, Eucalypt species, Paperbarks, Figs, Norfolk Island Pines, and street tree plantings of semi-mature Chinese Tallow. Overall, the condition of these trees typically ranges from fair to good, with trees displaying good health and vigour. As discussed in section 15.8.2, the five Cook Pines, Moreton Bay Fig, and Port Jackson Fig within High Cross Park are listed on Randwick City Council's (2007) *Register of Significant Trees.*
Randwick stabling facility site	The Randwick stabling facility site contains approximately 50 trees within the tree study area. Dominant plantings on the site comprise evergreen Brush Boxes and scattered plantings of invasive species, such as Wild Olive and Blackberry. The condition of the brush boxes is generally considered to be good, with all trees displaying well-formed healthy crowns typical of the tree species. The Randwick stabling facility site also contains a large Moreton Bay Fig at the western end of the site. This tree is considered to be in good condition, displaying a broad, well-formed crown of healthy foliage.

Source: Based on Technical Paper 9, Volume 5

A number of the planted trees within the Randwick Precinct are listed on Randwick City Council's (2007) Significant Tree Register, and/or contribute to the significance of listed heritage items and heritage conservation areas (refer to section 15.8). A number of these trees also provide a substantial contribution to the visual character and amenity of the locality. Assessment of these trees from a heritage and visual amenity perspective is provided in sections 15.8 and 15.7, respectively.

Figure 15.21a Randwick Precinct (North) – Impacts to planted trees

Figure 15.21b Randwick Precinct (South) – Impacts to planted trees



15.6.2 Direct impacts to planted trees

Construction of the CSELR proposal would require the removal of up to approximately 280 planted trees within the Randwick Precinct, or approximately 70 per cent of the trees within the tree study area. The majority of impacted trees are located along Alison Road, Wansey Road and High Street, and would include the significant trees located adjacent to Royal Randwick racecourse and High Cross Park, as well as the large Live Oak adjacent to the busway on Alison Road (opposite the Doncaster Avenue intersection).

As discussed in Chapter 8, the following assumptions were made regarding which trees would require removal to facilitate the construction and operation of the CSELR proposal:

- *Encroachment into the tree protection zone* — Any incursion of the CSELR construction footprint (including any kerb realignments) greater than 10–20 per cent of the edge of a tree's canopy would most likely require the removal of the tree, subject to arborist advice.
- *Encroachment into the structural root zone* — Any incursion of the CSELR construction footprint (including any kerb realignments and service relocations) into the structural root zone of a tree would likely compromise the tree's structural stability and would likely require the removal of the tree.
- *Tree canopy height* — Trees with canopies that considerably encroach within one metre, or overhang, any light rail infrastructure, including overhead wiring and support systems, traffic signals and sight lines or the LRVs themselves were assumed to require removal, subject to arborist advice. While it is noted that some trees could be adequately trimmed to provide the required clearances for the operation of the CSELR proposal (and thus avoid the need to completely remove the tree), the impact that such trimming would have on the viability of the tree is currently unknown and would need to be determined by an arborist during detailed design.

The significant trees on Alison Road and adjacent to Royal Randwick racecourse would be significantly impacted by the CSELR alignment and the associated shared path, which would encroach into the structural root zone or into the tree protection zone, resulting in the removal of these trees.

The large mature Figs adjacent to Wansey Road would be directly impacted by the proposed retaining wall works. Retained trees would also likely require pruning to provide clearances for the shared path and CSELR infrastructure (e.g. overhead wires). Pruning of these trees would need to be taken on both sides of the tree (i.e. not just for branches overhanging Wansey Road) to maintain the structural integrity of the trees. Such pruning works would impact on the existing structure and form of these trees.

At High Cross Park, the CSELR proposal would result in the loss of a substantial amount of the trees within this park. This includes all of the significant trees listed on Randwick City Council's (2007) *Register of Significant Trees* within this park. Trees within High Cross Park would also be impacted by the kerb realignment to accommodate the associated bus interchange at the Randwick stop.

On High Street, the large mature trees located behind the bus stop outside UNSW would be removed to allow the bus stop to be indented into the kerb as part of the CSELR proposal.

Planted trees would be retained within George Dan Reserve, as well as along the section of the CSELR alignment which is proposed to run along the busway adjacent to Centennial Park. However, there is the potential that some of these trees may require pruning where their branches encroach on the required clearances to the CSELR overhead wires.

The Randwick stabling facility site would be configured so as to retain the large Moreton Bay Fig at the western end of the site; however, all other trees are likely to be removed.

15.6.3 Mitigation measures

Overarching environmental management measures that would be adopted for the CSELR proposal to minimise direct impacts on planted trees are described in section 12.6.3. The following additional management and mitigation measures would be implemented to further minimise impacts on planted trees within the Randwick Precinct:

- Potential opportunities to reduce the number of mature trees that would be impacted adjacent to Royal Randwick racecourse and along Wansey Road would be investigated during detailed design.
- Proposed construction methods would be reviewed to reduce the construction footprint, where feasible.
- The large mature Figs adjacent to Alison Road, Wansey Road and within George Dan Reserve would be reviewed by a suitably qualified arborist during detailed design to confirm whether these trees can be retained. This review could include root zone mapping of potentially impacted Figs to determine the likely extent of their tree roots adjacent to and beneath the road surface. Where the viability of any mature Fig tree is identified as being significantly at risk, opportunities to minimise impacts to the tree would be further investigated.
- The Randwick stabling facility site would be configured so as to retain the large Moreton Bay Fig at the western end of the site.
- Planted trees within George Dan Reserve and adjacent to the section of the CSELR alignment along the busway would be retained. Some trees would require one-off or ongoing maintenance, for example pruning of low branches that would interfere with the overhead wiring. Where pruning of trees is required, a qualified arborist would be engaged to assess the health and condition of the tree and to plan and undertake any pruning works.
- Exclusion fencing would be established around the drip lines of each tree to be retained 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 the underlying tree roots, in accordance with Australian Standard AS 4970 *Protection of Trees on Development Sites.*
- The tree impacts associated with 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. The corner of Avoca Street and Cuthill Street would remain a turf area. Two raised planter beds would also be incorporated into the new park design. New trees, located in the planter beds and turf area, would provide shade and would partly compensate for the loss of existing trees.

Where the loss of trees is unable to be mitigated through the above measures, Transport for NSW would replace trees removed as a result of the CSELR, in accordance with the Transport for NSW *'Vegetation Offset Guide'* (2013d), which includes a principle of replacing 'the amenity/visual landscape value of vegetation removed' even if the vegetation may not have significant ecological value. Trees would be replaced at a ratio of between 2:1 and 8:1, depending on the size of the tree to be removed. Selection of tree species, size and planting locations would be undertaken in close consultation with Randwick City Council and the ATC. The CSELR Landscape Strategy (refer to Appendix F) recommends the following tree species are used for replacement planting in the Randwick Precinct:

- Along Alison Road the preference would be to replace trees with the same species. However, where space is constrained by the CSELR and Fig trees may not be feasible, alternate species would be used, in consultation with Randwick City Council, the ATC and the Centennial and Moore Park Trust. This could include *Corymbia citriodora* (Lemon-scented Gum) and *Lophostemon confertus* (Brush Box), which are currently used tree species in this precinct.
- *Angophora costata* (Smooth-barked Apple), *Eucalyptus haemastoma* (Scribbly gum) and Lemon-scented Gums are proposed to be used along Wansey Road. *Lophostemon confertus* (Brush Box) is also currently used as a tree species in this precinct and could be another species option for this location.
- *Corymbia citriodora* (Lemon-scented Gum) is proposed to be used along High Street. *Lophostemon confertus* (Brush Box) is also a currently used tree species in this precinct and could be another species option along for this location.

- Within High Cross Park, the following species are proposed to be used: *Corymbia citriodora* (Lemon-scented Gum), *Lophostemon confertus* (Brush Box), *Ficus macrophylla* (Moreton Bay Fig), *Ficus rubiginosa* (Port Jackson Fig), *Tristaniopsis laurina* (Water Gum), *Agonis flexuosa* (Willow-leafed Peppermint Myrtle), *Podocarpus elatus* (Illawarra Pine) and *Araucaria heterophylla* (Norfolk Island Pine). However the use of Fig trees in this park would need to be considered with respect to the potential size of these trees once mature and the constraints of access requirements of the interchange and light rail clearances.

15.7 Visual and landscape character

The following sections provide a summary of the potential local visual and landscape impacts of the proposal within the Randwick Precinct, based on Technical Paper 10 — *Visual Impact Assessment* contained in Volume 5 of this EIS.

15.7.1 Existing landscape character and visual conditions

Tay Reserve is located at the intersection of Alison Road and Anzac Parade, at the western end of the Randwick Precinct. The Tay Reserve is a small remnant park with some mature trees.

Alison Road is a wide road corridor and lined by multi-unit residential dwellings from various periods. To the north of Alison Road is the Centennial Parklands, which is a significant historic and recreational resource for Sydney with high scenic and landscape significance. In this area Alison Road has seven lanes of traffic and a dedicated busway runs along the southern edge of Centennial Park. Away from the road corridor, there is a largely open berm on the edge of Centennial Park, delineating its boundary. From Alison Road, views to the mature trees within undulating parkland characterise this area.

Alison Road is typically flat in its topography in the vicinity of Centennial Park and the Royal Randwick racecourse. Tall street trees frame the northern edge of the road corridor, which includes fencing along its southern side and in the central median. Brick fences, entry gates and associated historic brick buildings mark the major entry points of the Royal Randwick racecourse off Alison Road.

Views into the main public entry to the racecourse feature a cluster of historic buildings, intermixed with modern structures and a grandstand beyond. In the vicinity of Anzac Parade and Cowper Street a row of large, mature Fig trees follow the curve of the racetrack, marking the boundary of the racecourse.

Along Wansey Road, the streetscape is enclosed by a double row of large mature Fig trees, located on the street and within George Dan Reserve, with overarching branches. These trees define the character and feel of this residential area. The built form in this area is predominately distinguished by Federation and Interwar dwellings overlooking the racecourse. At the eastern end of Wansey Road, opaque fencing encloses areas of stabling and associated areas of the racecourse.

As the CSELR alignment turns into High Street, the character changes from a residential setting to an institutional setting, comprising the UNSW and Randwick health precinct. As the topography of High Street rises to the ridgeline of Belmore Road, the setting retains its institutional feel and also incorporates some commercial activity.

Views towards the heritage precinct of the hospital, statue of Captain Cook and High Cross Park are prominent landscape features marking the cross roads of High Street and Belmore Road.

High Cross Park is a small civic park with a War Memorial and historic plantings. The trees within this park are visually prominent and visible along a number of vistas, including Avoca Street, the main civic centre of Randwick; High Street, which leads to the hospital and UNSW; and Coogee Road which is the main historic route to the beach. A number of historic buildings address this park including the Royal Hotel, a National Trust property built in 1887, and the former Destitute Children's Asylum, built in 1856 fronting Avoca Street.

15.7.2 Visual sensitivity

The Randwick Precinct is influenced by the metropolitan open space of Centennial Park and the racecourse and the grand mature avenue of Figs along its perimeter, its institutional setting, and a Victorian era local park. A summary of visual sensitivity for the main viewing areas across the study area is provided below:

- Centennial Park is an historic parkland set out in the Victorian period tradition of high scenic and landscape significance. This park includes formal gardens, ponds, grand avenues, statues, historic buildings and sporting fields. This parkland is iconic to the region, and is considered to be of regional sensitivity.
- Royal Randwick racecourse forms one of the largest areas of open space in Sydney (together with Moore Park and Centennial Park). Its landscape and built features are considered to be of regional sensitivity as this racecourse is iconic to the region. The racecourse is metropolitan Sydney's oldest and longest continually operating racecourse and a place of State heritage significance.
- Port Jackson and Moreton Bay Figs at Royal Randwick racecourse on Alison Road, the George Dan Reserve and Wansey roads, create an avenue of planting which are identified on Randwick City Council's (2007) *Register of Significant Trees* and are considered to be of regional sensitivity. The Figs contribute to the significance of the racecourse as a landscape element and provide amenity to the adjoining streets.
- High Street from UNSW to the Prince of Wales Hospital is part of the institutional setting of Randwick and is considered to be of regional sensitivity. The modern character of the University contrasts with the layering of buildings typologies in the health campus, with sandstone featuring prominently in its oldest buildings.
- High Cross Park is one of Randwick's community gathering spaces, providing an important part of the cross-roads character of the Randwick Precinct. The mature trees within the park are rare and culturally important and are both listed on the Randwick City Council (2007) *Register of Significant Trees.* They also provide an important visual landmark for the area, as is the park's visual connection with the Captain Cook statue and war memorial. Predominately owing to the importance of the existing trees (Cook Pines), this park is considered to be of regional sensitivity.

These sensitivity levels have been applied throughout the visual impact assessment for the Randwick Precinct.

15.7.3 Landscape character areas

The landscape character areas assessed within the Randwick Precinct are shown on Figure 15.22. The impact of the CSELR proposal on these landscape characters is summarised in section 15.7.5 and section 15.7.6.

15.7.4 Representative viewpoints

The viewpoints which were selected as representative of the range of views to the CSELR proposal within the Randwick Precinct are shown in Figure 15.23. The impact of the proposal on these viewpoints is summarised in section 15.7.5 and section 15.7.6.

Figure 15.22 Randwick Precinct – Key landscape character areas

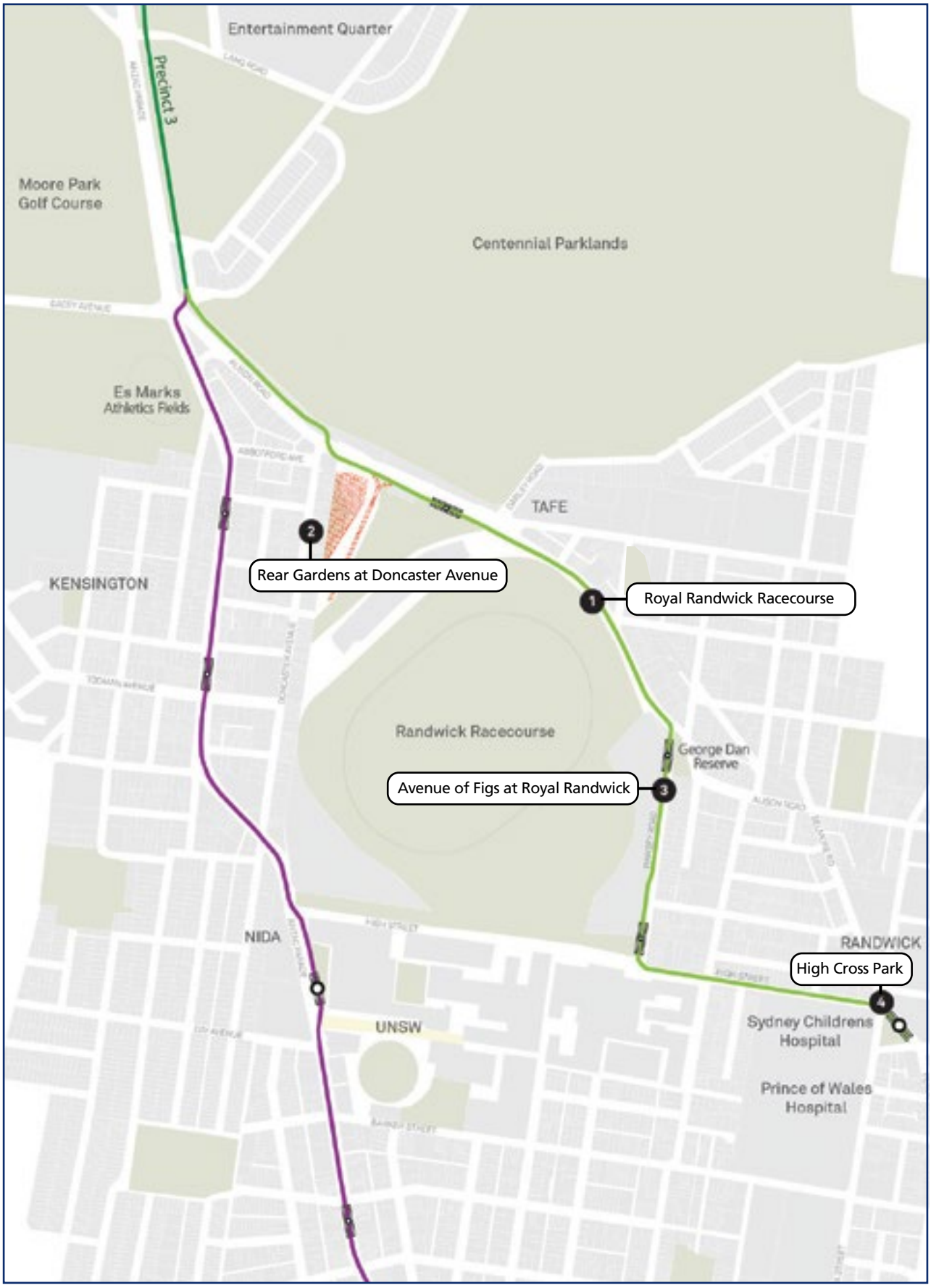
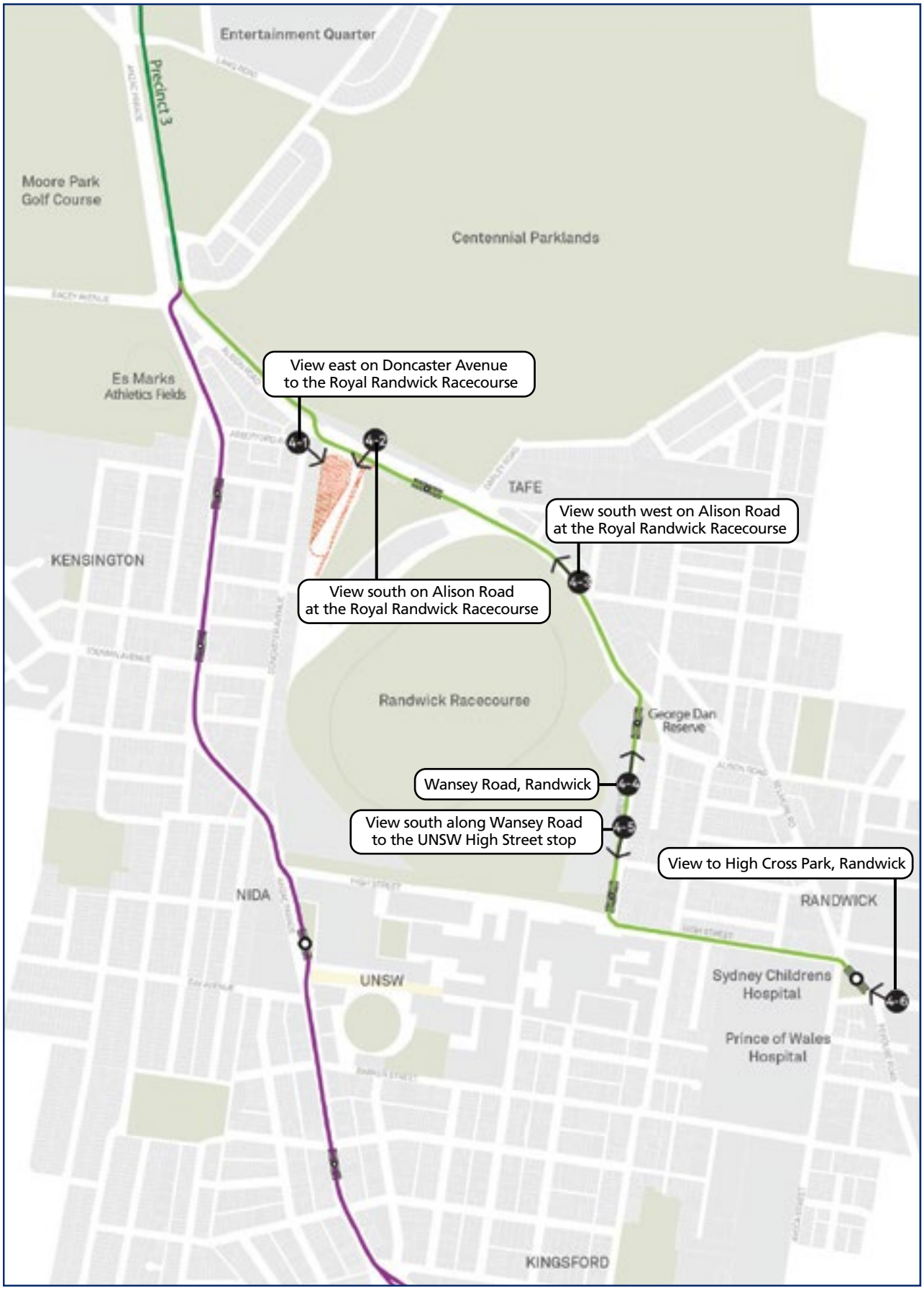


Figure 15.23 Randwick Precinct – Key viewpoints



15.7.5 Impacts during operation

The key visual impacts during operation of the CSELR within the Randwick Precinct would generally include the proposed stops and light rail infrastructure design, including:

- introduction of light rail tracks within the road surface along the length of the CSELR alignment
- overhead wiring along the length of the CSELR alignment
- removal of street trees along Alison Road, Wansey Road and High Street
- changes to the visual landscape character of High Cross Park due to the removal of trees, grass and creation of a transport interchange facility.

Assessment of landscape impacts (daytime)

The most significant landscape impacts during operation of the CSELR proposal would occur at the Royal Randwick racecourse and Wansey Road as a result of the removal of a number of significant mature Fig trees, and at High Cross Park due to the loss of a substantial portion of the park to provide a transport interchange.

A summary of the potential landscape impacts of the CSELR proposal in the Randwick Precinct during operation is provided in Table 15.24.

Table 15.24 Randwick Precinct – Assessment of landscape impacts (operation)

LANDSCAPE CHARACTER (REFER FIGURE 15.22)	POTENTIAL IMPACT	ASSESSMENT OF IMPACT
1. Royal Randwick racecourse	High adverse landscape impact	• During operation there would be open views to the stabling facility, ancillary buildings and car park owing to the loss of mature trees. These trees would be replaced in accordance with the Transport for NSW *'Vegetation Offset Guide'* (2013d) in suitable nearby locations in the form of buffer planting around the perimeter of the site. • The loss of trees of 'exceptional significance' (Randwick DCP, 2013), would result in a substantial loss of a treed internal streetscape and the visual connection to the landscape of the racecourse would be lost on this site.
2. Rear Gardens at Doncaster Avenue	Minor adverse landscape impact	• During operation, the introduction of potential noise mitigation at the Randwick stabling facility (such as a potential acoustic shed or a noise attenuation wall within the western boundary of the site and oriented along the western boundary of the site) may cause overshadowing to adjacent properties and land uses. • If developed as part of the proposal, long shadows would be created by this potential acoustic shed or noise attenuating wall, which would block morning sun to a number of rear gardens to properties on Doncaster Street. This overshadowing is not likely to directly impact on the living spaces of these homes; however, the reduction in solar access would change the landscape character and landscape function of these back gardens.
3. Fig trees at Royal Randwick racecourse along Alison and Wansey Roads	High adverse landscape impact	• During operation there would be open views to the racecourse, but due to width restrictions there would not be any trees provided along Alison Road or Wansey Road reserve to replace those removed. These trees would be replaced in accordance with the Transport for NSW *'Vegetation Offset Guide'* (2013d) in nearby suitable locations. • The loss of trees of 'exceptional significance' (Randwick DCP, 2013), would result in a substantial loss of street tree cover.

Table 15.24 cont.

LANDSCAPE CHARACTER (REFER FIGURE 15.22)	POTENTIAL IMPACT	ASSESSMENT OF IMPACT
4. High Cross Park	High adverse landscape impact	• During operation, High Cross Park would be substantially reduced in size. • The proposed interchange at the Randwick stop would alter the character and types of uses that are suitable for this location. Due to the local landform, the installation of the two stop platforms would also require a number of ramps and handrails to maintain accessibility. • There may be some adverse impacts on the Belmore Road entry to the park as well as additional clutter. • The remaining parkland area would be revitalised with improvements including new tree planting, a public plaza and new landscaping. • The park's landmark status (which result from the existing significant trees; which would be removed for construction), would take a considerable time to be restored. • A substation would be positioned within the park, surrounded by a shade structure, on the Cuthill Street frontage.

Source: *Based on Technical Paper 10 – Visual and Landscape Assessment, Volume 5*

Assessment of representative viewpoints (daytime)

The CSELR proposal would introduce a series of new infrastructure elements to the Randwick Precinct including catenary structures, overhead wires and LRVs. These elements, combined with the removal of some trees along Alison Road, Wansey Road and within High Cross Park would have some visual prominence within the Randwick Precinct and would impact on some of the existing views within this area, including negative impacts on the view to some public spaces such as High Cross Park.

A summary of the potential daytime visual impacts of the CSELR proposal on representative viewpoints in the Randwick Precinct is provided in Table 15.25.

Table 15.25 Randwick Precinct – Assessment of representative viewpoints (operation)

VIEWPOINT (REFER FIGURE 15.23)	POTENTIAL IMPACT	ASSESSMENT OF IMPACT
View east on Doncaster Avenue to the Royal Randwick racecourse (View 4-1)	High adverse visual impact	• In this location, the stabling facility would be sited at the rear of the residential dwellings. • A number of trees and existing buildings would have been removed to accommodate the stabling facility, ancillary buildings and car parking. • These elements may be largely screened by the potential acoustic shed or noise attenuation wall on the western site boundaries (if considered to be the preferred mitigation measure). The removal of trees would however open up views into the site and the access road and catenary structure and overhead wiring would be prominent in this view.
View south on Alison Road, at the Royal Randwick racecourse (View 4-2)	High adverse visual impact	• The CSELR would run along the southern edge of Alison Road with catenary structures and wires overhead. • In this area Alison Road would be reduced from six lanes to four. The landscaping treatment on the southern edge which would be removed to accommodate the CSELR would not be replaced, due to width restrictions, and therefore no trees would be seen in this view. • LRVs would be seen moving through this view with the stabling facility in the foreground. This would include the service road, light rail maintenance shed, and LRV storage yard which would be visible with limited screening along Alison Road. • The entrance to the Royal Randwick racecourse would be alongside the LRV entrance to the stabling facility, creating a large opening with limited opportunities for landscaping. The combination of the road corridor, light rail infrastructure and stabling facility would introduce additional visual clutter at street level.

Table 15.25 cont.

VIEWPOINT (REFER FIGURE 15.23)	POTENTIAL IMPACT	ASSESSMENT OF IMPACT
View north west on Alison Road, at the Royal Randwick racecourse (View 4-3)	High adverse visual impact	• The CSELR would run along the southern edge of Alison Road (in the vicinity of the existing footpath) with catenary structures and wires overhead. • In this area Alison Road would be reduced from six lanes to four. The row of Fig trees (of exceptional significance) which would be removed to accommodate the CSELR would not be replaced, due to width restrictions, and therefore no trees would be seen in this view. • LRVs would be seen moving through this view in the middle ground and would be visually prominent due their length and scale. The road corridor would become more visually dominant in the view, as the proposed light rail infrastructure merges visually with the road corridor.
Wansey Road, Randwick (View 4-4)	Moderate adverse visual impact	• The light rail track would run parallel to the western side of Wansey Road with catenary structures and wires overhead at this point. Some replacement street trees would be in accordance with the Transport for NSW *'Vegetation Offset Guide'* (2013d): however, this would not restore the character of the vegetation lost at the western end of Wansey Road and within the racecourse grounds during construction. This view would open up to the racecourse to the west. • Along Wansey Road, stop infrastructure, including a single canopy roof structure and platforms, would terminate the existing view with the canopy of trees forming a less prominent background element. With the introduction of elements such as the stop canopy, platform, overhead wires and roadside barriers, there would be additional visual clutter at street level. • LRVs would be seen moving through this view, approaching and departing as well as stationary at the stop. LRVs would be visually prominent due their length, scale and design.
View south along Wansey Road to the UNSW High Street stop (View 4-5)	Moderate adverse visual impact	• The CSELR would be seen along the western edge of the racecourse and the UNSW stop with platform structures and associated elements introduced centrally in the foreground of the view, creating visual clutter at street level. • This view would change considerably as the trees along the western boundary of Wansey Road, which define and visually enclose local views from the racecourse, are removed to accommodate the site corridor and stop works. • LRVs would have a visual envelope extending for up to 45 metres, and would be visually prominent due their length and scale. • The new shared pedestrian and cycleway would encroach onto the racecourse grounds and result in the loss of a number of existing mature street trees, and the large Fig tree at the corner of Wansey Road and High Street. The loss of a mature Fig at the eastern end of Wansey Road would open views to the massing of the institutional buildings at the University.
View to High Cross Park, Randwick (View 4-6)	High adverse visual impact	• The location of the Randwick stop would result in the loss of approximately 16 trees, within High Cross Park. • The use of High Cross Park for the light rail interchange (Randwick stop) would change the character of the park considerably from a Victorian era park to a contemporary styled transport interchange plaza and park (refer to Figure 15.24) resulting in this viewpoint becoming more open and visually prominent from the surrounding area. • LRVs would have a visual envelope extending for up to 45 metres, and would be visually prominent due to their length and scale, resulting in a considerable reduction in amenity of views to and from the park.

Source: *Based on Technical Paper 10 – Visual and Landscape Assessment, Volume 5*

Assessment of night-time visual impacts

During operation, there would be lighting at each of the light rail stops within the precinct and headlights on the LRVs following the alignment. Where the LRVs run parallel to the existing roadway (such as along Alison Road or Wansey Road), the headlights of the LRVs would run parallel to the roadway, and not directly into adjacent properties like the Royal Randwick racecourse site or residential properties along Wansey Road. Where the LRVs would run centrally along High Street and then towards the park, there should not be any direct light spill on adjacent residential properties. However, there would be some light spill on High Cross Park and potentially on surrounding residential properties on the northern side of Belmore Road as the LRVs turn from High Street into the stop area.

There may also be some direct light spill into the buildings on the corner of Cuthill and Belmore Road as LRVs are stopped at the Randwick stop. This stop, however, is located on a busy intersection and there are currently car headlights using the same intersections, and causing similar visual impacts.

It is possible that there would be some additional skyglow (the illumination of the night sky or parts of it, typically as a result of artificial light) visible above the CSELR alignment as a result of lighting required for the proposal. Generally, the proposed light rail elements would not create a noticeable change in amenity towards the north-western end of the precinct (aligning with Alison Road) due to the potential for direct headlight intrusion onto private sites. However, the proposed light rail infrastructure would create a noticeable reduction in the amenity towards the central and south-eastern portion of the precinct due to tree loss. This would, however, result in a negligible visual impact given the area is already of high district brightness.

Figure 15.24 Indicative view looking west towards Randwick stop at High Cross Park

15.7.6 Impacts during construction

Construction of the CSELR proposal in the Randwick Precinct would require works including utility relocations, intersection modifications, track slab construction and other systems works (installation of wiring etc.). As part of the works, some sections of streets and footpaths would be closed to pedestrians and general traffic (refer to section 15.3). Civil and systems works would include construction of the track slab and rail installation. Track construction would occur in linear sections between intersecting streets, with the intersections constructed separately during weekends or week nights.

Each section would be established as a site with traffic lanes diverted, temporary hoardings and barriers. During this time, construction equipment such as slip track machinery, cherry pickers, mobile cranes and trucks would be seen within the precinct. A series of construction compounds would also be located within the Randwick Precinct including within High Cross Park, UNSW, and the proposed Randwick stabling facility. Further detail regarding the proposed construction of the CSELR proposal is provided in Chapter 6.

Assessment of landscape impacts (daytime)

During construction there would be moderate to high adverse landscape and visual impacts at the Centennial Parklands, High Cross Park and the Royal Randwick racecourse along Alison Road and Wansey Road. Impacts would primarily be derived from tree loss and the scale of the works.

A summary of the potential landscape impacts of the CSELR proposal in the Randwick Precinct during construction is provided in Table 15.26.

Table 15.26 Randwick Precinct – Assessment of landscape impacts (construction)

LANDSCAPE CHARACTER (REFER FIGURE 15.22)	POTENTIAL IMPACT	ASSESSMENT OF IMPACT
1. Royal Randwick racecourse	High adverse landscape impact	• The north-western portion of the racecourse currently comprises the services precinct which includes a number of heritage buildings and trees of exceptional and high significance. • It is proposed that this area would be used for construction and would accommodate parking and laydown facilities as well as other construction activities. • Some trees would be removed to accommodate the stabling facility. This includes many which have been identified as having exceptional and high significance; these trees form a distinctive broad arc, remnant of a previous landscape design for the site. Although not in a publicly accessible area, these trees contribute to the character and amenity of the area due to their size and layout.
2. Rear Gardens at Doncaster Avenue	Minor adverse landscape impact	• The construction of the Randwick stabling facility and specifically (if selected as a feasible mitigation measure) the potential acoustic shed or noise wall on the western site boundary would be seen from the adjacent gardens at the residences on Doncaster Avenue. The works may result in some overshadowing as work occurs adjacent to the site and the potential acoustic shed or noise wall are erected. This work would result in a considerable change to the amenity of these gardens, which are of neighbourhood sensitivity.
3. Fig trees at Royal Randwick racecourse along Alison and Wansey Roads	High adverse landscape impact	• The perimeter of the racecourse along Alison Road and Wansey Road would be used for construction of the light rail track, necessitating the removal of approximately 85 trees along Alison Road (from Doncaster Avenue to Wansey Road) and a number of trees fronting Wansey Road.
4. High Cross Park	High adverse landscape impact	• High Cross Park would be directly impacted to accommodate the Randwick stop. A number of trees within the park, including significant Cook Pines and Figs, would be removed. • The impacted areas of the park would be enclosed by chain wire security fencing, and access to the open space would be limited.

Source: Based on Technical Paper 10 – Visual and Landscape Assessment, Volume 5

Assessment of representative viewpoints (daytime)

During construction, the CSELR proposal would generally result in a high adverse impact to existing viewpoints within the Randwick Precinct, associated with removal of existing trees, the creation of worksites surrounded by hoardings, and the channelling of views along streets and footpaths which would block existing views to open spaces, and the general movement of plant and equipment which would intermittently impact existing views.

A summary of the potential daytime visual impacts on representative viewpoints of the CSELR proposal in the Randwick Precinct during construction is provided in Table 15.27.

Table 15.27 Randwick Precinct – Assessment of representative viewpoints (construction)

VIEWPOINT (REFER FIGURE 15.23)	POTENTIAL IMPACT	ASSESSMENT OF IMPACT
View east on Doncaster Avenue to the Royal Randwick racecourse (View 4-1)	High adverse visual impact	• This view would change considerably owing to the removal of the majority of mature trees forming part of the avenue, which acts as a gateway feature. • This vegetation would be replaced with a site compound and substation. The removal of vegetation and its associated gateway role would signify the change in use of the site from a racecourse servicing area to light rail stabling and would change the character of this view. • Although the visual catchment of this particular view would be less than that from Alison Road, views from the residential properties immediately adjacent to the racecourse on Doncaster Avenue would also be impacted.
View south on Alison Road, at the Royal Randwick racecourse (View 4-2)	High adverse visual impact	• This view towards Royal Randwick racecourse would change considerably owing to the removal of the street edge landscape and tree avenue at the Doncaster Avenue entrance to accommodate the CSELR alignment and stabling facility. • The view would be focused on the worksite for both the CSELR alignment and the stabling facility, which would be established directly adjacent to the road, adding visual clutter to views to the racecourse beyond.
View north west on Alison Road, at the Royal Randwick racecourse (View 4-3)	High adverse visual impact	• This view would change considerably as the grouping of mature Fig trees (of exceptional significance) which define and frame views to the racecourse are removed to accommodate the site works. • The view would be focused on the worksite which would be established directly adjacent to the road, and move progressively along the length of Alison Road, adding visual clutter to views to the racecourse beyond. This view would become more open and exposed, with the loss of the trees, changing the character of this view substantially.
Wansey Road, Randwick (View 4-4)	High adverse visual impact	• This view would change considerably as the trees which define and frame views to the racecourse are removed along the western boundary of Wansey Road to accommodate the site works. • The view would be focused on a worksite which would be established directly adjacent to the road, and extend progressively along the length of the road. • Additional construction traffic would also be seen using the street to access the worksites, thereby having a visual effect.
View south along Wansey Road to the UNSW High Street stop (View 4-5)	High adverse visual impact	• This view would change considerably as the trees, along the western boundary of Wansey Road, which define and visually enclose local views from the racecourse, are removed to accommodate the site corridor and stop works. • This view would focus on the stop site which would be established directly adjacent to the road, with corridor works extending progressively across the view.
View to High Cross Park, Randwick (View 4-6)	High adverse visual impact	• During construction this view would change considerably as the site would be transformed into a worksite. Views to the park and surrounding historic buildings would be somewhat obscured by security fencing. • The significant Cook Pines and Figs would be removed. The landmark function of these trees would be lost.

Source: Based on Technical Paper 10– Visual and Landscape Assessment, Volume 5

Assessment of night-time visual impacts

During construction there may be times when there would be 24-hour use of the construction sites, particularly at High Cross Park. At these times the sites would include brightly lit areas providing a safe work environment for construction activities. Headlights from construction related traffic would also be visible, including trucks accessing the sites. It is expected that lighting on the sites would be brighter than the current traffic and street lighting, which would have a noticeable visual effect. However any additional skyglow would be managed by cut-off light fittings and directed lights for the construction tasks.

The loss of the tree cover within parts of the Randwick Precinct would allow existing lighting to be seen more widely. Additional construction traffic that may be seen during night-time works would be visually prominent. The additional light during night works would not be compatible with the existing night scene in some areas of the Randwick Precinct. There would be a considerable reduction in the amenity of the areas of medium district brightness, which would result in a moderate adverse visual impact for these residential areas during evening hours.

Views across the Royal Randwick racecourse would be more prominent from this location as the intervening vegetation is removed. During events it is considered that the combination of the construction works and additional exposure to the racecourse would create a considerable reduction in the amenity of adjacent areas. This would result in a minor to moderate adverse visual impact.

Adjacent to the hospital and university, where night-time activity occurs, the additional lit activity of construction would add to the illumination of the night scene. However, this additional light would generally be compatible with the existing active night scene. These elements would not create a noticeable reduction in the amenity of the areas of high district brightness and would result in a negligible visual impact for this area during evening hours.

15.7.7 Management and mitigation

A series of mitigation measures have been designed to mitigate the potential visual and amenity impacts of the CSELR proposal during construction and operation. Mitigation measures for the Randwick Precinct are presented in Table 15.28 and Table 15.29.

General mitigation measures for the whole of the CSELR proposal are also provided in section 12.7.7 of this EIS.

Table 15.28 Randwick Precinct – Visual and landscape mitigation measures (operation)

MITIGATION MEASURES	APPLICABLE LOCATIONS
• Reinstate planting, where removed for construction purposes, on the periphery of Centennial Park in accordance with the Centennial Parklands Conservation Management Plan.	Centennial Park
• Replace the impacted row of Fig trees of 'exceptional significance' on Alison Road with semi-mature Fig trees as appropriate in consultation with the ATC and in accordance with the Transport for NSW 'Vegetation Offset Guide' (2013d) and in suitable locations.	Figs at Randwick racecourse on Alison Road and Wansey Road
• Detailed design would consider opportunities for siting mature Fig trees within the racecourse grounds in the vicinity of the intersection of Wansey Road and Alison Road, and in the Wansey Road nature strip (between Arthur and High streets) to recreate the canopy of the lost street trees on the western side of Wansey Road in consultation with the ATC.	Figs at Randwick racecourse on Alison Road and Wansey Road
• Detailed design would consider the opportunity for a central pole catenary system as the alignment diverts from north to south to minimise visual impacts.	Alison Road to Wansey Road
• Revitalise High Cross Park with new tree planting, plaza and landscaping, including a semi-mature Fig and Pine trees to replace those lost at the corner of Avoca Street and Belmore Road in consultation with Randwick City Council.	High Cross Park
• Detailed design would consider opportunities to incorporate the High Cross Park substation into other uses such as seating and shade structures or built development, to reduce its visual prominence, in consultation with Randwick City Council.	High Cross Park

Table 15.28 cont.

MITIGATION MEASURES	APPLICABLE LOCATIONS
• Where possible any areas of direct light intrusion (glare and spill) from LRV headlights would be identified and managed	At The Royal Randwick Racecourse, Wansley Road, UNSW, corner of Belmore Road and Avoca Street, corner of Belmore Road and Cuthill Street, and other locations where the alignment bends
• At stops and stabling areas, cut off and directed light fittings (or similar techniques) would be used to minimise glare and light spill onto private property	Royal Randwick Racecourse stop, Wansey Road stop, UNSW High Street stop, High Cross Park stop, and Randwick Stabling Yard
• Ongoing consultation with Randwick City Council and other relevant stakeholders would continue to be undertaken throughout the detailed design phase to identify opportunities for revitalisation of existing public spaces and the public domain and to determine the most appropriate form or revitalisation for these areas.	All public open spaces

Source: *Based on Technical Paper 10 – Visual and Landscape Assessment, Volume 5*

Table 15.29 Randwick Precinct – Visual and landscape mitigation measures (construction)

MITIGATION MEASURES	APPLICABLE LOCATIONS
• Consolidate site equipment and facilities within one location to maximise the area of useable public green space, and maintaining pedestrian permeability.	Centennial Park
• Hoardings to be designed to visually recede into the open space setting. Use hoarding treatment (colours and or materials) that complement the green parkland surroundings.	Centennial Park
• Detailed design would identify opportunities for an artistic approach to treatment of the site hoarding and enclosure, in collaboration with the Randwick City Council.	Royal Randwick racecourse and UNSW Randwick
• Works would be timed to avoid special events (such as Anzac Day) given the significance of the war memorial.	High Cross Park
• Detailed design would consider opportunities for an artistic approach to treatment of the site hoarding and enclosure, in collaboration with Randwick City Council.	High Cross Park

Source: *Based on Technical Paper 10 – Visual and Landscape Assessment, Volume 5*

15.8 Built and non-Indigenous heritage

A detailed historic heritage impact assessment for the CSELR proposal was undertaken by Godden Mackay Logan. A comprehensive technical report is available as Technical Paper 5 — *Heritage Impact Assessment* in Volume 4. A summary of the assessment is provided in the following sections.

15.8.1 Existing conditions

Heritage context and significance

The Randwick Precinct comprises a mix of residential and commercial development punctuated by substantial public institutions and recreation grounds dating from the mid-19th Century. These include the Royal Randwick racecourse (initially established on the site in 1832, then formally in 1858), the Prince of Wales Hospital, High Street (established in 1852 as the Randwick Destitute Children's Asylum, then as a hospital in 1915), and the southern portion of Centennial Park.

Three of the former asylum buildings within the Prince of Wales Hospital grounds face Avoca Street and their sandstone facades contribute to the character of this part of Randwick. Opposite the hospital is High Cross Park, a heritage item that features a cenotaph and a number of significant trees.

Much of Randwick did not see intense development until the late 19th Century and early 20th Century. The listed heritage items located within the precinct reflect these key periods of development and include Victorian, Edwardian, Federation and interwar houses and interwar apartments, as well as 19th Century corner hotels (the Royal Hotel on St Pauls Road and the former Star and Garter Inn at 141–143 Belmore Road). The precinct is also characterised by areas of mature street trees, many of which are listed on the Randwick City Council's (2007) *Significant Tree Register* and include palms, figs and pines.

Further discussion on the heritage context and significance of the Randwick Precinct is provided in Technical Paper 5.

Listed heritage items

A total of 26 heritage listed items were identified within, or immediately adjacent to, the proposed CSELR corridor within the Randwick Precinct; however, only eight of these items would have the potential to be directly affected by the CSELR proposal. A summary of the heritage-listed items within or immediately adjacent to the proposed CSELR corridor is provided in Table 15.30, while the locations of these items are shown in Figure 15.25a and Figure 15.25b.

Table 15.30 Summary of historic heritage-listed items within or immediately adjacent to the proposed CSELR corridor – Randwick Precinct

ITEM	LISTING[1]	LEVEL OF SIGNIFICANCE	POTENTIAL TO BE DIRECTLY IMPACTED?
Centennial Park, Moore Park, Queens Park	SHR	State	Yes
Corana and Hygeia	SHR	State	Yes
'The Legers', Federation dwelling	RLEP 2012	Local	No
Two-storey Federation duplex	RLEP 2012	Local	No
Members' Stand/Official Stand, Royal Randwick racecourse	RLEP 2012	Local	No
'Shahzada', Victorian house	RLEP 2012	Local	No
Part of Normanhurst boundary wall (adjacent to former tramway reservation)	RLEP 2012	Local	No
Royal Randwick racecourse Significant Trees: • Group A: High Street boundary, south-eastern slop and eastern flat grassed area (four Woody Pears and one Bangalay). • Group H: Eastern boundary adjoining Wansey Road including north-east corner (20 Moreton Bay Figs, nine Hills Weeping Figs)	RCCRST 2008	Local	Yes
George Dan Reserve (five Washington Palms, nine Canary date palms)	RCCRST 2008	Local	Yes

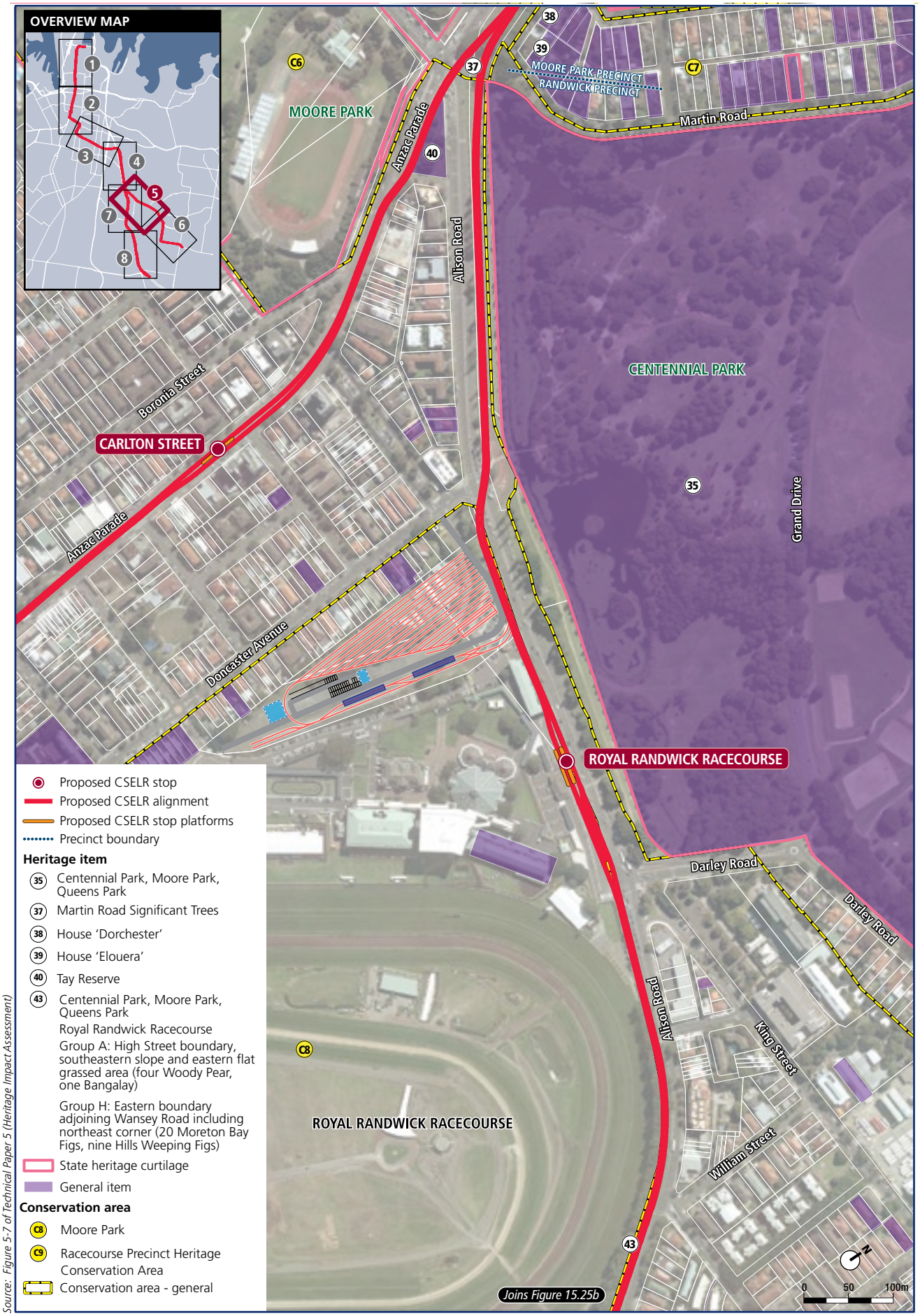
Table 15.30 cont.

ITEM	LISTING[1]	LEVEL OF SIGNIFICANCE	POTENTIAL TO BE DIRECTLY IMPACTED?
Pepperberry tree (located at rear of private property)	RCCRST 2008	Local	No
UNSW Significant Trees: • Group D: High Street boundary, lower campus (22 Hill's Weeping Figs, four Moreton Bay Figs) • Group E: High Street boundary, upper campus (three Moreton Bay Figs, one Cork Oak)	RCCRST 2008	Local	No
Semi-detached pair	RLEP 2012	Local	Yes
Prince of Wales Hospital group	RLEP 2012	Local	Yes
Prince of Wales Hospital gates and fence	RLEP 2012	Local	No
The Star and Garter Inn	RLEP 2012	Local	No
Statue of Captain James Cook	RLEP 2012	Local	No
High Cross Reserve	RLEP 2012	Local	Yes
High Cross Reserve (five Cook Pines, one Moreton Bay Fig, one Port Jackson Fig)	RCCRST 2008	Local	Yes
Essex, Victorian house	RLEP 2012	Local	No
Edith, Victorian house	RLEP 2012	Local	No
Royal Hotel	RLEP 2012	Local	No
'Gower Galtees', Art Deco residential flat building	RLEP 2012	Local	No
Edwardian residence	RLEP 2012	Local	No
Pair of cottages	RLEP 2012	Local	No
Sandstone boundary wall to Daintrey Crescent, gardens and landscape associated with 'Aeolia', Brigidine Convent and Chapel	RLEP 2012	Local	No
Coogee Bay Road retaining walls	RLEP 2012	Local	No

Source: *Adapted from Tables 5.10 and 5.12 of Technical Paper 5 – Heritage Impact Assessment, Volume 4*

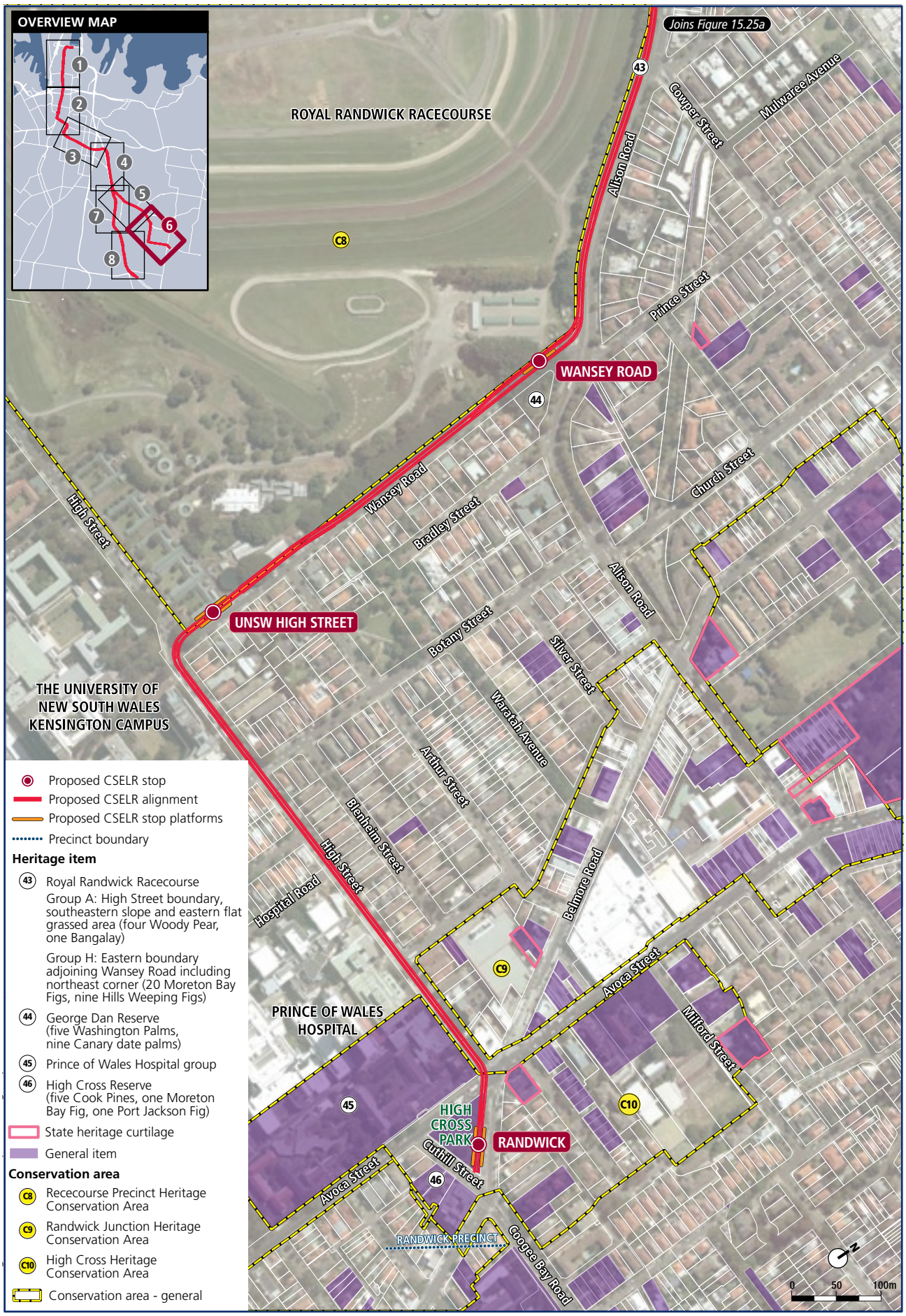
Note 1: *SHR = State Heritage Register; RLEP 2012 = Randwick Local Environmental Plan 2012; RCCRST 2008 = Randwick City Council Register of Significant Trees 2008.*

Figure 15.25a Randwick Precinct (North) – Existing built and non-Indigenous heritage items



Source: Figure 5-7 of Technical Paper 5 (Heritage Impact Assessment)

Figure 15.25b Randwick Precinct (South) – Existing built and non-Indigenous heritage items



Heritage conservation areas

The proposed CSELR corridor would either traverse, or be located immediately adjacent to, a total of five listed heritage conservation areas; however, only three of these conservation areas would have the potential to be directly affected by the CSELR proposal. A summary of the listed heritage conservation areas within the Randwick Precinct is provided in Table 15.31, while the location and extent of these areas is shown in Figure 15.25a and Figure 15.25b.

Table 15.31 Summary of listed heritage conservation areas traversed by, or located immediately adjacent to, the proposed CSELR corridor – Randwick Precinct

ITEM	LISTING[1]	LEVEL OF SIGNIFICANCE	POTENTIAL TO BE DIRECTLY IMPACTED?
North Randwick Heritage Conservation Area	RLEP 2012	Local	No
Racecourse Precinct Heritage Conservation Area	RLEP 2012	Local	Yes
Randwick Junction Heritage Conservation Area	RLEP 2012	Local	Yes
High Cross Heritage Conservation Area	RLEP 2012	Local	Yes
The Spot Heritage Conservation Area	RLEP 2012	Local	No

Source: *Adapted from Table 5.11 of Technical Paper 5 – Heritage Impact Assessment, Volume 4*

Note 1: *SHR = State Heritage Register; RLEP 2012 = Randwick Local Environmental Plan 2012; RCCRST 2008 = Randwick City Council Register of Significant Trees 2007*

Areas of archaeological potential

As discussed in section 12.8.1, three archaeological zones have been developed to respond to known or potential archaeological significance along the proposed CSELR alignment. These zones comprise:

- Zone 1: State significant archaeological resource — known or potential
- Zone 2: Locally significant archaeological resource — known or potential
- Zone 3: No archaeological resource present.

The potential archaeological significance of the proposed CSELR corridor within the Randwick Precinct is shown in Figures 15.26a and b and described in section 4.7 of Technical Paper 5. The CSELR corridor has been divided into a number of discrete Historical Archaeological Management Units (HAMUs). Each unit has been allocated according to the nature of the potential archaeological resource in an area. These units have then been allocated a particular archaeology zoning based on the significance of the potential archaeology. This zoning would allow the varying nature and significance of the archaeological resource to be managed pragmatically and consistently throughout the development of the CSELR proposal.

As shown in Figure 15.26a and Figure 15.26b, the following six HAMUs were defined within the Randwick Precinct for the CSELR:

- Centennial Park
- Randwick stabling facility
- Royal Randwick racecourse
- High Street
- Prince of Wales Hospital
- High Cross Park.

All of the above HAMUs were defined as having the potential to contain local significant archaeology and are discussed in Table 15.32. However, for the Centennial Park HAMU, in the unlikely event that archaeological evidence associated with unrecorded activities of early land grants or wool washing activities were identified, it may be assessed as being of State significance (depending on the nature and intactness of the archaeology). Similarly for the Prince of Wales Hospital HAMU, in the unlikely event that any archaeological evidence associated with the Randwick Destitute Children's Asylum (including the cemetery) is identified, it may be of State significance (depending on its nature and extent).

Table 15.32 Description of HAMUs in the Randwick Precinct

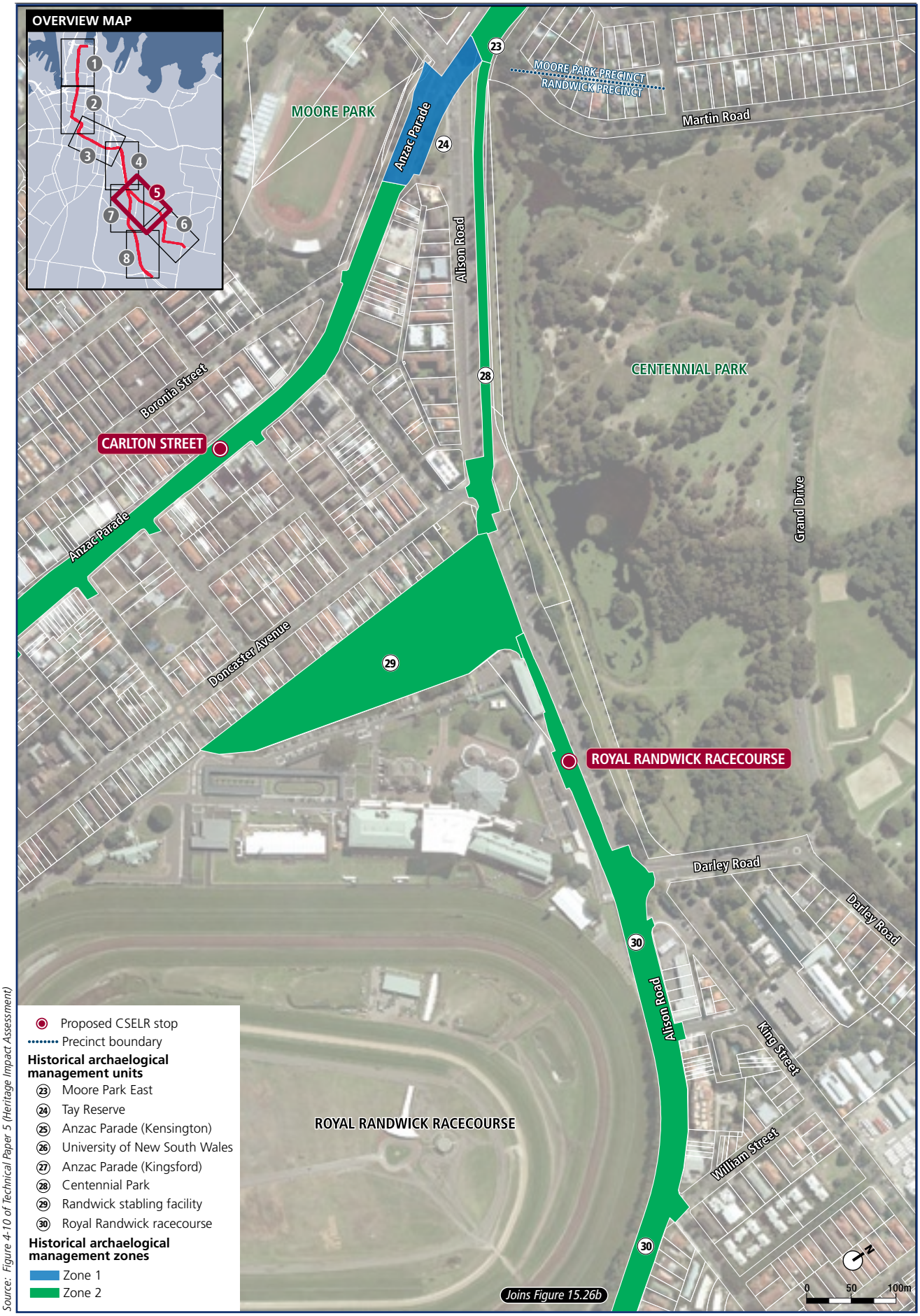
HAMU	LISTING	DESCRIPTION OF HAMU
Centennial Park	No listings specifically reference significance of the potential historical archaeological resource within the Centennial Park HAMU	There is low-moderate potential for historical archaeological remains to be present and may be associated with the following: • metal tracks and wooden sleepers with the tram line • early alignment of Alison Road, including the remains of sandstone kerbs, drains, early road surfaces and structural remains indicating the alignment of the street • evidence of 19th Century and early 20th Century development such as drains, sewerage, water and gas services • early boundaries of Centennial Park (prior to the widening of Anzac Parade) such as the post holes of timber fencing and evidence of early planting lining the road. Some sites or features may be previously disturbed by the installation of services, construction of roadways and paths, and landscape modification. It is likely that some areas of this HAMU have no historical archaeological evidence present due to removal by modern activities or through a lack of activities that would have left historical archaeological remains in the immediate area.
Randwick stabling facility	No listings specifically reference significance of the potential historical archaeological resource within Randwick Stabling Yard HAMU	There is high and known potential for historical archaeological remains to be present including: • tram platforms and overhead bridge constructed c1900. Sections of the concrete tram platform bases and foundations are still visible and a shadow of the concrete bridge footing survives. Archival documentation suggests that all tram tracks were removed when the tram system was decommissioned c1960. There is low-moderate potential for historical archaeological remains to be present including: • evidence of 19th and early 20th Century services, such as drains, sewerage, eater and gas services constructed of stone, brick, ceramic, metal or wood.
Randwick stabling facility Royal Randwick racecourse	No listings specifically reference significance of the potential historical archaeological resource within Royal Randwick racecourse HAMU	There is high and known potential for historical archaeological remains to be present including: • brick structural elements associated with stalls and a 1920s narrow rectangular building shed along the Alison Road frontage (east of the Swab Building). There is low-moderate potential for historical archaeological remains to be present, which may be associated with the following: • evidence of 19th and early 20th Century services, such as drains, sewerage, eater and gas services constructed of stone, brick, ceramic, metal or wood.

Table 15.32 cont.

HAMU	LISTING	DESCRIPTION OF HAMU
High Street	No listings specifically reference significance of the potential historical archaeological resource within High Street HAMU	There is low-moderate potential for historical remains to be present, which may be associated with the following: • evidence of early land grants; evidence of early land clearing; activities such as artefact scatters or rubbish pits; any archaeological evidence, if found is likely to be ephemeral in nature and its location not possible to predict • early alignment of High Street, including the remains of sandstone kerbs, drains, early road surfaces and structural remains indicating the alignment of the street • evidence of 19th and early 20th Century services, such as drains, sewerage, eater and gas services constructed of stone, brick, ceramic, metal or wood.
Prince of Wales Hospital	No listings specifically reference significance of the potential historical archaeological resource within Prince of Wales Hospital HAMU	There is low-nil potential for historical archaeological remains to be present. This may include: • evidence of early use of the Prince of Wales Hospital site as the location of the Randwick Destitute Children's Asylum (1852–1915) • evidence of the use of the Prince of Wales Hospital as a military hospital (1915–1954). There is low-moderate potential for historical archaeological remains to be present. This may include: • early alignment of High Street, including the remains of sandstone kerbs, drains, early road surfaces and structural remains indicating the alignment of the street. • evidence of 19th and early 20th Century services, such as drains, sewerage, eater and gas services constructed of stone, brick, ceramic, metal or wood.
High Cross Park	No listings specifically reference significance of the potential historical archaeological resource within High Cross Park HAMU	There is low-moderate potential for historical archaeological remains to be present, which may be associated with the following: • early alignment of Belmore, Avoca and Cuthill Streets, including the remains of sandstone kerbs, drains, early road surfaces and structural remains indicating the alignment of the street • evidence of 19th and early 20th Century services, such as drains, sewerage, eater and gas services constructed of stone, brick, ceramic, metal or wood • evidence of earlier landscaping formats, such as garden beds, pathways and plantings • evidence of unrecorded activities and/or elements associated with the continuous use of High Cross Park as an open civic space.

Source: Section 4.7 in Technical Paper 5- Heritage Impact Assessment, Volume 4

Figure 15.26a Randwick Precinct (North) – Historical archaeological management units



Source: Figure 4-10 of Technical Paper 5 (Heritage Impact Assessment)

Figure 15.26b Randwick Precinct (South) – Historical archaeological management units

Source: Figure 4-11 of Technical Paper 5 (Heritage Impact Assessment)

15.8.2 Impacts on heritage listed items

As outlined in section 15.8.1, the CSELR proposal has the potential to directly affect eight heritage listed items and three heritage conservation areas within the Randwick Precinct (as indicated in Table 15.32). Heritage impact assessments for each individual heritage item are provided in section 5.7.2 of Technical Paper 5 and summarised in Table 15.33.

In summary, the heritage impact of the CSELR proposal in the Randwick Precinct would be substantial, resulting primarily from the removal of significant trees, parts of parklands and significant elements of the Royal Randwick racecourse. The significant trees that would be affected are located within the racecourse (which is a heritage conservation area of local significance) along its Alison Road and Wansey Road frontages (its north-western area) and at High Cross Reserve. Street trees also affected by the CSELR proposal are situated along Wansey Road and Alison Road, and in two reserves — George Dan Reserve and High Cross Park.

Heritage impacts on Royal Randwick racecourse and the racecourse precinct heritage conservation area would result from demolition of the Swab Building and the removal of existing historic tram infrastructure in the north-western area of the racecourse.

The impact on High Cross Park would result from a substantial incursion of the proposed light rail stop and interchange into the park itself. Approximately half of the park would be lost; the character of the remaining portion would be irrevocably transformed from that of a Victorian-era local park to that of a contemporary transport interchange.

Visual impacts on heritage conservation areas would be similar to those in Surry Hills, with poles, wires and stops adding to the visual clutter in these areas. The removal of significant trees would also have adverse heritage impacts on the heritage conservation areas.

Environmental management measures that Transport for NSW proposes to implement to manage the potential heritage impacts of the CSELR proposal in the Randwick Precinct are described in section 15.8.4.

Table 15.33 Summary of impacts on heritage listed items and conservation areas – Randwick Precinct

HERITAGE ITEM	IMPACT ON THE HERITAGE ITEM/CONSERVATION AREA DUE TO THE CSELR PROPOSAL
Racecourse Precinct Heritage Conservation Area (Alison Road Section)	The CSELR proposal would require removal of the Swab building (High significance) and the boundary planting of figs and London Planes to the east. A tram stabling facility would be located in the former racecourse tram stop, in the north-western area of the racecourse, and above-ground substations would be located within the stabling facility and on the Alison Road alignment just north of the Wansey Road corner. The proposed demolition of the Swab Building would result in the loss of one of the earliest remaining buildings at the racecourse. The Swab Building also demonstrates the long-term role and use of this part of the racecourse as a race day and spectator area. It contributes to the significance of the racecourse and its demolition would be a major adverse heritage impact. Removal of the trees along Alison Road, Wansey Road and in the north-western area of the site would result in the loss of plantings of Exceptional and High significance that contribute to the aesthetic and historic significance of the racecourse. The substantial bulk of the proposed above-ground substation on the Alison Road alignment, in conjunction with the extensive removal of trees, would increase the amount of built infrastructure on the edge of the racecourse. This would be a major adverse impact on the conservation area. The proposed CSELR Randwick stabling facility within the alignment of the earlier tramway stabling yard would result in the demolition of remnant infrastructure that demonstrates earlier use, including a starter's cabin, retaining walls and a brick pedestrian ramp. The workshop buildings complex, which is of Moderate significance, would also be removed. While the proposed new use would be consistent with the heritage significance of this part of the racecourse land, the stabling facility would result in the loss of elements that have played an important functional role in the racecourse since the 1920s (the workshops) and remaining physical evidence of the earlier tramway. This would be a moderate adverse heritage impact. Overall, the CSELR proposal would have a major adverse impact on the heritage significance of the Racecourse precinct heritage conservation area.

Table 15.33 cont.

HERITAGE ITEM	IMPACT ON THE HERITAGE ITEM/CONSERVATION AREA DUE TO THE CSELR PROPOSAL
Racecourse Precinct Heritage Conservation Area/ Significant Trees (Wansey Road Section)	The proposed CSELR alignment would turn into Wansey Road, requiring removal of a number of mature figs in the north-eastern corner racecourse for the Wansey Road stop. The UNSW (High Street) stop would be located on the south-eastern boundary of the racecourse, also requiring removal of significant trees, as well as the Wansey Road water reservoir (Moderate significance), part of the south-east stables group (Moderate/Little significance) and the Steeplehill (Rogerson) stables (Little significance). The proposed CSELR alignment and associated infrastructure would require removal of the majority of significant trees in Group A, Group F, and the Alison Road mixed planting, as well as some trees in Group H. Demolition of the Wansey Road reservoir (part of the south-east stables group) and the Graeme Rogerson stables (in the south-east stables group) would result in the loss of significant built heritage items of Moderate or Little significance that reflect the expansion and development of the racecourse during the 20th Century. However, the majority of the south-east stables group would not be affected by the works. This would be a minor adverse impact on the conservation area. The removal of so many significant trees within the Royal Randwick racecourse would result in the loss of trees with exceptional natural and cultural values, which are of significance to Randwick local government area and the racecourse precinct heritage conservation area. This loss would also have an impact on the aesthetic heritage values of the conservation area. The removal of these trees would be a major adverse impact on these groups of significant trees.
George Dan Reserve	The Wansey Road stop is proposed to be located on Wansey Road immediately to the west of George Dan Reserve. No significant trees in George Dan Reserve are proposed to be removed; however, footpath widening and regrading of the reserve associated with the stop has the potential to be a minor adverse impact on George Dan Reserve and its significant trees.
Randwick Junction Heritage Conservation Area	The Randwick stop is proposed to be located on Belmore Road immediately to the south-east of the Randwick Junction Heritage Conservation Area. The proposed High Street alignment would run along the southern boundary of the conservation area. The stop and route would have a neutral impact on the setting and appreciation of the conservation area.
Prince of Wales Hospital Group	The Randwick stop is proposed to be located on Belmore Road to the east of the Prince of Wales Hospital group. The proposed High Street alignment would run along the northern boundary of the hospital and require catenary wires and associated poles. The Randwick stop, associated bus interchange and infrastructure there and along High Street would have a minor adverse visual impact on the setting of the Prince of Wales Hospital group in relation to views of the group from Belmore Road and High Street. The impact on the principal elevation of the group (which faces Avoca Street) would also be minor.
High Cross Reserve and High Cross Reserve Significant Trees	The Randwick stop is proposed to be located in the northern portion of High Cross Reserve adjacent to Belmore Road. Approximately half of the reserve to be occupied by the stop platforms would include a large-scale elevated canopy and associated infrastructure, including an aboveground substation. The stop would also include an interchange between buses and light rail. The proposed Randwick stop would result in the loss of approximately half of the existing area of High Cross Reserve and the removal of its significant trees. The cenotaph would be retained. The historic character of the park with its landmark Cook Pines would be substantially diminished by the stop and associated bus/light rail interchange, especially the large-scale elevated canopy and the substantial bulk of the aboveground substation. This would be a major adverse heritage impact.
High Cross Heritage Conservation Area	The Randwick stop for the CSELR would result in the transformation of High Cross Reserve from the Victorian era park to a much reduced contemporary landscape, dominated by a transport interchange. High Cross Reserve is the landmark and focus of the High Cross Heritage Conservation Area and forms an important part of the setting of the Victorian houses and the Royal Hotel on Cuthill Street. Its transformation for the stop and interchange would have a moderate adverse heritage impact on the High Cross Heritage Conservation Area.
Corana and Hygeia	The Randwick stop is proposed to be located on Belmore Road immediately to the south of Corana and Hygeia, which are two semi-detached mansions in the late Victorian style and constructed in 1898. The stop, associated infrastructure and tracks would have a minor adverse visual impact on the setting and appreciation of these grand Victorian semi-detached mansions.

15.8.3 Impacts on areas of potential archaeological significance

Direct impacts to areas of potential archaeological significance would generally be associated with the construction of the CSELR causing disturbance to, or loss of, archaeological resources.

Potential impacts during the construction phase of the proposal could arise from:

- soil compaction associated with the installation of demountable sheds, establishment of construction compounds/work areas, material laydown and/or movement of heavy vehicles
- construction of the CSELR track slab
- construction of extensive areas of track for the stabling of LRVs
- construction of the stabling facility, including maintenance facilities, wash plant, and a two or three-storey staff facilities building
- installation of catenary support poles
- construction of the light rail stops at Royal Randwick racecourse, Wansey Road, UNSW High Street and High Cross Park and associated infrastructure (such as stop shelters)
- installation of the proposed Royal Randwick racecourse substation
- demolition of the Swab Building at Royal Randwick racecourse
- regrading of the ground to achieve final track and stop levels
- service/utility relocations
- tree removal
- footpath reconstruction and landscaping.

Detailed descriptions of each HAMU and the potential impacts to them as a result of the proposal are summarised below in Table 15.34.

Table 15.34 Heritage impact assessment of HAMUs in the Randwick Precinct

HAMU	HERITAGE IMPACT ASSESSMENT
Centennial Park	Construction of the CSELR track slab would involve excavation below the current ground surface. These works are likely to have a moderate adverse impact on the potential historical resource. Other ground disturbance activities within the Centennial Park HAMU (service relocation) would be likely to have a minor to moderate adverse impact on the potential historical archaeological resource, depending on the extent and nature of the proposed works. Use of Centennial Park HAMU as a construction zone — where it would not involve the removal of the existing ground surface and/or excavation — is unlikely to have an impact on the historical archaeological resource. Details of the construction boundaries or details of additional facilities that may be located within HAMU have not yet been provided. The impact on Centennial Park HAMU would require assessment once final impacts are determined
Randwick stabling facility	Construction of the CSELR track slab would involve excavation below the current ground surface. These works are likely to have a moderate adverse impact on the potential historical resource. Excavation for the stop shelter and associated infrastructure would involve deeper excavation than for the CSELR track in other parts of this HAMU. Construction of facilities such as stabling sheds, maintenance facilities, wash plant and the staff facilities building are likely to involve deeper excavation in these areas. Proposed works associated with the installation of the Randwick stabling facility substation have not yet been defined at this stage. It is assumed that ground disturbance works (including excavation for the substation and associated services) would have to occur. These works would have a moderate to major adverse impact on the potential historical archaeological resource. Other ground disturbance activities within the Randwick stabling facility HAMU (i.e. service relocation, tree removal) would be likely to have localised impacts on the historical archaeological resource. These works are likely to have a minor to moderate adverse impact on the potential historical archaeological resource, depending on the extent and nature of the proposed works. Use of the Randwick stabling facility HAMU as a construction zone — where it would not involve the removal of the existing ground surface and/or excavation — is unlikely to have an impact on the historical archaeological resource.

Table 15.34 cont.

HAMU	HERITAGE IMPACT ASSESSMENT
Royal Randwick racecourse	Construction of the CSELR track slab would involve excavation below the current ground surface. These works are likely to have a moderate adverse impact on the potential historical resource. Excavation for the stop shelter and associated infrastructure would involve deeper excavation than for the CSELR track in other parts of this HAMU. The installation of the Royal Randwick racecourse substation would involve ground disturbance works, including excavation for the substation and associated services. These works would have a moderate adverse impact on the potential historical archaeological resource, depending on the extent and nature of the proposed works. Demolition of the Swab building at Royal Randwick racecourse may disturb any historical archaeological remains directly below the building or in the immediate vicinity. These works are likely to have a minor adverse impact on the surrounding potential historical archaeological resource. Regrading in the vicinity of the UNSW High Street Stop is not close to any identified areas of historical archaeological potential. These works are likely to have a neutral impact on the historical archaeological resource. Other ground disturbance activities within the Royal Randwick racecourse HAMU (i.e. service relocation, tree removal) would be likely to have localised impacts on the historical archaeological resource. These works are likely to have a minor adverse impact on the potential historical archaeological resource, depending on the extent and nature of the proposed works. Use of Royal Randwick racecourse HAMU as a construction zone — where it would not involve the removal of the existing ground surface and/or excavation — is unlikely to have an impact on the historical archaeological resource.
High Street	Construction of the CSELR track slab would involve excavation below the current ground surface. These works are likely to have a moderate adverse impact on the potential historical resource. Other ground disturbance activities within the High Street HAMU (service relocation) would be likely to have a minor to moderate adverse impact on the potential historical archaeological resource, depending on the extent and nature of the proposed works. Use of High Street HAMU as a construction zone — where it would not involve the removal of the existing ground surface and/or excavation — is unlikely to have an impact on the historical archaeological resource.
Prince of Wales Hospital	Construction of the CSELR track slab would involve excavation below the current ground surface. These works are likely to have a moderate adverse impact on the potential historical resource. Other ground disturbance activities within the Prince of Wales Hospital HAMU (service relocation) would be likely to have a minor to moderate adverse impact on the potential historical archaeological resource, depending on the extent and nature of the proposed works. Use of Prince of Wales Hospital HAMU as a construction zone — where it would not involve the removal of the existing ground surface and/or excavation — is unlikely to have an impact on the historical archaeological resource.

Source: Section 4.7 in Technical Paper 5- Heritage Impact Assessment, Volume 4

15.8.4 Management and mitigation

Impacts on built and landscape heritage

Overarching environmental management measures that would be adopted for the CSELR proposal to manage potential impacts on built and landscape heritage items and heritage conservation areas are described in section 12.8.4. The following additional management and mitigation measures would be implemented to further minimise impacts on listed heritage items within the Randwick Precinct:

- Racecourse Precinct Heritage Conservation Area:
  - The detailed design of the CSELR alignment and the associated Royal Randwick racecourse stop would seek to retain (if possible) and/or avoid/minimise impacts on the significant built elements including the former racecourse gates and landscaping of the Racecourse Precinct Heritage Conservation Area.
  - Detailed design of the Randwick stabling facility in the north-western corner of the racecourse would investigate retention of remnant historic tram infrastructure to be integrated into the new stabling facility.
  - A photographic archival recording of the Alison Road and Wansey Road boundaries, the north-western area and the Swab Building would be undertaken prior to works commencing. Significant trees and structures to be demolished or altered would be recorded.

- Royal Randwick racecourse Significant Trees:
  - Detailed design of the Wansey Road stop and the stabling facility would seek to retain as many as practicable of the significant trees at the Royal Randwick racecourse.
  - Where significant trees must be removed, suitable replacements would be made, where possible.
- George Dan Reserve Significant Trees:
  - Detailed design of the Wansey Road stop would allow for retention of significant trees.
- High Cross Park, Significant Trees and High Cross Heritage Conservation Area:
  - Detailed design of the proposed stop, especially the large-scale elevated canopy and associated infrastructure, would seek to minimise the area of the reserve to be excised for the stop and associated infrastructure. The detailed design would seek to retain significant trees, where possible, and the cenotaph area.
  - Where feasible, the proposed above-ground substation would be changed to a below-ground facility to reduce the extent of additional built infrastructure.
  - Reinstatement of the remnant reserve landscaping would be subject to a management plan or other approved document.
  - A photographic archival recording of the reserve would be undertaken prior to works commencing.

Impacts on areas of potential archaeological significance

Overarching environmental management measures that would be adopted for the CSELR proposal to manage potential impacts on areas of potential archaeological significance are described in section 12.8.4. As outlined in section 12.8.4, archaeological resources within the proposed CSELR corridor would be managed in accordance with their significance. The management and mitigation strategies described in section 12.8.4 were developed to address the likely significance of the identified historical archaeological resource.

Mitigation measures, as outlined for Zone 2 in section 12.8.4, would generally be implemented for all of the HAMUs within the Randwick Precinct. The exception to this would be for the High Street HAMU, where mitigation measures, as outlined for Zone 4 in section 12.8.4, would also apply (as indicated in Figures 15.26a and b).

Some HAMUs would require additional specific mitigation and management strategies be implemented, which would be tailored to address the anticipated nature of archaeological resource in that area. Additional mitigation measures that would apply to HAMU within the Randwick Precinct comprise the following:

- Prince of Wales Hospital HAMU — In the unlikely event that skeletal remains are identified, they would be managed in accordance with Zone 1 strategies (as outlined in section 12.8.4) and, at a minimum, managed in accordance with the Heritage Division guideline *Skeletal Remains: Guidelines for Management of Human Skeletal Remains,* and exhumed and reinterred at an appropriate location. If identified, consultation with the office of Environment and Heritage (Heritage Division) would be required.

Heritage Interpretation Strategy

A Heritage Interpretation Strategy (HIS) has been developed for the CSELR proposal and is included as Technical Paper 6. The HIS outlines how the history, significant heritage places and stories associated with each of the precincts through which the CSELR travels may be interpreted.

For the Randwick Precinct the key places of interest are:

- Royal Randwick racecourse
- Prince of Wales Hospital – former Asylum for the Relief of Destitute Children
- High Cross Reserve
- Captain Cook Statue (1874) – possibly the first statue of Cook to be erected in Australia
- Corana and Hygeia – a pair of large semi-detached mansions built in 1894.

The following opportunities for interpretation have been identified:

- Application of interpretive signage/or evocative historical imagery at select light rail stops
- development of an online exhibition, or digital publication outlining the history and significance of the precincts and places along the CSELR
- 'Walk the Line' – a self guided tour along the CSELR route that could be downloaded from a website, developed as an app, or printed as a brochure or booklet.

Heritage interpretation measures would be developed during detailed design in consultation with Randwick City Council.

Effectiveness of the mitigation measures

As discussed in section 12.8.4, the effectiveness of the built and non-Indigenous heritage management and mitigation measures proposed in this EIS has been ranked in section 6.2 of Technical Paper 5.

The effectiveness of the mitigation measures proposed for historical archaeology is identified against each of the specific HAMUs in Table 6.1 of Technical Paper 5, whereas the effectiveness of the mitigation measures proposed for built and landscape heritage are identified against each heritage item/conservation area in Table 6.4 of Technical Paper 5.

A summary of the general effectiveness of each form of mitigation for built and landscape heritage is provided in Table 12.47.

15.9 Socio-economic characteristics

The following section provides a summary of the potential local social and economic impacts of the proposal within the Randwick Precinct, based on Technical Paper 3 — *Social Impact Assessment* and Technical Paper 4 — *Economic Impact Assessment* contained in Volume 3 of this EIS.

15.9.1 Existing conditions

Census statistics for the Randwick Statistical Area (Level 2), using sources such as the Australian Bureau of Statistics (ABS) 2011 and Bureau of Transport Statistics (BTS) (2011 and 2012) data, were taken to be representative of the Randwick Precinct.

The BTS estimated the population of Randwick Precinct to be approximately 27,140 in 2011, and projected the population to increase to approximately 30,158 by 2031. This is an average annual increase of approximately 0.6 per cent per annum. BTS employment projections (2011 and 2012), forecast that the Randwick Precinct would experience an increase of 9,987 jobs or 65 per cent between 2011 and 2031 (increasing from 15,351 jobs to 25,338 jobs). The education and training, and healthcare and social assistance sectors are projected to increase by the greatest margin, increasing by approximately 11,034 jobs or 65per cent and 10,102 jobs or 104per cent respectively over the same period.

The key features of the local demographic, employment and travel profiles are listed below:

- Randwick's median population age is 35.
- Three-quarters of the population speaks only English at home. Just over 30 per cent of the population is born overseas, with the greatest percentage of overseas residents coming from the United Kingdom, China, and Ireland.
- Just under half (approximately 46 per cent) of the population did not change address in the five years prior to the 2011 census, the highest percentage of any CSELR precinct.
- Apart from Moore Park, Randwick has the lowest unemployment rate of any CSELR precinct. Healthcare, education, and scientific professions are amongst the most popular for residents.
- Randwick provides a more suburban character than Surry Hills and the City Centre precincts. One quarter of dwellings are owned outright, and another quarter are owned with a mortgage.
- Approximately 60 per cent of dwelling are flats, units, or apartments, while just over 20 per cent are detached houses and just under 20 per cent are semi-detached houses.
- Randwick has the lowest percentage of households without a motor vehicle (approximately 19.9 per cent) of any CSELR precinct. Approximately half of households have one motor vehicle, with approximately another 30 per cent owning two or more vehicles.

- Just under half of residents use a car to commute to work, and just over one-third use public transport. Of those that use public transport, nearly all use a bus at some point in their journey. Randwick City Council noted that buses are the only form of public transport available for the LGA.

A full profile of the Randwick Precinct, broken down by topic and compared with each of the other CSELR precincts, is provided in Appendix 8.1 of Technical Paper 3 — *Social impact assessment.*

15.9.2 Impacts during operation

The potential social and economic impacts during operation are summarised below and described further in Technical Paper 3 — *Social Impact Assessment* and Technical Paper 4 — *Economic Impact Assessment*.

All of the public transport currently serving Randwick is bus-based. In addition to providing an alternative public transport option for the wider suburb of Randwick, the CSELR proposal would benefit the Royal Randwick racecourse by improving transport links with the CBD. The CSELR proposal would also aid the further development of the Randwick Health and Education Specialised Centre, which is serving an increasing number of patients from around Greater Sydney that require specialist care. Staff and students attending the UNSW would also benefit from improved transport links to Central Railway Station.

Key economic concerns during operation of the CSELR proposal within the Randwick Precinct would include ongoing impacts to the operation of businesses within the precinct including the potential changes in access arrangements and ongoing noise impacts.

Social impacts

The key social impacts of the CSELR proposal during operation are summarised in Table 15.35. This table provides a summary and rating of the key potential social impacts both before and after implementation of proposed mitigation measures. These mitigation measures are presented in section 15.9.4.

Table 15.35 Randwick Precinct – Key social impacts during operation

POTENTIAL IMPACT	KEY EFFECTS OF IMPACT	IMPACT RATING (POST MITIGATION)
Local amenity, character, environment	Moderately Negative • The loss of significant trees along Alison Road and Wansey Road that border the racecourse would have a negative impact; although urban amenity improvements may mitigate these impacts. • The character of High Street would be changed by the CSELR; however High Cross Park would be negatively impacted due to the construction of the Randwick stop and the loss of some open space in this area.	Slightly Negative
Visual impact	Slightly Negative (High Street) Significantly Negative (Alison and Wansey Road) • Although there would be a reduction in traffic on Alison Road, there would be additional visual clutter at street level from light rail infrastructure. • The loss of significant Fig trees along Alison Road would be a major visual change. The Alison Road corridor would become more visually dominant given the merging of the proposed light rail infrastructure with the road corridor. Whilst there would be a reduction in traffic lanes, the CSELR would introduce additional visual clutter at street level. These changes constitute a considerable reduction in visual amenity in the area around Royal Randwick racecourse. • Views of High Cross Park would be altered given the loss of trees. The location of the Randwick stop in High Cross Park has the potential to generate a visual disconnection of the commercial and residential properties lining High Cross Park to the east. Light rail infrastructure would be of a similar visual character to the road infrastructure that currently exists. • Visual impacts are further discussed in section 15.7.	Neutral (High Street) Slightly Negative (Alison Road and Wansey Road)
Changes to access and local traffic conditions	Neutral • Access and local traffic conditions would be permanently altered from the existing state before the proposal commences. • Bus congestion would be substantially reduced, as express services between Central and the UNSW would no longer be required. These services presently use Anzac Parade, High Street, and Wansey Road. • There would be a loss of parking along areas of the alignment including Alison Road, Wansey Road, and High Street. • A mode shift away from private vehicles to light rail may reduce the need for parking, particularly for students using areas such as Wansey Road. • Access and traffic impacts are further discussed in section 15.3.	Neutral
Changes to local community services, Prince of Wales Hospital, UNSW	Significantly Positive • Access and local traffic conditions would be permanently altered from the before project state; however, over the medium term, people would adjust to the new traffic conditions. • Access by light rail to the Randwick health precinct would be enhanced. • UNSW staff and students would experience a significant benefit in the ability to access the university, as many currently alight from suburban heavy rail services at Central Railway Station and catch express buses from Eddy Avenue.	Significantly Positive

Table 15.35 cont.

POTENTIAL IMPACT	KEY EFFECTS OF IMPACT	IMPACT RATING (POST MITIGATION)
Access to and use of public spaces and urban connectivity	Moderately Positive • Access to the Randwick Health and Education Specialised Centre would be greatly enhanced. • The open space of High Cross Park would be substantially reduced due to the Randwick stop. Urban design and public domain interventions would be required to encourage the use of High Cross Park as a public space rather than simply a transport interchange. • These impacts are further discussed in section 15.7.	Moderately Positive
Noise and vibration	Neutral • The High Street area currently experiences significant bus, private vehicle, and foot traffic. The existing road traffic noise is likely to be well above the predicted light rail noise levels. • Consultation with the U NSW, facilities within the Randwick health precinct, and other practices along High Street and Belmore Road would be undertaken during detailed design to assess potential impacts to vibration sensitive equipment. • Noise and vibration impacts are further discussed in section 15.5.	Neutral
Property acquisition	Neutral • High Cross Park may need to be permanently acquired from Randwick City Council.	Neutral
Safety and security	Slightly Negative • The CSELR may impact on existing pedestrian and cycle routes around Wansey Road and High Street, in particular around the in the entrance to the upper campus of UNSW. • There may be privacy concerns for residences in the immediate vicinity of the proposed stops that would need to be mitigated through appropriate design of the stop and its surroundings. Of particular concern are the stops on Wansey Road.	Neutral
Community and cultural issues	Moderately Negative • The Randwick ANZAC Memorial in High Cross Park is used on an annual basis for a memorial service. Co-ordination of the urban design of the Randwick stop at High Cross Park would be undertaken to retain the heritage character of the park. • The existing location of the ANZAC Memorial would not be impacted as part of the proposal. There is also the possibility of continuing the ANZAC Day service at this location.	Neutral
Health and wellbeing	Moderately Positive • The CSELR may encourage more walking and cycling.	Moderately Positive
Social sustainability and community functioning	Moderately Positive • The CSELR may encourage better access to community services, particularly Prince of Wales Hospital, the UNSW and employment opportunities.	Moderately Positive

Source: *Based on Technical Paper 3 – Social Impact Assessment, Volume 3*

Economic impacts

The key economic impacts of the CSELR proposal during operation are summarised in Table 15.36. This table provides a summary and rating of the key potential economic impacts both before and after implementation of proposed mitigation measures. These mitigation measures are presented in section 15.9.4.

Table 15.36 Randwick Precinct – Key economic impacts during operation

POTENTIAL IMPACT	KEY EFFECTS OF IMPACT	IMPACT RATING (POST MITIGATION)
Access to work, retail and leisure	Moderate Positive • The CSELR proposal would improve accessibility and connectivity with other locations along the corridor which may expand the trade area of local businesses and the attraction of visiting important regional services, employment and economic drivers, such as the Royal Randwick racecourse, TAFE, UNSW, and medical services. • The Randwick stop at High Cross Park would act as an important focal point that may have flow-on benefits to local retailers and services in High Street/Avoca Street including the Randwick shopping centre.	Significant Positive
Loss of car parking	Significant Negative • The CSELR proposal would result in the permanent loss of approximately 225 car parking spaces across the Randwick Precinct. • The overall loss in car parking in the precinct would impact the desirability of visiting some businesses (such as medical and professional services) especially where alternative parking is not available.	Moderate Negative
Impact to land values	Slight to Moderate Positive • Improved capacity and reliability of public transport would be likely to create positive flow-on benefits to landowners.	Slight to Moderate Positive
Amenity	Slight Positive • The CSELR proposal would result in improvements to existing levels of amenity resulting from the reduction in traffic and appropriate landscaping. • Some long-term negative impacts may occur due to the reduction in the overall open space available within High Cross Park.	Moderate Positive
Access to servicing areas	Slight Negative • The CSELR proposal may impact on the ability to for businesses to access service and delivery areas along and adjacent to High Street.	Neutral

Source: *Based on Technical Paper 4 – Economic Impact Assessment, Volume 3*

15.9.3 Impacts during construction

Potential social and economic impacts during construction are summarised below and described further in Technical Paper 3 — *Social Impact Assessment* and Technical Paper 4 — *Economic Impact Assessment*.

Key social and economic concerns during construction of the CSELR proposal within the Randwick Precinct would include visual and amenity impacts of the construction of the stabling facility at the north-west corner of Royal Randwick racecourse, changes to amenity along Wansey Road, and access concerns around the Randwick health precinct. High Cross Park would be unavailable for public use during construction.

Social impacts

The key social impacts of the CSELR proposal during construction are summarised in Table 15.37. This table provides a summary and rating of the key potential social impacts both before and after implementation of proposed mitigation measures. These mitigation measures are presented in section 15.9.4.

Table 15.37 Randwick Precinct – Key social impacts during construction

POTENTIAL IMPACT	KEY EFFECTS OF IMPACT	IMPACT RATING (POST MITIGATION)
Local amenity, character, environment	Moderately Negative • Tree removal, and introduction of construction traffic and materials along Wansey Road is likely impact the character of the Randwick Precinct. • Construction would impact on the existing shared footpath/ cycleway along Alison Road and Wansey Road. • Construction (and eventual operation) of the Randwick stop within High Cross Park would change the amenity of the park. • The ongoing upgrade to Royal Randwick racecourse, including the proposed construction of a new hotel, may result in some cumulative construction impact (refer to Chapter 11).	Moderately Negative
Visual impact	Significantly Negative • The visual intrusion of construction activities along the CSELR alignment would result in some negative impacts. • The more urbanised area of High Street would better absorb visual impacts. • Visual impacts are further discussed in section 15.7.	Moderately Negative
Changes to access and local traffic conditions	Moderately Negative • Changes to access and local traffic conditions would impact on residents, students and businesses within the Randwick Precinct. • Access to Royal Randwick racecourse from Alison Road and Wansey Road would be restricted during construction. During events, the current bus set-down area on Alison Road would be unavailable. Horse trucks currently access horse stables on the east side of Royal Randwick racecourse using a driveway off Wansey Road, which may also be impacted. • Construction may require localised changes to existing bus operations. • Access to the bus stop on the south side of Alison Road east of Darley Road may be impacted, requiring special access arrangements to ensure accessibility for those travelling to TAFE and UNSW. • Access and local traffic impacts are further discussed in section 15.3.	Slightly Negative
Changes to local community services, Randwick Hospitals Precinct and the UNSW	Moderately Negative • Traffic access along High Street would remain, although constrained to one lane in each direction, consistent with the traffic arrangements planned for when light rail is fully operational. Sydney Children's Hospital is dependent on the functionality of High Street at all times for its emergency vehicles as well as general emergency visits. Prince of Wales Hospital has a pedestrian entrance off High Street that would require management but vehicular access via Barker Street would be unaffected. • Bus movements on High Street would need to be diverted and High Street bus stops relocated, potentially permanently. • During construction, access to UNSW from Wansey Road/High Street may be limited. Access to the UNSW is only likely to suffer minor impacts due to the exiting number of entrances. • Maintaining access to community services will be especially important for socio-economically disadvantaged residents along the route. Service providers would be informed of works and consulted as to access requirements to ensure continuity of service for those affected. • Access and local traffic impacts are further discussed in section 15.3.	Slightly Negative

Table 15.37 cont.

POTENTIAL IMPACT	KEY EFFECTS OF IMPACT	IMPACT RATING (POST MITIGATION)
Access to public spaces and urban public spaces and urban connectivity	Moderately Negative • Part of High Cross Park would be used as a construction compound, which would limit recreational use of the area during construction. • Urban connectivity would be constrained during construction between both sides of High Street. This may affect the relationship between the medical precinct and shops and cafes that depend on medical precinct customers. • The junction at Wansey Road would also be impacted during construction, particularly access for cyclists to the UNSW.	Slightly Negative
Noise and vibration	Moderately Negative • Noise impacts would occur at periodic intervals during construction. The most noise intensive works would be excavation activities. These activities are expected to last for no longer than a total of two weeks at any single receptor during the main track works. Receptors near to proposed stop locations would also be likely to be impacted by additional excavation activities or stop construction. • The Randwick health precinct may be particularly sensitive to construction noise and vibration. • Construction and demolition activities within the proposed Randwick stabling facility site may impact on residents in this area, in particular along Doncaster Avenue. • Within the Randwick Precinct, there are a number of horse stables in the area near the proposed works. It is recommended that the proponent communicates with the affected premises to clearly explain the timing, duration and likely noise levels of the works. • Noise and vibration impacts are further discussed in section 15.5.	Slightly Negative
Property acquisition	• Neutral • A site south of the Royal Randwick racecourse stabling facility is identified as one of two potential worksites to be used as the site office for the South East corridor of the CSELR. • Smaller areas to be temporarily acquired for construction purposes are not expected to have social impacts.	Neutral
Safety and security	Moderately Negative • There are moderate risks to the public from any construction site. Road safety around the construction sites in this location is likely to be critical due to elderly and disabled persons attending medical services and hospital appointments.	Neutral
Community and cultural issues	Moderately Negative • Although the Randwick war memorial in High Cross Park would be retained, it may be inaccessible for part or all of construction. • The ANZAC Day dawn service may need to be temporarily relocated from High Cross Park.	Slightly Negative
Health and wellbeing	Moderately Negative • Construction works may result in potential health impacts due to noise and dust generation.	Neutral
Social sustainability and community functioning	Slightly Negative • The overall functioning of the local community may be impaired temporarily due to construction due to perceived barriers to movement within the precinct as a result of ongoing construction works.	Neutral

Source: Based on Technical Paper 3 – Social Impact Assessment, Volume 3

Economic impacts

The key economic impacts of the CSELR proposal during construction are summarised in Table 15.38. This table provides a summary and rating of the key potential economic impacts both before and after implementation of proposed mitigation measures. These mitigation measures are presented in section 15.9.4.

Table 15.38 Randwick Precinct – Key economic impacts during construction

POTENTIAL IMPACT	KEY EFFECTS OF IMPACT	IMPACT RATING (POST MITIGATION)
Changes to access and local traffic conditions	Moderate Negative • During construction access to the Royal Randwick racecourse from Alison Road and Wansey Road would be restricted. Access to some businesses within the Randwick Precinct may also be impacted which may have a negative impact on these businesses. • Flow on delays from changes to access and traffic conditions may also impact overall commuting and travel times for the broader community, potentially impacting businesses outside the Randwick Precinct.	Slight Negative
Amenity impacts (i.e. noise and vibration)	Moderate Negative • Construction impacts such as noise and vibration (refer to section 15.5) may impact on businesses reliant on the amenity of outdoor areas (i.e. cafes with outdoor dining on High Street) or facilities with sensitivity to vibration (hospitals, medical practices, research centres) or to the operation of hotels/short-term accommodation associated with the Prince of Wales Hospital.	Slight Negative
Loss of on street car parking	Moderate Negative • The CSELR proposal would result in the removal of car parking in Wansey Road, High Street and surrounding High Cross Park, which would impact clients of local businesses relying on these streets for parking to access local services and facilities.	Moderate Negative
Access to loading docks/ servicing areas	Moderate Negative • The ability to access service and delivery areas along and adjacent to High Street and High Cross Park may be affected along with access implications for businesses that use connecting streets.	Slight Negative
Perceived impact and business viability	Slight Negative • Due to perceived adverse amenity and access constraints from clients, there may be some impacts to businesses (such as the retailers on High Street) during the construction period.	Slight Negative
Stimulation of redevelopment opportunities	Moderate Positive • A commitment to the proposal and the commencement of works, together with the Randwick UAP programme could create a positive catalyst for the redevelopment of some underutilised sites and locations within the Randwick Precinct.	Moderate Positive
Access to work, retail and leisure	Moderate Negative • Impacts to the perceived ease of getting to work or other land use activities could reduce the attraction of working/visiting/ operating facilities in the Randwick Precinct.	Slight Negative
Visual impact	Moderate Negative • Impacts to visual the amenity of the Randwick Precinct, including High Street and High Cross Park, could lead to potential negative impacts to businesses reliant on these characteristic (i.e. cafes, hotels).	Slight Negative

Source: Based on Technical Paper 4 – Economic Impact Assessment, Volume 3

15.9.4 Management and mitigation

A series of mitigation measures for the management of the social and economic impacts identified in section 15.9.2 and section 15.9.3 would be implemented as part of the CSELR proposal. The construction and operational mitigation measures relating to potential social impacts are summarised in Table 15.39.

Table 15.39 Social construction and operational mitigation measures

POTENTIAL IMPACT	POTENTIAL MITIGATION
Operation	
Local amenity, character, environment	• Adverse local amenity and character impacts would be mitigated through urban design and/or public domain improvements. Urban design elements proposed for light rail stops would include the use of consistent materials, and new street tree plantings to side footpaths to unify the corridor. Public domain improvements could include the maximisation of open space (for example within High Cross Park) and the replanting of street trees where possible. • Details of the mitigation for impacts associated with loss of tree loss are provided in section 15.6.
Visual impact	• Where possible, public open spaces directly affected by the CSELR proposal would be reinstated as soon as possible. • Where possible, urban design measures, such as revegetation along the corridor, would be adopted to neutralise or enhance any impacts to the existing median strips and road corridors. • Details for the mitigation of visual impacts are provided section 15.7.
Changes to access and local traffic conditions	• Where required and feasible, special arrangements for deliveries to businesses directly fronting the CSELR alignment would be provided. This could include the provision of time-based loading zones on nearby streets. • Appropriate access plans for CSELR stops within the Randwick Precinct would indicate how to maximise servicing the wider catchment and allow for adequate cycle lock-up facilities. • Details of the mitigation of local access and traffic impacts are provided in section 15.3.
Changes to local community services, Randwick Hospitals Precinct, UNSW	• Access to local community services and open spaces would be maintained during operation of the CSELR proposal. Consultation with the operators of community services (including local childcare centres and places of worship) would be undertaken to minimise impacts to the access of these facilities. • Details of the mitigation of access to these services are provided in section 15.3.
Access to and use of public spaces and urban connectivity	• Light rail stops would incorporate a high quality urban design that would reflect the precinct in which they would be located to assist in minimising impacts to visual amenity resulting from the provision of the CSELR proposal. • Transport for NSW would continue to work with stakeholders to identify potential opportunities to integrate CSELR public domain improvements with other city planning strategies to improve access to local community services and further enhance the public domain along the route. • Where possible, public open spaces directly affected by the CSELR proposal would be reinstated as soon as possible.
Noise and vibration	• Details of the mitigation of noise and vibration impacts are provided in section 15.5.
Safety and security	• Where feasible, the CSELR would incorporate features to maintain the safety of passengers, CSELR employees and the general public. Stops would be designed to be safe and attractive places to wait for CSELR services and would (where feasible and appropriate) incorporate light-emitting diode (LED) lighting technology, be emergency calling capabilities and closed circuit television (CCTV). • Details of the mitigation of safety and security impacts are provided in section 15.7.
Community and cultural issues	• A targeted communication strategy would be developed for UNSW staff and students to allow for a smooth transition to light rail operations. • Informational material advertising the commencement of CSELR operations would be prepared in multiple languages widely spoken by the affected community. • Details of the mitigation of heritage impacts are provided in section 15.8.

Table 15.39 cont.

POTENTIAL IMPACT	POTENTIAL MITIGATION
Health and wellbeing	• Appropriate access plans for stops would indicate how to maximise servicing the wider catchment and allow for adequate cycle lock-up facilities. Such measures are particularly important for encouraging those south-east of the Randwick stop to use the light rail.
Social sustainability and community functioning	• The light rail and stops would be designed to promote interaction with, and facilitate access to/from, neighbouring areas. • Light rail would assist in activating growth opportunities in accordance with the Randwick UAP (refer to section 15.4).
Construction	
Local amenity, character, environment	• A construction environmental management plan (CEMP) would be prepared by the contractor and would specify further mitigation measures suitable for specific impacts. • Further mitigation of amenity and character impacts are provided in section 15.7.
Visual impact	• Public space and parkland used for construction would be reinstated, including compounds/site offices, as soon as possible once these areas are no longer required for the construction of the CSELR. • Further mitigation of visual impacts is provided in section 15.6.
Changes to access and local traffic conditions	• Ongoing consultation with affected stakeholders and organisers of special events would be undertaken. Alternate routes to avoid impacting special events are to be provided where possible. Advance planning for major events should occur with the Randwick City Council. • Most footpaths and cycleways would remain unaffected during construction; however in the limited cases where construction impinges on these paths, clearly marked alternatives would be provided. • Traffic and transport mitigation strategies for the mitigation of local access and traffic impacts during construction of the CSELR proposal have been prepared and are provided in section 15.3.
Changes to local community services, Randwick Hospitals Precinct, UNSW	• Access to local community services and open spaces would be maintained during construction of the CSELR proposal, where possible. This could include undertaking construction works in segments and stages. Where this is not possible, alternative access arrangements would be made in consultation with relevant service operators. • Access to High Street properties, in particular UNSW access and hospital access points for the Prince of Wales Hospital and Sydney Children's Hospital, would be maintained by undertaking construction works in segments and stages. • Access plans would be prepared in consultation with property owners and businesses. • Patients and visitors accessing the hospitals by private vehicle or bus would be made aware of any changes. Distributing communications materials to hospitals to give to patients and visitors may help in this regard. • Access plans would be prepared in consultation with property owners and businesses.
Access to and use of public spaces and urban connectivity	• Sequencing of construction activities would be managed to ensure that impacts on public spaces are minimised. • Construction along High Street would be staged to minimise access impacts and maintain connectivity. • Where footpaths are narrowed or closed off, local diversions would be put in place. • Pedestrians would be diverted to an alternate footpath or crossing prior to any works zone being established that would close off the footpath or crossing. • During detailed design, seek opportunities to refine construction work areas to minimise impacts on public spaces. • Provide clear signage around construction compounds utilising open spaces such as High Cross Park advising of the project, timing, access arrangements and contact details for complaints. • Alternate spaces would be considered that could substitute for the use of public space required for the construction of the CSELR, for example, High Cross Park. • Mitigation of public domain and connectivity impacts is provided in section 15.7 and further mitigation regarding impact to public spaces is provided in section 15.6 and 15.7.
Noise and vibration	• Details for the mitigation of noise and vibration impacts are provided in section 15.5.
Property acquisition	• Where property acquisition is required, it would be acquired in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*. A property acquisition plan would be prepared as part of detailed design.

Table 15.39 cont.

POTENTIAL IMPACT	POTENTIAL MITIGATION
Safety and security	• The CEMP would identify risks to safety and security on a site-by-site basis and provide appropriate mitigation measures. • Detailed design would incorporate the principles of Crime Prevention through Environmental Design (CPTED). • *Disability Discrimination Act 1992* requirements would be adopted. • Construction lighting standards would be met or exceeded. • Hoarding/fence lines would be erected to maximise sight lines for pedestrians and avoid hiding places and blind spots to improve pedestrian personal security. • Any gantry arrangements would have internal lighting. • Relocation of CCTV cameras would be considered if construction obstructs their view field. • Separation barriers would be installed along the borders of worksites. • Consideration would be given to suspension of works on event days at the Royal Randwick racecourse or at the UNSW to minimise construction safety risks to crowds. • Safety and security impacts would be addressed as part of the CEMP.
Community and cultural issues	• The scheduling of construction activities would take into consideration major events at the Royal Randwick racecourse and the UNSW to minimise impacts on the access to, and function of, these events. This would include consultation with relevant stakeholders. • Staging of works would be undertaken to minimise disruption, in consultation with local community groups, to minimise impacts to community activities and functions. • Materials promoting light rail operation and use would be prepared in non-english languages spoken by the affected community.
Health and wellbeing	• The CEMP is to identify risks to health and wellbeing on a site-by-site basis and would include appropriate mitigation measures. • The CEMP would account for cumulative impacts of construction given concurrent works in the precinct. • Health impacts would be addressed as part of the CEMP, including watering exposed areas to minimise dust impacts, using non-tonal reversing indicators, and fitting construction machinery with appropriate muffling devices.
Social sustainability and community functioning	• Staging of works would be designed to minimise disruption, ensuring that community activities and functions can still take place.

Source: *Based on Technical Paper 3 – Social Impact Assessment, Volume 3*

Three main mitigation measures are proposed to be implemented during the construction and operational phases of the CSELR proposal to mitigate the potential economic impacts identified for the Randwick Precinct. These include the preparation of the following:

- Through liaison with businesses and landowners, access plans would be developed to establish existing servicing and delivery requirements, access periods or alternative arrangements for businesses and landowners affect by the proposal. These access plans would also identify alternative routes specific activities or land uses (such as schools, medical centres etc) within each precinct and would identify strategies to maintain emergency access throughout each precinct at all times. Further details regarding the proposed traffic management strategies for the Randwick Precinct are provided in section 15.3.3.
- A business and landowner engagement and management plan would provide ongoing information to businesses and landowners potentially affected by the proposal, through a variety of sources including information packs, a website, regular newsletters/brochures and email alerts. The plan would also identify effective means for ongoing cooperation and communication with the business community.
- The CEMP would outline a range of mitigation measures to minimise the level of disturbance created as a result of construction related activities. The CEMP would contain a number of additional plans to manage specific impacts such as noise or traffic. Further details regarding the CEMP for the CSELR proposal is provided in Chapter 18.