



16. Local impacts: Kensington/Kingsford Precinct

Chapter 16 details the existing character and environment of the Kensington/Kingsford 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).

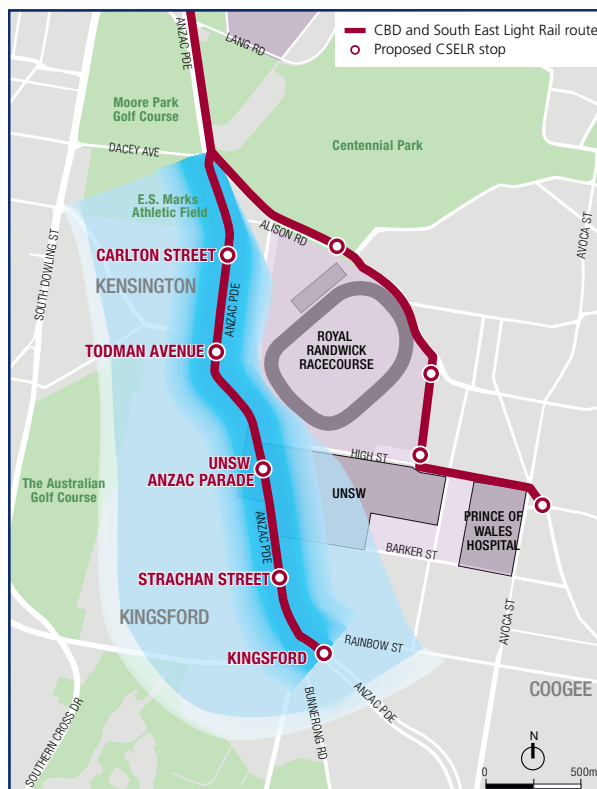
16.1 Key characteristics of the precinct

Kensington and Kingsford are residential suburbs of South East Sydney that have developed primarily along the Anzac Parade corridor that runs through both suburbs.

Kensington is known for its world class educational institutions which are key landmarks along Anzac Parade, including the University of New South Wales (UNSW) and National Institute of Dramatic Art (NIDA). The suburb has a high prevalence of apartments, which are primarily located close to Anzac Parade from the north of the suburb down to Doncaster Avenue. These are home to many students, young singles and couples. Kensington also has grand Victorian and Federation style family homes.

Kingsford is a mixture of one and two-storey single dwellings as well as larger homes near the prestigious Australian Golf Course. Apartment buildings are clustered at the northern reaches of the suburb along Anzac Parade. A key feature of the Kingsford streetscape is the well-known Nine Ways roundabout, connecting road users to nine possible destinations.

Figure 16.1 Kensington/Kingsford Precinct



Anzac Parade is a unifying feature of Kingsford and Kensington and home to many types of businesses and facilities including chemists, accountants, medical practices, pubs, restaurants and the well-known Peter's of Kensington. There are also several childcare centres, community halls and places of worship along the alignment. The South Sydney Juniors Rugby League Club (The Juniors) located to the south-east of the Nine Ways is a popular local club for dinner, shows and activities for the community throughout the year. Kensington/Kingsford is only served by buses, which have a significant presence on Anzac Parade.

UNSW and NIDA have a strong influence on the demographic profile of the precinct and make it popular place for students and young people to live. The Kensington/Kingsford Precinct is also a hub of ethnic diversity with less than half of residents born in Australia. The most common countries of origin are China, Indonesia and Malaysia. In line with this diversity, less than half of the population speaks only English at home, with Mandarin, Greek, and Cantonese the most common other languages spoken.

16.2 Key community concerns for the precinct

Based on community consultations to date (refer Chapter 2), key community issues for the Kensington/Kingsford Precinct have been identified as:

- *Traffic impacts during construction and operation of the CSELR* — In particular potential traffic impacts on Todman Avenue and Doncaster Avenue were raised as concerns, in relation to traffic displacement caused by the reduced lanes on Anzac Parade. In addition, increased traffic congestion from the proposed Randwick Urban Activation Precinct (UAP) and the Kingsford light rail stop was seen as an issue due to the potential impact on traffic in and around Kensington and Kingsford.
- *Bus service changes* — In particular, the reduction of services from Sydney's South East suburbs to the Sydney CBD and the interchange between buses and the light rail service were raised as concerns. The capacity of light rail to meet the number of people currently travelling on buses was also a concern. Additionally the need for the CSELR service was also questioned, as the current bus service in this area was viewed as efficient and was perceived to have better travel times than the proposed CSELR service.
- *Construction and operation noise* — This was raised as a key issue for local residents and for the residential colleges at UNSW. In particular, noise levels associated with the light rail vehicles (LRVs) and warning bells. Construction noise was also flagged as an issue for residents, and students residing, studying and sitting exams adjacent to construction worksites along the alignment.
- *Loss of parking* — In particular, the loss of parking on Anzac Parade and the impact on the car park at the proposed Kingsford stop were raised as concerns. The loss of parking was seen to have negative impacts on access to local businesses. This may place additional strain on parking in the area which is used by commuters from other areas to catch bus services to the CBD. The proposed Randwick UAP, in combination with the introduction of a major light rail network, were seen as increasing the need for parking in the area, at the same time as decreasing total parking capacity along the CSELR alignment.

16.3 Local traffic, transport and access

16.3.1 Existing conditions

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

Roads

Existing road network

The existing road network within the Kensington/Kingsford Precinct is shown in Figure 16.2a and Figure 16.2b. Anzac Parade is the only major road in the Kensington/Kingsford Precinct that would be directly affected by the CSELR proposal.



Anzac Parade is a major north-south State arterial road under the care and control of NSW Roads and Maritime Services (RMS). It provides a significant connection for road traffic accessing the Sydney CBD. The traffic along this road is mainly generated by the trips to UNSW and the City from the eastern suburbs, including Moore Park, Kensington, Kingsford, Randwick, Eastlakes, Maroubra, Chifley, Malabar and Little Bay.

The section of road between Alison Road and the Nine Ways intersection is a divided six-lane road with two through-traffic lanes in each direction and dedicated kerbside bus/parking lanes along the entire north-south length of the corridor. A number of dedicated turning lanes are provided at key intersections.

The Alison Road/Anzac Parade intersection is one of the major intersections along Anzac Parade and accommodates over 7,000 vehicle movements during the morning peak hour (7.45–8.45 am). This intersection is located near to the Moore Park sports and entertainment complex and the Royal Randwick racecourse, which regularly generate large crowds during weekends.

Similar to Alison Road, but to a lesser extent, Todman Avenue is a major signalised intersection that links Anzac Parade traffic with Southern Cross Drive. The peak traffic movements at the intersection, during weekdays, occur mainly during the morning and afternoon peak periods; whereas during the weekend, peak flows occur in the afternoon period equivalent to approximately 90 per cent of the peak weekday traffic.

The intersection of High Street and Anzac Parade provides access to three major developments within the precinct — Royal Randwick racecourse, UNSW and the Randwick hospitals (Sydney Children's Hospital and Prince of Wales Hospital). Although other access points are available for these developments, the High Street and Anzac Parade intersection serves as one of the major points of access for these developments.

The roundabout intersection of Anzac Parade, Rainbow Street, and Gardeners Road (commonly referred to as the Nine Ways intersection) accommodates volumes exceeding 4,000 vehicles in the afternoon peak hour (4.45–5.45 pm).

Existing traffic operating patterns

Anzac Parade currently operates at capacity during weekday peak hour periods — approximately 5,700 vehicles in both the maximum morning and afternoon peak hours. The corridor currently experiences a high level of congestion with large delays to vehicles at the major intersections of Dacey Avenue/Alison Road and High Street. Bus-only lanes along the main carriageway, from Gardeners Road to Alison Road, provide priority to buses in both the morning and afternoon peaks. However, the buses still experience significant delays at signalised intersections.

Existing peak hour traffic volumes and composition

A summary of the peak traffic volumes travelling along Anzac Parade is provided in Table 16.1. The composition of the traffic (i.e. types of vehicles) on this road is outlined in Figure 2.26 of Technical Paper 1. Private light vehicles make up the majority of vehicles travelling along Anzac Parade.

Table 16.1 Average weekday morning and afternoon peak traffic volumes – Kensington/Kingsford Precinct

INTERSECTION	MORNING PEAK TRAFFIC (AVERAGE NO. VEHICLES)			AFTERNOON PEAK (AVERAGE NO. VEHICLES)		
	CITY-BOUND	OUTBOUND	PEAK DIRECTION SPLIT	CITY-BOUND	OUTBOUND	PEAK DIRECTION SPLIT
Anzac Parade/ Alison Road	3,448	2,284	60% city-bound	2,515	2,966	54% outbound
Anzac Parade/ Gardeners Road	1,548	746	67% city-bound	1,220	1,208	50% city/ outbound

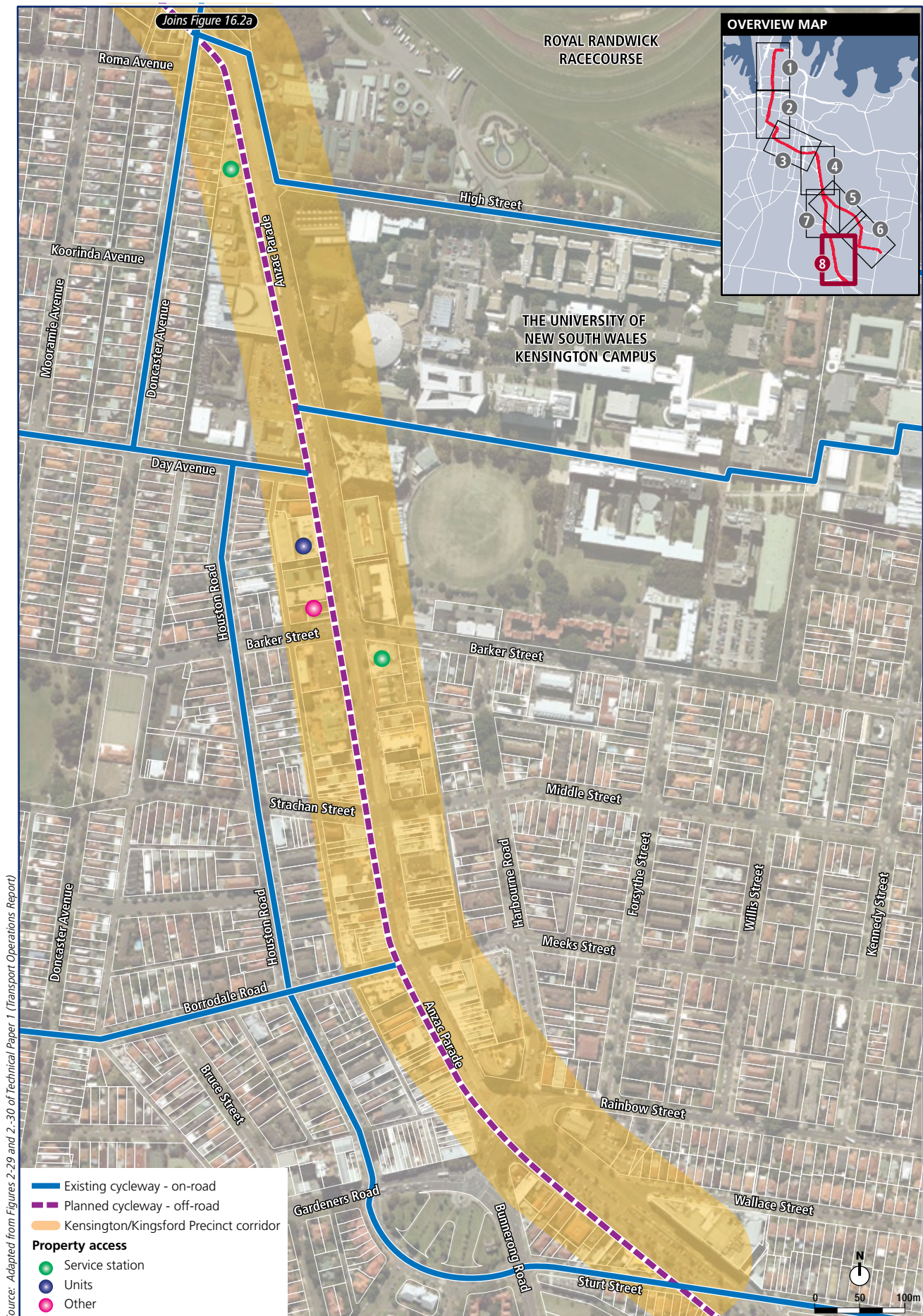
Source: Adapted from Table 2-34 of Technical Paper 1 – Transport Operations Report, Volume 2

Figure 16.2a Kensington/Kingsford Precinct – Existing traffic, transport and access





Figure 16.2b Kensington/Kingsford Precinct – Existing traffic, transport and access



Existing intersection performance

A summary of the performance of key intersections along Anzac Parade is provided in Table 16.2. Intersection performance in Table 16.2 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 could be expected.
- *Delay* — This represents the number of seconds a vehicle is delayed at an intersection.

The intersection of Anzac Parade and Alison Road/Dacey Avenue has the lowest level of performance with average delays greater than 60 seconds and an LoS of F during the morning peak hour.

Table 16.2 Existing intersection performance – Kensington/Kingsford Precinct

INTERSECTION	PEAK HOUR	EXISTING INTERSECTION PERFORMANCE		
		LoS	DoS	AVERAGE DELAY (SECONDS)
Anzac Parade/High Street (Anzac Parade Alignment)	AM	B	0.83	28.0
	PM	D	0.94	44.3
Anzac Parade/Dacey Avenue/ Alison Road	AM	F	0.98	73.5
	PM	D	0.90	50.2

Source: Adapted from Table 2-35 of Technical Paper 1 – Transport Operations Report, Volume 2.

Parking and kerbside access

Existing parking supply on the CSELR corridor

Kensington sub-precinct

Kerbside bus lanes run the entire north-south length of the Anzac Parade corridor, with on-street parking permitted in signed locations outside of the weekday peak periods (6 am–10 am and 3 pm–7 pm). The Kensington sub-precinct is characterised by medium-density residential apartment buildings and detached dwellings as well as sporting facilities (ES Marks Athletics Field, Moore Park Golf Course), street level retail and food premises.

The number of existing parking spaces and special kerbside uses within the Kensington sub-precinct is described in Table 16.3.



Table 16.3 Existing special kerbside uses and parking supply on the CSLER corridor in the Kensington sub-precinct

KERBSIDE RESTRICTION	SPECIAL KERBSIDE USES AND PARKING SUPPLY WITHIN THE KENSINGTON SUB-PRECINCT BY TIME PERIOD		
	PRE-MORNING PEAK ¹	INTERPEAK ¹	POST-AFTERNOON PEAK ¹
Car share, hospital, mail zone	1	1	1
Disability parking	0	0	0
Loading zone	0	0	0
Taxi zone	0	0	0
Total – Special Kerbside Use	1	1	1
Short stay parking (≤ 1P)	4	52	31
Long-stay parking (restricted)	7	7	0
Long-stay parking (unrestricted)	73	94	119
Total – General Parking	84	153	150

Source: Table 2-36 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.

Kingsford sub-precinct

Kerbside bus lanes run the entire north-south length of Anzac Parade in the Kingsford sub-precinct with on-street parking permitted in signed locations after hours. In this area, Anzac Parade has a number of general traffic parking spaces along with four loading zones. The land uses adjacent to the kerbside uses include medium and high-density residential apartment buildings as well as education facilities (the UNSW and the NIDA), street level retail, restaurants and cafes.

The number of existing parking spaces and special kerbside use zones within the Kingsford sub-precinct is outlined in Table 16.4.

Table 16.4 Existing special kerbside uses and parking supply on the CSLER corridor in the Kingsford sub-precinct

KERBSIDE RESTRICTION	SPECIAL KERBSIDE USES AND PARKING SUPPLY WITHIN THE KINGSFORD SUB-PRECINCT BY TIME PERIOD		
	PRE-MORNING PEAK ¹	INTERPEAK ¹	POST-AFTERNOON PEAK ¹
Car share, hospital, mail zone	0	0	0
Disability parking	0	0	0
Loading zone	4	4	2
Taxi zone	2	2	2
Total – Special Kerbside Use	6	6	4
Short-stay parking (≤ 1P)	32	68	25
Long-stay parking (restricted)	20	20	4
Long-stay parking (unrestricted)	173	173	232
Total – General Parking	225	261	261

Source: Table 2-37 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.

Existing parking supply, demand and occupancy in the broader Kensington/Kingsford Precinct

A parking occupancy survey was undertaken for the Kensington/Kingsford Precinct during May 2013. The survey extent is shown in Figures 16.3 to 16.8 and included the proposed CSELR corridor as well as streets parallel to the corridor and within a potential walking catchment of the proposed light rail stops, 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
- inter peak — between 10.00 am and 2.00 pm
- post-afternoon peak — after 6.30 pm.

The parking supply and demand quantities that have been used to calculate the average occupancy were based on parking spaces available to general traffic use. The general traffic use included time restricted parking and non-restricted parking only. Ancillary special kerbside uses, such as loading and bus zones, were excluded to avoid skewing the analysis.

For the purpose of the parking assessment, the Kensington/Kingsford Precinct has been split into the following two sub-precincts:

- Kensington — comprising the section of Anzac Parade located between the Alison Road/Dacey Avenue intersection and Day Avenue, as shown in Figures 16.3 to 16.5
- Kingsford — comprising the section of Anzac Parade located between the Anzac Parade/Day Avenue intersection and south of the Nine Ways intersection, as shown in Figures 16.6 to 16.8.

Kensington sub-precinct

The distribution of unrestricted and time restricted parking spaces within the broader Kensington sub-precinct is shown in Figures 6.5 to 6.7 of Technical Paper 1.

The occupancy survey results for the broader Kensington sub-precinct are illustrated in Figures 16.3 to 16.5, with summary data outlined in Table 16.5. The key trends from the parking occupancy analysis of the existing Kensington sub-precinct network include:

- General parking supply within the broader Kensington sub-precinct is lower during the pre-morning peak (before 7.30 am), with bus-only lanes along the western side of Anzac Parade implementing early morning parking restrictions.
- The parking occupancy for the pre-morning peak (before 7.30 am) is consistent across the broader Kensington sub-precinct.
- Parking occupancy is greatest during the interpeak (10.00 am to 2.00 pm), with zone 2 showing the greatest inter-peak increase in demand.

Table 16.5 Parking supply, demand and occupancy for Kensington sub-precinct

ZONE	PRE-MORNING PEAK ^{1,2}			INTERPEAK ^{1,2}			POST-AFTERNOON PEAK ^{1,2}			DAILY % HIGH TURNOVER
	DEMAND	SUPPLY	OCCUPANCY	DEMAND	SUPPLY	OCCUPANCY	DEMAND	SUPPLY	OCCUPANCY	
Zone 1	501	654	77%	570	706	81%	510	703	73%	35%
Zone 2	538	702	77%	647	755	86%	594	732	81%	33%
Total	1,039	1,356	77%	1,217	1,461	83%	1,104	1,435	77%	34%

Source: Table 6-11 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 16.3 Average pre-morning peak (before 7.30 am) parking occupancy and parking survey zones - Kensington sub-precinct



Source: Adapted from Figures 6.26 and 6.19 of Technical Paper 1 - Transport Operations Report

Figure 16.4 Average interpeak (10 am–2 pm) parking occupancy and parking survey zones – Kensington sub-precinct





Figure 16.5 Average post-afternoon peak (after 6.30 pm) parking occupancy and parking survey zones – Kensington sub-precinct



Kingsford sub-precinct

The distribution of unrestricted and time restricted general parking spaces within the broader Kingsford sub-precinct is shown in Figures 6.8 and 6.10 of Technical Paper 1.

The occupancy survey results for the Kingsford sub-precinct are illustrated in Figures 16.6 to 16.8 with summary data outlined in Table 16.6. The key trends from the parking occupancy analysis of the existing Kingsford sub-precinct network include:

- The area designated as sub-precinct zone 1 contains a large proportion of the parking supply within the broader Kingsford sub-precinct.
- Parking occupancy remains low throughout the day within sub-precinct zone 2, ranging between 36 per cent and 53 per cent.
- The greatest occupancy rates were observed during the interpeak (10.00 am to 2.00 pm), with zones 1 and 3 experiencing the greatest uplift in demand.

Table 16.6 Parking supply, demand and occupancy for Kingsford sub-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	822	1,275	64%	1,113	1,335	83%	961	1,335	72%	40%
Zone 2	154	423	36%	230	436	53%	210	439	48%	45%
Zone 3	472	890	53%	732	888	82%	635	888	72%	32%
Total	1,448	2,588	56%	2,075	2,659	78%	1,806	2,662	68%	38%

Source: Table 6-12 of Technical Paper 1 – Transport Operations Report, Volume 2.

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

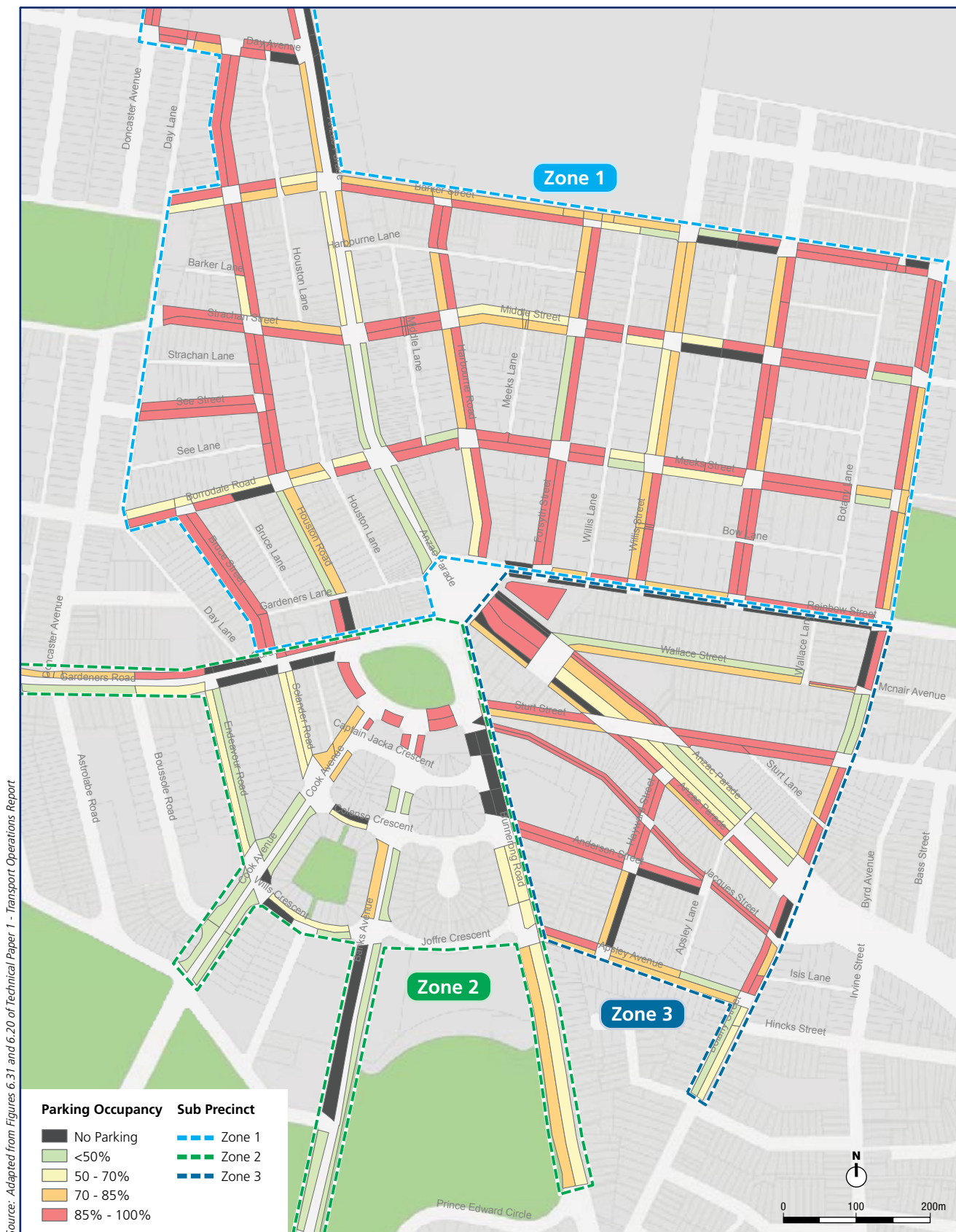
Note 2: Pre-morning peak = before 7.30 am; Interpeak = 10.00 am to 2.00 pm; Post-afternoon peak = after 6.30 pm.



Figure 16.6 Average pre-morning peak (before 7.30 am) parking occupancy and parking survey zones - Kingsford sub-precinct



Figure 16.7 Average interpeak (10 am–2 pm) parking occupancy and parking survey zones – Kingsford sub-precinct





Property access

The locations of property accesses along Anzac Parade within the Kensington/Kingsford Precinct are shown in Figure 16.2a and Figure 16.2b. Major driveway accesses are predominantly used to access high-density units, which are generally concentrated at the northern end of the precinct. There are also numerous lower-density residential accesses, four service stations and access to two local businesses along the corridor. All movements are restricted to left-in left-out arrangements through physical separation by a central median on Anzac Parade.

Bus services

The Anzac Parade corridor is a major bus route for city services (including express) and cross-regional bus services. Dedicated peak hour bus lanes along Anzac Parade provide priority to buses in the peak direction (approximately 80 bus services during peak hours). During off-peak hours, the bus lanes are utilised for time-restricted parking. Parking is generally permitted along the section of Anzac Parade between Alison Road and the Nine Ways intersection outside of the weekday peak periods (6 am–10 am and 3 pm–7 pm).

Cyclists

The bicycle network within the Kensington/Kingsford Precinct is shown in Figures 16.2a and b. There are no formal cycleways provided along Anzac Parade within the Kensington/Kingsford Precinct. The majority of cyclists travelling along the proposed CSELR alignment currently use footpaths; while bus lanes are also permitted for use by cyclists; however, this shared use creates potential conflict and safety issues for cyclists.

It is noted that outside of the Kensington/Kingsford Precinct, a section of the Anzac Parade (between Cleveland Street to Dacey Avenue) is identified as an on-road segregated bicycle route and the remaining sections are considered as a planned bicycle route under the Randwick City Council bicycle route network map.

Pedestrians

Pedestrian access facilities along Anzac Parade within the Kensington/Kingsford Precinct comprise sealed footpaths, five signalised mid-block crossings, seven signalised intersection crossings and kerb ramps. Pedestrian activity is generated from residential and commercial properties, small businesses, sporting grounds, a high school and the UNSW campus. Walking trips from the surrounding bus stops around the university result in a significant number of pedestrians on the network during a typical peak hour.

16.3.2 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 are summarised below for the Kensington/Kingsford Precinct.

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 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 that are proposed within the Kensington/Kingsford Precinct as part of the CSELR proposal are shown in Figures 16.9a and b and described in the following sections.



Anzac Parade/Alison Road intersection

To minimise traffic capacity reduction at the Anzac Parade/Alison Road intersection, a two stage transition would be adopted to transfer the CSELR proposal from the eastern side of Anzac Parade into the median, south of Alison Road. This two stage crossing would allow light rail to run concurrently with key traffic movements, which would in turn provide a 20–35 per cent reduction in light rail delays at the intersection and an increase in traffic capacity of 5 per cent when compared to a single transition through the intersection. The specific design details of this intersection and the transition are currently under review by RMS and Transport for NSW.

Anzac Parade

The CSELR proposal would run generally in the central median of Anzac Parade, with the exception of at the proposed UNSW Anzac Parade stop, where it would cross to the eastern side of the road. Key changes proposed along Anzac Parade were developed, taking into consideration the constrained Anzac Parade cross-section and the need to accommodate light rail stops at strategic locations to service the residential catchments and other land uses in the area.

The functional changes proposed along Anzac Parade as part of the CSELR proposal include the following:

- A minimum of two traffic lanes along Anzac Parade would be retained in each direction. Where achievable, an additional city-bound lane would be provided which would operate as a peak period bus-only lane and off-peak parking zone.
- 3.5 metre wide shared bus and light rail running lanes would be provided between the Kingsford stop and High Street for normal bus services. This would include an additional short bus-only lane adjacent to the proposed light rail track on approach to Meeks Street (southbound).
- 4.2 to 4.4 metre wide light rail island platforms would be provided along the middle of the corridor.
- Right-turn movements at Doncaster Avenue would be consolidated into a single right-turn at Todman Avenue, as illustrated in Figure 16.9a.
- The right-turn from Anzac Parade into Day Avenue would be banned. This would require the rerouting of bus services that currently make this manoeuvre. Pending further approval by Randwick City Council and investigation of impact to bike lanes, this route would likely be via Doncaster Avenue.
- Right-turn movements from Anzac Parade between Barker Street and Meeks Street would be consolidated into a single right-turn at Barker Street, as illustrated in Figure 16.9b.
- The existing signalised pedestrian crossing would be relocated to adjacent to the Carlton Street stop.
- The existing Nine Ways roundabout intersection would be reconstructed and upgraded to incorporate traffic signals.
- Physical separation would be provided between light rail and general traffic, particularly at locations where right-turns off Anzac Parade were previously permitted but would be prohibited in the future.
- An off-line UNSW Anzac Parade light rail stop would be provided that caters for the large CSELR travel demand to the university.

The above measures aim to maximise utility of the available road space whilst ensuring light rail, bus and traffic operations are balanced as effectively as possible.

Due to the operation of CSELR proposal in the median of Anzac Parade, a reduction in existing right-turn locations would be required south of Alison Road; however, the following right-turns would be permitted:

- southbound right-turn into Dacey Avenue
- southbound and northbound right-turns into Todman Avenue
- northbound right-turn into High Street
- southbound and northbound right-turn into Barker Street.

Figure 16.9a and Figure 16.9b show the permitted right-turn provisions from Anzac Parade.

UNSW Anzac Parade stop

UNSW Anzac Parade would be one of the busiest stops along the CSELR alignment in terms of forecast boarding and alighting passengers. As such, the stop design deviates from the centre alignment of Anzac Parade and interfaces directly with the UNSW campus on the eastern side, with the objective of creating a safe and direct access for students and staff, without the need to cross Anzac Parade in either direction. The use of university land to accommodate part of the stop infrastructure also provides an opportunity to minimise impacts to the existing road cross-section.

Kingsford stop and bus interchange

The Kingsford stop would be a critical bus to light rail transfer point (as the southern terminus on the Anzac Parade corridor). It would service approximately 90 buses per hour in the peak direction during the morning and afternoon peaks. The interchange would provide for highly legible, efficient bus to light rail and light rail to bus transfers.

Whilst serving the immediate catchment of Kingsford, the interchange is also designed to service a wider catchment, including La Perouse, Maroubra and suburbs to the south. The Kingsford stop is therefore planned to operate as the primary bus/light rail interchange for customers from the South East suburbs, for journeys to and from the CBD.

The design would provide a cross platform interchange between bus and light rail in both directions of travel. The interchange would be located in the centre median of Anzac Parade to the south of the Nine Ways intersection. This design would provide separation of bus and light rail movements between the platforms and the Nine Ways intersection, before converging into a shared bus and light rail running arrangement to ensure bus passengers continue to receive a degree of priority over general traffic as at present.

A light rail 'jump signal', citybound at the Nine Ways intersection, coordinated with the main north/south traffic phase at Meeks Street, would ensure light rail priority and safe merging of these movements.

Shared running of all bus services and light rail would continue between the Nine Ways intersection and Meeks Street. Non-express (local) bus services would then merge/diverge from the light rail alignment on approach to the Meeks Street intersection via short bus 'turn' bays adjacent to the light rail lanes on the Anzac Parade approaches to the intersection. The bus-only lanes would operate in a separate phase to the light rail to allow co-ordinated movements into and out of the central alignment.

Conversion of the Nine Ways roundabout to a signalised intersection would be required to allow integration of the Kingsford stop and to provide safe, controlled pedestrian access points across Anzac Parade. Initial modelling of the intersection by Transport for NSW indicates the current intersection design would operate at an LoS of E in the morning peak and an LoS of C in the afternoon peak. This indicates that whilst the intersection operates with spare capacity in the afternoon peak, it would be operating at capacity in the morning peak. Further design work is ongoing to optimise the intersection in consultation with Transport for NSW and RMS.

A turnback track would be provided to allow LRVs to operate via dedicated inbound and outbound platforms, which are co-located with inbound and outbound bus services respectively.



Figure 16.9a Functional changes to the road network – Kensington/Kingsford Precinct



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

Figure 16.9b Functional changes to the road network – Kensington/Kingsford Precinct





Light rail stop access and egress

Detailed access plans for each of the proposed light rail stops within the Kensington/Kingsford Precinct (including any key actions to address potential multimodal access, customer safety, or to improve access) are provided in section 7.3 of Technical Paper 1.

Operational impacts on property access

The proposed CSELR alignment within the Kensington/Kingsford Precinct would be located predominantly within the central median of Anzac Parade. Property accesses would be maintained during the operational phase of the CSELR proposal; however, access arrangements to some properties may change.

Ongoing consultation would be undertaken with owners of properties with direct access onto the CSELR corridor to determine specific access arrangements.

Operational impacts on cyclists

Cycle storage facilities would be provided at the Kingsford stop, providing opportunities for cyclists to change mode onto the light rail.

Operational impacts on pedestrians

Pedestrian activity is expected to increase in the vicinity of the proposed light rail stops and crossing facilities would be provided at these locations to permit safe access. Pedestrian access to the Kingsford stop would also be provided via signalised crossings on all approaches to the Nine Ways intersection.

Operational impact on buses

In order to maintain bus priority, an option for ‘shared running’ of bus and light rail is proposed. The design allows for buses and light rail to share the same road space in the centre of Anzac Parade between Rainbow Street and the UNSW Mall. Shared running north of Meeks Street would only be made available to those express bus services proposed to be retained to minimise the operational impacts to light rail. It is anticipated that any retained express services would re-join the main traffic flow adjacent to the UNSW Mall crossing and would do so during the dedicated light rail phase at this crossing point. Buses would not stop while undertaking shared running to avoid delays to CSELR operations.

Non express services would exit the shared running alignment at the Meeks Street intersection via a bus-only signal phase to allow them to access the kerbside bus stops along Anzac Parade.

Transport for NSW’s forecasts expect the Anzac Parade express bus services (X92, X94, X96, X97, and X99) to carry approximately 2,800 passengers in the morning peak hour if retained (Transport for NSW 2013a), which is similar to the forecast light rail patronage at Kingsford. The need for efficient light rail operations at the same time as priority for these bus routes was therefore an important consideration for this corridor.

Introduction of the CSELR proposal along the Anzac Parade corridor would reduce the cross-section available for general traffic and bus priority lanes. To mitigate the impacts to existing bus priority the following measures are proposed:

- In locations where the cross-section permits five traffic lanes, the design would introduce a dedicated city-bound bus-only lane.
- Kingsford stop would provide direct platform interchange for bus and light rail passengers.
- Shared running of bus and light rail movement would be provided through the proposed signalised nine-ways intersection.

It is expected that the CSELR proposal would reduce the need for existing bus services to connect to the CBD. Transport for NSW forecasts 1,454 passengers would access light rail at Kingsford during the morning peak hour, with 1,277 (88 per cent) transferring from bus and 177 (12 per cent) from walk up (Transport for NSW 2013).

As with other precincts, bus services in the region are anticipated to comprise a mix of suburban services feeding the light rail and cross-regional services travelling to non-CBD destinations such as the airport and Bondi Junction. For the Kensington/Kingsford Precinct, suburban services feeding the light rail would not be expected to terminate at the stop, but rather continue along Anzac Parade to terminate just north of the UNSW at Todman Avenue.

Operational impacts on parking and kerbside access

The CSELR proposal would result in the removal of 400 parking spaces from the broader Kensington/Kingsford Precinct. The impacts on on-street parking and other kerbside access zones within the Kensington/Kingsford Precinct are described in the following sections (with the sub-precincts defined in section 16.3.1).

Kensington sub-precinct

During off-peak hours, on-street parking within the proposed bus-only lanes on Anzac Parade would be retained. The city-bound bus-only lane extends along Anzac Parade between UNSW and Alison Road, except adjacent to the Carlton Street stop where the carriageway would be restricted to two traffic lanes in each direction.

On-street loading/unloading zones would be retained wherever possible within the western kerbside bus lanes outside of peak hours. No taxi zones are currently located along the section of Anzac Parade within the Kensington sub-precinct.

Parking spaces that would be impacted by the CSELR proposal operations are detailed in Table 16.7. The key parking supply impacts within the Kensington sub-precinct would be associated with the loss of long stay parking (unrestricted). This would include sections of Anzac Parade where no restrictions apply outside of the clearway hours of operation. It is noted, however, that 14 short-stay parking ($\leq 1P$) spaces would be retained along Anzac Parade (within the proposed bus-only lanes), which would be available during off-peak hours.



Table 16.7 On-street special kerbside uses and parking supply impacted by the CSELR proposal – Kensington sub-precinct

KERBSIDE RESTRICTION	SPECIAL KERBSIDE USES AND PARKING SUPPLY IMPACTED WITHIN THE KENSINGTON 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	1	0	1	0	1	0
Disability parking	0	0	0	0	0	0
Loading zone	0	0	0	0	0	0
Taxi zone	0	0	0	0	0	0
Total – Special Kerbside Uses	1	0	1	0	1	0
Short stay parking (≤1P)	4	0	38	14	17	14
Long stay parking (restricted)	7	0	7	0	0	0
Long stay parking (unrestricted)	73	0	94	0	119	0
Total – General Parking	84	0	139	14	136	14

Source: Table 6-7 of Technical Paper 1 – Transport Operations Report, Volume 2.

The existing demand for parking in the corridor of the Kensington sub-precinct that would be directly impacted by the CSELR proposal varies throughout the day between 74 and 121 spaces. This demand can be broken down as follows:

- Zone 1 includes impacted parking along Anzac Parade from Alison Road through to Todman Avenue. Demand on this section of Anzac Parade is between 30 and 49 vehicles.
- Zone 2 includes impacted parking along Anzac Parade between Todman Avenue and Day Avenue. Demand on this section of Anzac Parade is between 44 and 72 vehicles.

The assessment of the operational impacts of the CSELR proposal on the Kensington sub-precinct is set out below:

- A reduction in general parking supply of 139 spaces.
- Available capacity of 244 general parking spaces during the peak period under existing parking demands.
- Post implementation, there would be sufficient latent capacity of approximately 105 spaces (equivalent to seven per cent of potential capacity) across the Kensington sub-precinct to absorb displaced demand

At the local level, each of the sub-precincts is projected to retain sufficient capacity to accommodate demand within the local area surrounding the proposed CSELR corridor. However, this would be subject to the implementation of appropriate parking management measures to balance supply and demand.

The loss of parking spaces from Anzac Parade would be managed through the implementation of appropriate controls (i.e. duration of stay) to ensure availability of remaining on street capacity on the corridor and in surrounding streets is maximised through efficient turnover of the available spaces.

Adoption of appropriate parking management measures to balance supply and demand would be considered. Transport for NSW would work through implementation of these measures to manage kerbside activity with Randwick City Council.

Kingsford sub-precinct

Parking spaces within the Kingsford sub-precinct that would be impacted by the CSELR proposal operations are detailed in Table 16.8. These would include median and kerbside parking along Anzac Parade, in the vicinity of the CSELR proposal. The impact to long stay parking (unrestricted) would be primarily confined to the off-street parking within the Anzac Parade median south of the Nine Ways. The proposed central running CSELR alignment and kerbside travel lanes would impact on short stay parking along Anzac Parade.

No designated loading zones are currently located within the vicinity of the Kingsford stop; however, these may be introduced as part of the parking strategy for the CSELR proposal. Taxi bays would be provided at the Kingsford stop.

Table 16.8 On-street special kerbside uses and parking impacted by the CSELR proposal operations – Kingsford sub-precinct

KERBSIDE RESTRICTION	SPECIAL KERBSIDE USES AND PARKING SUPPLY IMPACTED WITHIN THE KINGSFORD 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	0	0	0	0	0	0
Disability parking	0	0	0	0	0	0
Loading zone	4	0	4	0	2	0
Taxi zone	2	0	2	0	2	0
Total – Special Kerbside Uses	6	0	6	0	4	0
Short stay parking (≤1P)	32	0	68	0	25	0
Long stay parking (restricted)	20	0	20	0	4	0
Long stay parking (unrestricted)	173	0	173	0	232	0
Total – General Parking	225	0	261	0	261	0

Source: Table 6-8 of Technical Paper 1 – Transport Operations Report, Volume 2.

The existing demand for parking in the corridor of the Kingsford sub-precinct that would be directly impacted by the CSELR proposal varies throughout the day between 80 and 204 spaces. This demand can be broken down as follows:

- Zone 1 includes impacted parking along Anzac Parade from Day Avenue through to Rainbow Street. Demand on this section of Anzac Parade is between 9 and 60 vehicles.
- Zone 3 includes impacted parking along Anzac Parade between Rainbow Street and Sturt Street, including off-street parking on Anzac Parade, south of the Nine Ways. Demand on this



section of Anzac Parade is between 71 and 148 vehicles.

The assessment of the operational impacts of the CSELR proposal on the Kingsford sub-precinct is set out below:

- A reduction in general parking supply of 261 spaces.
- Available capacity of 584 general parking spaces during the peak period under existing parking demands.
- Post implementation, there would be sufficient latent capacity of approximately 323 spaces (equivalent to twelve per cent of potential capacity) across the Kensington sub-precinct to absorb displaced demand.
- Parking demand and supply within zone 1 and zone 3 are forecast to operate at an 'effective' capacity during the busiest peak period, however with increased availability during the inter peak periods.

If existing demand levels are maintained, then parking utilisation would be close to effective capacity allowing for inefficiency in demand and supply. In order to maximise the benefit of available capacity for high priority users (including disabled spaces, servicing and loading spaces, short-stay parking for local business and long-stay for residents) and noting the potential for induced demand from the Kingsford stop, Transport for NSW would work with Randwick City Council to consider controls to restrict parking to key uses and remove unrestricted parking.

16.3.3 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. Key findings are summarised below for the Kensington/Kingsford Precinct.

Construction traffic management

Within the Kensington/Kingsford Precinct, the construction of the CSELR proposal would be staged to maximise the capacity of Anzac Parade for traffic and, where possible, to implement the ultimate operational configurations (i.e. the proposed functional changes to the road network, as discussed in section 16.3.2) along the CSELR alignment. This would involve maintaining a minimum of two lanes of traffic along Anzac Parade in both directions during the daytime and limiting construction activities at major intersections to weekend periods to minimise traffic impact on peak hour traffic and public transport operations.

Locations with proposed light rail stops would require staged night works with traffic controls, including traffic deflections, kerb barriers and a 40 kilometre per hour speed limit. Traffic controls would be removed before the morning peak.

The permanent closure of the median gaps at Abbotford Street, Carlton Street and Ascot Street would be implemented during the construction phase. This would force the right-turn movements at these intersections to be consolidated at the intersection of Todman Avenue (with the new right-turn facility from Anzac Parade south to Todman Avenue east).

During construction, it is probable that there may be multiple activities along various sites on Anzac Parade at any one time. These would be managed so that accesses to adjacent developments are maintained. In particular, concurrent construction activities may occur within UNSW adjacent to Anzac Parade, which would require local traffic management measures that consider the UNSW development's traffic management plans.

The proposed traffic management strategies that would be adopted for key roads in the Kensington/Kingsford Precinct directly impacted by the construction of the CSELR proposal are outlined in Table 16.9.

Table 16.9 Proposed traffic management for key roads directly impacted by the construction of the CSELR proposal – Kensington/Kingsford Precinct

ROAD	PROPOSED TRAFFIC MANAGEMENT
Alison Road	Given the important function of the intersection during peak weekday and weekend periods, the intersection works would be undertaken during week nights to minimise the impact on adjacent developments and the road network. The construction of the CSELR alignment across Alison Road would be undertaken in stages to maintain a minimum of two lanes of travel in each direction during construction. The proposed staging across the intersection is contained in Appendix B.6 of Technical Paper 2. If intersection works are limited to weeknights only, the duration of the intersection works would exceed 14 weeks. However, there may be opportunities where no events are scheduled in the Moore Park Precinct and during periods of lower background traffic volumes (such as Christmas/New Year) when intersection works would be feasible during the weekend period. Further discussions with Centennial Parklands, Royal Randwick racecourse, UNSW and other stakeholders would be undertaken to explore potential targeted periods.
Todman Avenue	To minimise the impact during journey to work/education trips, as well as the wider road network, the CSELR construction across the Todman Avenue intersection would be staged during the weekend. The staging would not impact on the north-south capacity of Anzac Parade; however, during some stages, the right-turn movement from Todman Avenue east to Anzac Parade north would not be accommodated. Therefore, the right-turn movements onto Anzac Parade northbound would be accommodated at the adjacent Doncaster Avenue intersection during construction activities at Todman Avenue. The intersection staging plans are contained in Appendix B.7 of Technical Paper 2.
High Street	Similar to Todman Avenue, 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 with total flows representing approximately 90 per cent of the weekday traffic. The average weekend flows are lower overall when compared to weekday flows. Therefore, the High Street intersection works would be staged during the weekend. This would also ensure that university express bus services remain operational during weekday peak hours. Furthermore, construction activities at the intersection would be avoided, wherever possible, during special events at the racecourse or the university during the weekends. The staging of the High Street intersection works would maintain all existing movements at the intersection; however, the existing dual right-turn from High Street would need to be restricted to a single lane during these weekend closures. Vehicles exceeding 12.5 metres would be prohibited from turning at this intersection. This would require bus operations between High Street and Anzac Parade to be limited to 12.5 metres long buses. Furthermore, heavy vehicle deliveries to Royal Randwick racecourse and UNSW would need to utilise alternate access points such as Doncaster Avenue (for the racecourse) and Barker Street (for the university) during the scheduled weekend periods when construction activities are carried out at the intersection of High Street and Anzac Parade. The proposed staging plan of for the High Street intersection works is contained in Appendix B.8 of Technical Paper 2.
Rainbow Street/ Gardeners Road (Nine Ways)	As per the operational phase of the CSELR proposal, right-turn vehicle movements from Anzac Parade south to Rainbow Street would be prohibited during construction. These movements would be accommodated at the downstream intersection at Barker Street or earlier upstream at adjoining roads and accessing Avoca Street. The interim layout would require removal of the existing kerb blisters surrounding the roundabout island as well as minor adjustments of the roundabout island to increase capacity. Upon completion of the light rail trackworks within the interim intersection worksite, the final road layout would be implemented to allow construction of the northern section of the Nine Ways intersection. The interim layout would allow for the installation of the southern light rail trackwork as well as the removal of the roundabout island and formation of the final intersection layout. With the implementation of the ultimate layout, the worksite required for the northern trackwork would be facilitated. Minor interruptions to the intersections would be required during overhead wiring installation as well as during changeovers between the intersection layouts to facilitate installation of signals, linemarking, removal of kerb blisters and paving. These construction works would need to be undertaken during nightshifts to minimise the impact on traffic.



During track works adjacent to proposed light rail stops within the median of Anzac Parade, the road width would be insufficient to accommodate both traffic and construction activities. Therefore, construction within constrained road widths would be undertaken in stages to maintain two lanes of traffic in each direction along Anzac Parade during peak daytime periods, and one lane in one direction during night works.

The staged construction of track works adjacent to the platforms would require closure of a single lane. These track works would occur during night shifts with speed restrictions along the corridor. After each night shift, the barriers would be positioned within the CSELR corridor to allow dual lanes in each direction prior to the start of the morning peak traffic.

Construction impacts on property access

The access strategy proposed during the construction of the CSELR proposal is to maintain the proposed operational (end-state) right-turn opportunities along Anzac Parade intersections wherever possible during construction. However, during construction works at key intersections, alternative access routes would be provided, in consultation with RMS, to ensure sufficient capacity is maintained. These alternative access routes would include:

- Doncaster Avenue as an alternative access route when Todman Avenue is closed
- Meeks and Middle Streets as alternatives access routes when Barker Street is closed
- Barker Street as an alternative access route when High Street is restricted.

The only periods where access may be affected would be during intersection works at Todman Avenue and Doncaster Avenue. Since these intersections would be key locations for vehicles accessing properties bounded by Anzac Parade, Doncaster Avenue and Alison Road, construction activities at Todman Avenue and Doncaster Avenue would need to be carried out separately.

Similarly, the right-turn movements from Anzac Parade at the Day Avenue, Strachan/Middle streets and Borrodale/Meeks streets intersections would be banned during both the construction and operational phases. This would limit right-turn movements to the intersection of Anzac Parade and Barker Street. Therefore, intersection works at Strachan/Middle streets and Borrodale/Meeks streets would not coincide with works at Barker Street.

Construction impacts on parking

The impact on on-street general parking within the Kensington/Kingsford Precinct during the construction of the CSELR proposal would be consistent with that proposed during the operational phase (refer section 16.3.2).

In summary the general parking supply would reduce by 139 spaces, north of Day Avenue, and 261 spaces between Day Avenue and Sturt Street. However, as discussed in section 16.3.2, the parking demand would be accommodated within the wider Kensington/Kingsford Precinct.

Construction impacts on existing bus services

During construction, opportunities to maintain the bus priority lanes between the Nine Ways intersection and UNSW would be limited, as only two lanes of traffic would be accommodated in each direction, with the loss of an additional lane adjacent to the proposed Strachan Street light rail stop during evening works. As such, the existing level of bus reliability would be potentially affected; however, other bus priority measures are currently being developed by Transport for NSW and could be initiated during the construction phase.

One measure would be to facilitate tidal flow operation on Anzac Parade to provide a peak direction bus lane along the kerbside lane and two peak direction traffic lanes. This would mean the non-peak traffic movement is constrained to a single lane, which is the subject of further traffic analysis. The tidal flow would ideally be effective between the proposed CSELR crossing of Anzac Parade (in the vicinity of the UNSW Anzac Parade stop) and the Nine Ways intersection, as these two locations provide ideal switch-over layouts, especially for the UNSW transition and interim Nine Ways intersection. For the final layout, the switchover would need to be facilitated at the intersection of Meeks and Borrodale streets.

North of Barker Street, the UNSW express buses would continue to operate via Anzac Parade and High Street, at bus stops adjacent to existing locations. However, vehicle movements between High Street and Anzac Parade would be limited to 12.5 metres during weekend construction works. Therefore, existing bus routes that utilise articulated buses would need to be restricted to 12.5 metre long buses, on weekends, during construction works at the intersection of High Street and Anzac Parade.

Consideration could also be given to local diversions such as Houston Road, between Gardeners Road and Day Avenue; however, this would result in a significant impact on a local residential street. Therefore, this would only be considered as a last resort and would following extensive feasibility investigations.

Construction impacts on pedestrians and cyclists

The existing pedestrian footpaths located along both sides of Anzac Parade would generally be maintained during construction, with the exception of during kerb realignments and services relocations where the footpaths would be narrowed and localised diversions would be in place to protect pedestrians from the road activities.

During intersection works, pedestrian crossing opportunities would be maintained either by providing an alternate crossing at an adjacent location or maintaining the existing pedestrian facility. However, at locations where proposed CSELR alignment is near the pedestrian facility, pedestrians would need to be diverted to an alternate footpath prior to the works zone being established. For example, the High Street intersection and UNSW platform works would require the closure of the pedestrian footpath between High Street and the UNSW main entrance and diversion of pedestrians to the western side Anzac Parade. Although this would extend the length of the pedestrian trips, access to destinations would be maintained.

There are currently no cycle facilities provided along Anzac Parade between Alison Road and the Nine Ways intersection. Cyclists are observed to utilise Anzac Parade both on-road and off-road along the footpaths, where widths permit. The lack of pavement markings or signs suggest that these are informal cycle movements, which would likely continue to occur along Anzac Parade, with no special provisions for cyclists.

Construction impacts on emergency vehicle access

No special access provisions would be provided for emergency vehicles adjacent to construction worksites within the Kensington/Kingsford Precinct. It is assumed that emergency services would travel via the open general traffic lanes along Anzac Parade 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, only on approach to the block, and the adjacent traffic lanes would form the key access point.

Construction impacts on taxis

There are limited taxi facilities along the proposed CSELR corridor within the Kensington/Kingsford Precinct. A taxi rank is located along Anzac Parade, south of the Nine Ways intersection (adjacent to the South Sydney Junior Leagues Club). This taxi zone would be permanently relocated upon commencement of construction. A potential alternative location for the taxi zone is along the Wallace Street frontage of the South Sydney Juniors Club. The establishment of the taxi zone in this location would be further investigated during detailed design, in consultation with Randwick City Council.

16.3.4 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 within the Kensington/Kingsford Precinct during the operation of the CSELR:

- Transport for NSW would continue to work with Randwick City Council and RMS to mitigate the local traffic impacts and potential increased traffic flows that may occur on local roads as a result of the CSELR proposal.
- A minimum of two traffic lanes would be retained along Anzac Parade in each direction. Where achievable, an additional city-bound lane would be provided which would operate as a peak period bus-only lane and off-peak parking zone.
- 3.5 metre wide shared bus and light rail running lanes would be provided on Anzac Parade between the Kingsford stop and High Street for normal bus services. This would include an additional short bus-only lane adjacent to the proposed light rail track on approach to Meeks Street (southbound).
- Right-turn movements that provide access to Doncaster Avenue from Anzac Parade would be consolidated into a single right-turn at Todman Avenue, as illustrated in Figure 16.9a.
- The right-turn from Anzac Parade into Day Avenue would be banned and bus services that currently make this manoeuvre would be rerouted. Pending further Randwick City Council approval and investigation of impact to bike lanes, this route would likely to be via Doncaster Avenue.
- Right-turn movements from Anzac Parade between Barker Street and Meeks Street would be consolidated into a single right-turn at Barker Street, as illustrated in Figure 16.9b.
- One existing signalised pedestrian crossing of Anzac Parade, south of Goodwood Street, would be relocated to be adjacent to the Carlton Street stop.
- The existing Nine Ways roundabout intersection would be reconstructed and upgraded to incorporate traffic signals.
- Physical separation would be provided between light rail and general traffic, particularly at locations where right-turns off Anzac Parade were previously permitted but would be prohibited in the future.
- The following right-turns from Anzac Parade would be permitted:
 - southbound right-turn into Dacey Avenue
 - southbound and northbound right-turns into Todman Avenue
 - northbound right-turn into High Street
 - southbound and northbound right-turn into Barker Street.
- The existing on-road shared path along the eastern kerb of Anzac Parade between Moore Park Road and Alison Road would be retained.
- Cycle storage facilities would be provided at the Kingsford stop, providing opportunities for cyclists to change mode onto the light rail.
- Property accesses would be maintained during the operational phase of the CSELR proposal; however, access arrangements to some properties may change. Ongoing consultation would be undertaken with owners of properties with direct access onto the CSELR corridor to determine specific access arrangements.
- Pedestrian crossing facilities across Anzac Parade would be provided to permit safe access to the proposed light rail stops situated within the central median of Anzac Parade.
- Pedestrian access to the Kingsford stop would be provided via signalised crossings on all approaches to the Nine Ways intersection.
- To mitigate the impacts that the introduction of the CSELR proposal would have to existing bus priority along Anzac Parade (due to a reduced cross-section available for general traffic and bus priority lanes) the following measures are proposed:
 - In locations where the cross-section permits five traffic lanes, the design would introduce a dedicated city-bound bus-only lane.
 - The Kingsford stop would provide direct platform interchange for bus and light rail passengers.
 - Shared running of bus and light rail movement would be provided through the proposed signalised Nine Ways intersection.

- Parking management measures to improve the future balance between car parking supply and demand and to maintain effective spare capacity to meet varied demands would be investigated during detailed design. Transport for NSW would work through implementation of these measures to manage kerbside activity with Randwick City Council.
- For the Kingsford sub-precinct, controls on remaining parking spaces (to restrict parking to key uses and removing unrestricted parking) would be investigated during detailed design with the aim of maximising the benefit of available parking capacity for high priority users (including disabled parking, servicing and loading, short-stay parking for local business and long-stay parking for residents). Transport for NSW would work through implementation of these measures to manage kerbside activity with Randwick City Council.
- 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.
- 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 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 Kensington/Kingsford Precinct:

- A minimum of two lanes of traffic would be maintained along Anzac Parade in both directions during the daytime.
- Construction activities at major intersections would be limited to weekend periods to minimise traffic impact on peak hour traffic and public transport operations.
- Construction works at locations with proposed light rail stops would be undertaken during staged night works (where required) with traffic controls including traffic deflections, kerb barriers and a 40 kilometre per hour speed limit. Traffic controls would be removed before the morning peak.
- The closure of the median gaps at Abbotford Street, Carlton Street and Ascot Street would be implemented during the construction phase.
- Multiple construction activities occurring concurrently at multiple sites along Anzac Parade would be managed so that accesses to adjacent developments are maintained.
- CSELR construction works at the Alison Road/Anzac Parade intersection would be undertaken during week nights to minimise the impact on adjacent developments and the road network.
- CSELR construction works across the Todman Avenue intersection would be staged during the weekend.
- The High Street intersection works would be staged during the weekend. Construction activities at the intersection would be avoided, wherever possible, during special events at Royal Randwick racecourse or UNSW during the weekends. The staging of the High Street intersection would maintain all existing movements at the intersection; however, the existing dual right-turn from High Street would need to be restricted to a single lane during these weekend closures.



- The right-turn movement from Anzac Parade south to Rainbow Street would be permanently banned at the commencement of construction. Right-turn movements would be accommodated at the downstream intersection at Barker Street or earlier upstream at adjoining roads and accessing Avoca Street.
- Overhead wiring works and changeovers between the intersection layouts at the Nine Ways intersection (to facilitate installation of signals, linemarking, removal of kerb blisters and paving) would be undertaken during nightshifts to minimise the impact on traffic.
- Right-turn opportunities along Anzac Parade intersections would be maintained during construction wherever possible and consistent with the proposed operational configuration. Where such opportunities cannot be maintained, alternative access routes would be provided, in conjunction with RMS, to ensure sufficient capacity is maintained. These alternative access routes would include:
 - Doncaster Avenue as an alternative access route when Todman Avenue is closed
 - Meeks and Middle streets as alternative access routes when Barker Street is closed
 - Barker Street as an alternative access route when High Street is restricted.
- Construction activities at Todman Avenue and Doncaster Avenue would be undertaken at separate times to minimise impacts to access.
- Intersection works at Strachan/Middle streets and Borrodale/Meeks streets would not coincide with works at Barker Street to minimise impacts to access.
- Transport for NSW would investigate bus priority measures to be implemented along Anzac Parade to maintain the existing level of bus reliability during construction works. The preferred measure would be to facilitate tidal flow operation on Anzac Parade to provide a peak direction bus lane along the kerbside lane and two peak direction traffic lanes. The final bus priority measures to be implemented would be determined in consultation with Randwick City Council and RMS.
- Opportunity to relocate the existing taxi rank from Anzac Parade (south of the Nine Ways intersection and adjacent to the South Sydney Junior Leagues Club) to the Wallace Street frontage of the South Sydney Juniors Club would be investigated during detailed design, in consultation with Randwick City Council.

16.4 Local property and land use

16.4.1 Existing conditions

Existing land use patterns, land use features and an overview of the potential future developments within the Kensington/Kingsford Precinct area are described below. Figure 16.10a and Figure 16.10b identify the major existing land uses in the Kensington/Kingsford Precinct adjacent to the proposal. Figures 16.11a and b identify current land use zoning.

Existing property and land uses within the vicinity of the proposal

The Kensington/Kingsford Precinct typically includes three main land uses, each centred on the main transport route of Anzac Parade. The predominant land use within the precinct is low and medium-density residential housing. The areas of medium-density housing are typically focused around the commercial and retail centres of Kensington (towards the northern end of the precinct) and Kingsford (towards the southern end of the precinct). Commercial and retail uses within the two local centres represent the second main land use within the Kensington/Kingsford Precinct. This includes small food retail outlets, some clothing stores, doctors/medical services and the South Sydney Juniors Rugby Leagues Club at the southern end of the precinct.

The final dominant land use within the Kensington/Kingsford Precinct is the lower campus of the UNSW which includes the associated NIDA campus on the western side of Anzac Parade.

Photographs of the typical land uses within the Randwick Precinct are shown in Figure 16.12 to Figure 16.16.

Planning controls

The *Randwick Local Environmental Plan 2012* (Randwick LEP) describes the land use zoning within the Kensington/Kingsford Precinct (refer to Figure 16.11a and Figure 16.11b). The zoning within the Kensington/Kingsford Precinct generally aligns with the land uses described above, comprising four main zones: 'R2 – Low Density Residential'; 'R3 – Medium Density Residential'; 'B2 – Local Centre' along the main alignment of Anzac Parade; and the 'SP2 – Infrastructure' zone for UNSW. 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.

The areas of medium-density housing are generally three to four storeys in height, with some buildings ranging from nine to twelve storeys along the main alignment of Anzac Parade. This is generally consistent with the building heights permitted under the Randwick LEP, which generally allow for heights between 24 and 31 metres adjacent to Anzac Parade within the identified town centres, and between 9.5 metres and 12 metres outside of the main corridor. Based on existing land uses permitted under the Randwick LEP, the existing permissible building heights indicate that the immediate areas around the Carlton Street stop, Todman Avenue stop and Strachan Street stop represent areas of potential development opportunity.

OVERVIEW MAP

1 2 3 4 5 6 7 8

MOORE PARK PRECINCT
KENSINGTON/KINGSFORD PRECINCT

Dacey Avenue

E.S. Marks Athletic Field

Tay Reserve

CENTENNIAL PARK

MOORE PARK

Salisbury Road

Carlton Street

Peters of Kensington

Goodwood Street

Ascot Street

Bowral Street

TODMAN AVENUE

Kensington Public School

Addison Hotel

Medical Suite

'Uni lodge'

Doncaster Hotel

Masonic Temple

Join Figure 16.10b

Legend:

- Proposed CSELR stop
- Proposed CSELR alignment
- Proposed CSELR stop platforms
- Precinct boundary
- Residential
- Business/commercial
- Mixed use (typically residential with groundfloor retail)
- Community facilities/education/hospitals
- Open space
- Substations
- Temporary acquisition
- Permanent acquisition

Scale: 0 50 100m

North Arrow

Figure 16.10b Kensington/Kingsford Precinct – Land use and property

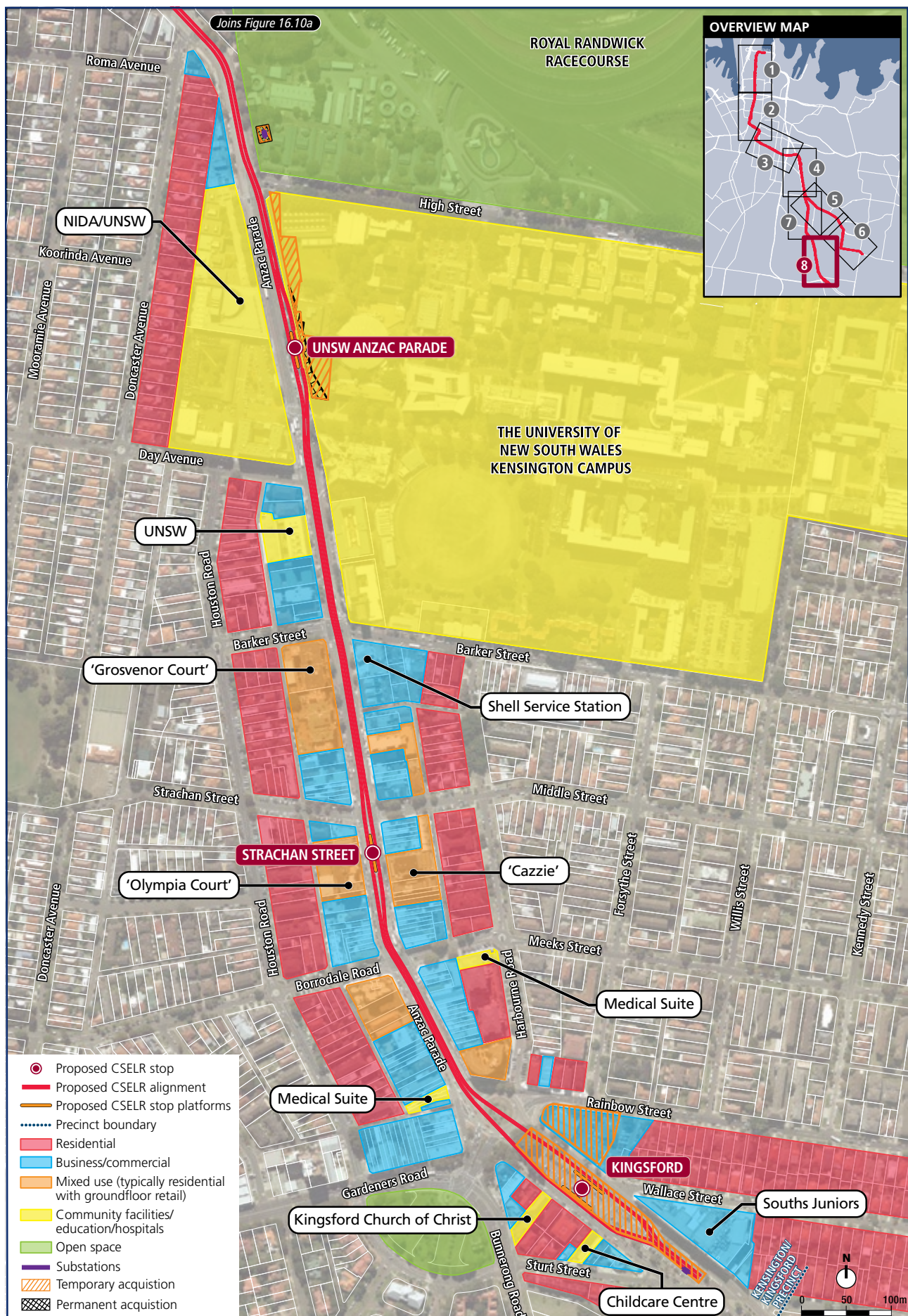




Figure 16.11a Kensington/Kingsford Precinct – Existing land use zoning

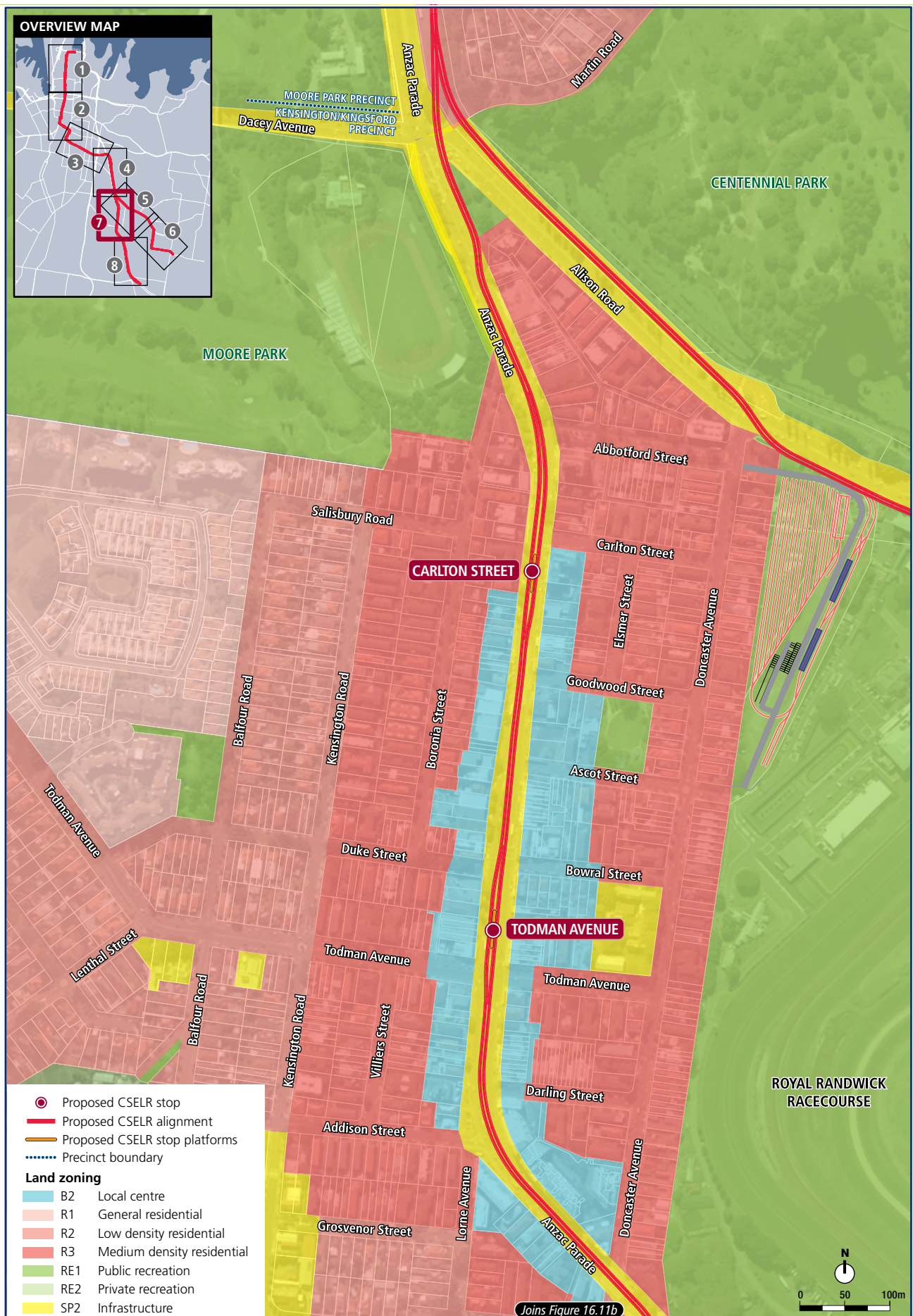


Figure 16.11b Kensington/Kingsford Precinct – Existing land use zoning

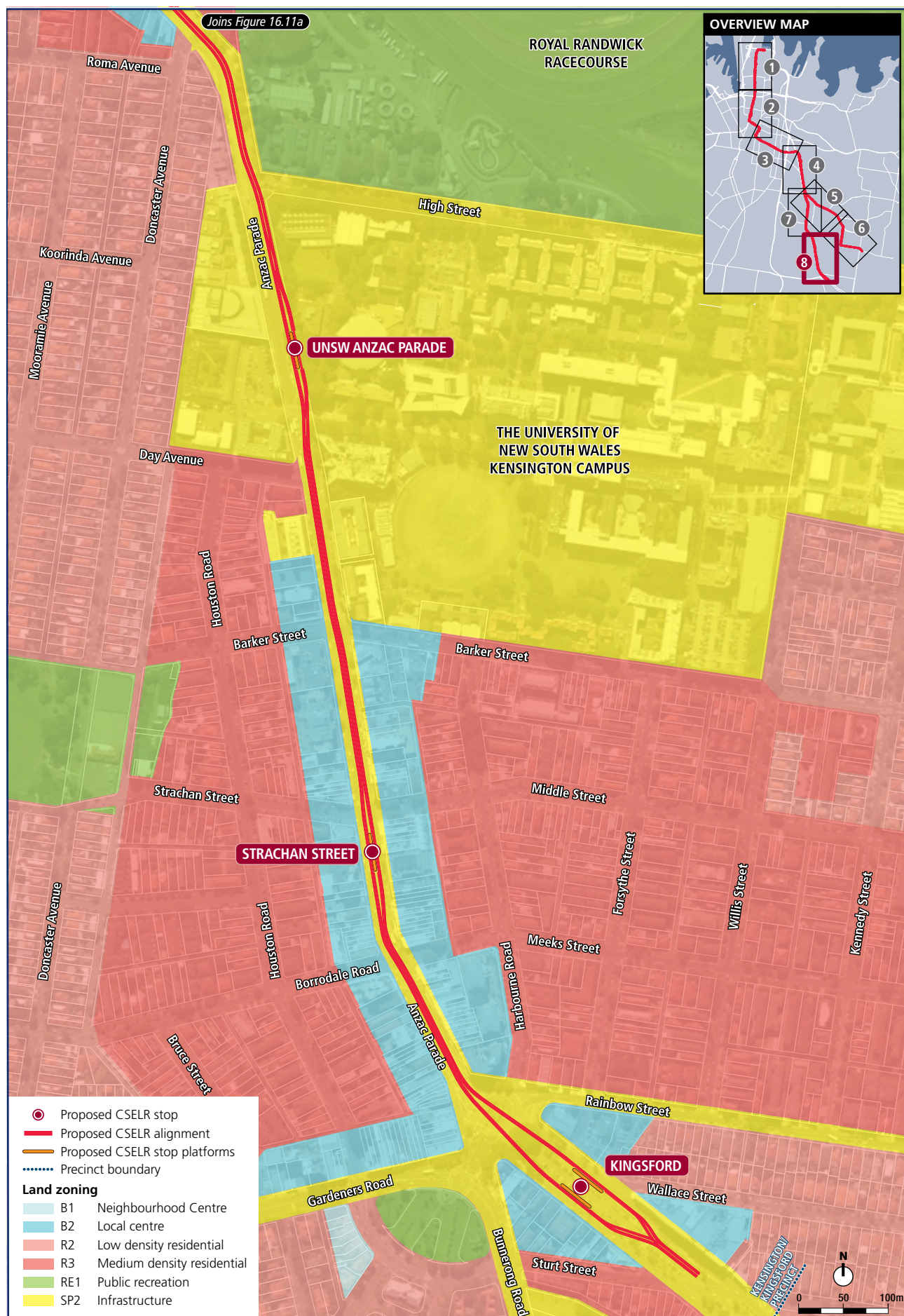




Figure 16.12 Photographs of the existing land uses along Anzac Parade including older, medium density developments (top and centre) and more recent higher density residential development near Addison Street, Kensington (bottom)



Source: Parsons Brinckerhoff 2013

Figure 16.13 Photograph of the existing land uses along Anzac Parade within the Kingsford town centre



Source: Parsons Brinckerhoff 2013

Figure 16.14 Photograph of the new high density residential development recently constructed along Anzac Parade within the Kingsford town centre



Source: Parsons Brinckerhoff 2013



Figure 16.15 View of the existing Nine Ways intersection



Source: Parsons Brinckerhoff 2013

Figure 16.16 View looking south towards the South Sydney Juniors Rugby League Club



Source: Parsons Brinckerhoff 2013

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, three major future urban land uses have been identified within the vicinity of the Kensington/Kingsford Precinct that would impact on the existing land use. These developments are described below.

UNSW Campus development

The UNSW is currently investing approximately \$400 million across three major projects at its Kensington campus:

- \$110 million Kensington Colleges development
- \$145 million Wallace Wurth building redevelopment
- \$145 million Materials Science and Engineering Building.

An overview of each of these projects is provided below.

Kensington Colleges development

This comprises construction of five new colleges to replace three colleges previously demolished. The colleges will provide housing for up to 920 students and are expected to open in early 2014 at a total cost of \$110 million.

Wallace Wurth building redevelopment

Redevelopment of the existing Wallace Wurth building will modernise facilities and expand floor space from 13,000 to 21,000 square metres. The building will house the Kirby institute and contribute to creating a biomedical research precinct on UNSW's upper campus. Scheduled for completion in March 2014, the building is expected to accommodate over 1,250 students and 750 research personnel at a total cost of \$145 million.

Materials Science and Engineering Building

Construction of a new building will support the teaching and research of materials science and engineering. The building will be ten storeys high with approximately 20,000 square metres floor space. Planned for completion in 2015, the expected total cost of the project is \$145 million.

Randwick Urban Activation Precinct (UAP)

As described in sections 9.3 and 15.4.1, the UAP is currently being investigated for a range of development opportunities within the Randwick local government area. As with the Randwick Precinct, potential opportunities for growth are being investigated within the Randwick UAP that have the potential to affect the Kensington/Kingsford section of the CSELR proposal. Investigations within the Randwick UAP would typically centre on the proposed light rail stops on Anzac Parade, including the Todman Avenue stop, UNSW Anzac Parade stop and Kingsford stop.

Kingsford Town Centre Strategy

Randwick City Council has recently undertaken a study of the Kingsford Town Centre (Randwick City Council 2013a) to develop a strategy and actions for improving the future health and sustainability of the precinct. This precinct includes the existing retail strips along Anzac Parade and Gardeners Road in Kingsford. The strategy sets out a vision for the future, with objectives, targets and proposals to achieve the vision. It details how regeneration will be delivered and co-ordinated by the public and private sectors working in partnership together with other agencies.

The strategy identifies a range of opportunities for beneficial change to improve the natural and built environment, as well as the quality and range of attractions and services to strengthen the local economy.



16.4.2 Impacts during operation

Direct impacts on land use and property

The permanent footprint of the CSELR proposal within the Kensington/Kingsford Precinct would be largely within the existing road corridor along Anzac Parade. Whilst the proposal would result in a change in the composition of transport uses along Anzac Parade, the primary land use would be maintained.

As identified in section 5.3 and on Figure 16.10a and Figure 16.10b, some portions of land would be required to be permanently acquired as a result of the proposal. For the Kensington/Kingsford Precinct, these comprise:

- acquisition of portions of Randwick City Council land for the CSELR alignment
- acquisition of a small strip of land owned by UNSW adjacent to Anzac Parade for the UNSW Anzac Parade stop.

Land use integration and amenity

The implementation of the CSELR proposal may lead to some changes in the environment of Anzac Parade. Reduced traffic volumes (as a result of decreased bus routes and transport mode changes from private vehicles to the CSELR) would improve the amenity of the existing environment for those residents and commercial premises immediately adjacent to the route of the CSELR proposal. Additionally, the proposal would result in the removal of a number of trees along Anzac Parade (refer to section 16.6). However, the general upgrade of Anzac Parade as a result of the proposal would improve access to facilities on and around this major road. This has the potential to widen the range of activities in the immediate area, and improve access to community services.

Improvements are also anticipated in relation to air quality (reduced vehicle emissions) and noise levels as existing ambient noise levels in the vicinity of this location are higher than the predicted light rail noise levels (refer to section 16.5). Reduced bus vehicle levels are also anticipated at street level, which would have some general benefit to the surrounding area from reduced air pollution (refer to section 10.8). 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 Anzac Parade 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.

Pedestrian footpaths along Anzac Parade would be maintained during operation of the CSELR; however, the width of some footpaths may be reduced slightly. It is anticipated that any reduction in the width of existing pedestrian pathways would be suitable to meet existing and future pedestrian capacity.

No property severance impacts are anticipated to occur within the Kensington/Kingsford Precinct and access to existing services from the surrounding area is not expected to be impacted by the proposal. Access between both sides of Anzac Parade would continue in a similar manner as current. The proposed Kingsford stop, bus interchange and associated pedestrian crossing improvements are anticipated to provide an increased benefit for both public transport customers and local residents.

Impacts on future land uses and developments

The CSELR proposal would provide a substantial catalyst for influencing changes to the character, demographics and land uses within the Kensington/Kingsford Precinct. The existing planning controls that are provided along the main alignment of Anzac Parade provide the opportunity for growth of a series of transit-orientated developments, in particular around the commercial town centres of Kensington and Kingsford (refer to Figure 16.11a and Figure 16.11b). Implementation of the CSELR proposal would provide for increased development opportunities consistent with planning controls.

Additionally, the ongoing future development of the UNSW campus (section 16.4.1) and the development of the Randwick UAP would integrate positively with the CSELR through increased public transport provision.

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.

16.4.3 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 Kensington/Kingsford Precinct, these areas of temporary land take for proposed construction compound sites would comprise:

- temporary use of a portion of UNSW land adjacent to the area to be permanently acquired for the UNSW Anzac Parade stop as a temporary worksite
- temporary use of land adjacent to the Nine Ways intersection between Rainbow Street and Anzac Parade as a temporary worksite for the construction of the Kingsford stop.

The location of these temporary land uses are shown on Figure 16.11a and Figure 16.11b. The use of these sites would be subject to consultation with Randwick City Council and the UNSW.

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

The proposed works would affect the amenity of the Kensington/Kingsford Precinct throughout the construction period. The effects would result from a combination of the local impacts of construction noise, dust, general disturbance and disruption to traffic and access arrangements to properties affected by the construction activities. This may have an adverse effect on those businesses that rely heavily on pedestrian traffic, such as the various retail outlets and cafes located towards the southern end of the precinct centred around Strachan Street and the Nine Ways intersection. The amenity of UNSW would also be potentially affected by the construction of the proposal. Residents within the Kensington/Kingsford Precinct would also experience disturbance from construction activities, particularly those undertaken at night (where required).

Although amenity within the Kensington/Kingsford 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 Kensington/Kingsford 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 including night work, to minimise impacts to surrounding land uses and to ensure that access to retail, residential, educational and medical uses throughout the Kensington/Kingsford Precinct is maintained during construction.

16.4.4 Management and mitigation

To minimise the land use and property impacts of the CSELR proposal within the Kensington/Kingsford Precinct, consultation would occur with the surrounding businesses, the community and commuters, to advise 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 UNSW throughout construction of the proposal to minimise ongoing impacts to existing land uses.

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.



16.5 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 in relation to the Kensington/Kingsford Precinct.

16.5.1 Existing conditions

To outline the existing noise environment and determine likely impacts, noise catchment areas (NCAs) were defined. Figures 16.17a and Figure 16.17b show the extent of the NCAs considered for the Kensington/Kingsford Precinct, as well as noise monitoring locations (BG06, BG10 and BG11), and noise and vibration sensitive receptors. Noise and vibration sensitive receptors within the Kensington/Kingsford Precinct include residences, commercial premises, and numerous other special uses including childcare centres, horse stables at Royal Randwick racecourse, medical centres/clinics, places of worship, UNSW, NIDA and areas of open space/recreation. A list of these receptors is presented in Table 3 of Technical Paper 11.

Table 16.10 presents results of the unattended background noise monitoring at locations BG06, BG10 and BG11. The background monitoring results are presented in the form of the Rating Background Level (RBL) and average (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 associated decrease in traffic volumes in the area.

Table 16.10 Unattended noise monitoring results – Kensington/Kingsford Precinct

NOISE MONITORING LOCATION (REFER FIGURE 16.17A AND FIGURE 16.17B)	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}
BG06	53	65	50	65	39	61
BG10	59	72	57	71	46	68
BG11	57	66	54	65	48	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 at locations BG06, BG10 and BG11 to measure the noise sources that influence the existing environment. The results of the attended monitoring confirmed the influence of road traffic noise on Anzac Parade, construction works, horns, buses, pedestrians, birds, aeroplanes, wind in trees and other noise sources. The highest maximum noise levels (L_{Amax}) levels were observed for buses (up to 94 dBA) and road traffic on Anzac Parade (up to 85 dBA).

Figure 16.17a Kensington/Kingsford Precinct: noise catchment areas and noise monitoring locations





Figure 16.17b Kensington/Kingsford Precinct: noise catchment areas and noise monitoring locations



16.5.2 Impacts during operation

Potential noise and vibration impacts in the Kensington/Kingsford 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)
- operational noise from light rail stops and traction power substations.

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 Kensington/Kingsford Precinct, as described in section 16.3. These changes would not be expected to increase traffic numbers or road traffic noise impacts in the precinct. The noise impact of any changes to bus routes and daily bus movements that may be proposed in the Kensington/Kingsford Precinct are outside the scope of this assessment, as explained in Chapter 1 of this EIS (section 1.6).

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.

In accordance with guidance provided by the NSW Environment Protection Authority (EPA) in the *Rail Infrastructure Noise Guideline* (RING) (EPA 2013), non-mandatory noise trigger levels are referenced 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) (EPA 2000) 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 Kensington/Kingsford Precinct that would experience the highest airborne noise levels during a regular daily service are summarised in Table 16.11 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 light rail vehicles (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, daytime rail noise levels were predicted to increase by no more than 1 dB. Where exceedances of the L_{Aeq} and L_{Amax} noise trigger levels, under the RING are apparent, they are indicated in Table 16.11 in bold.



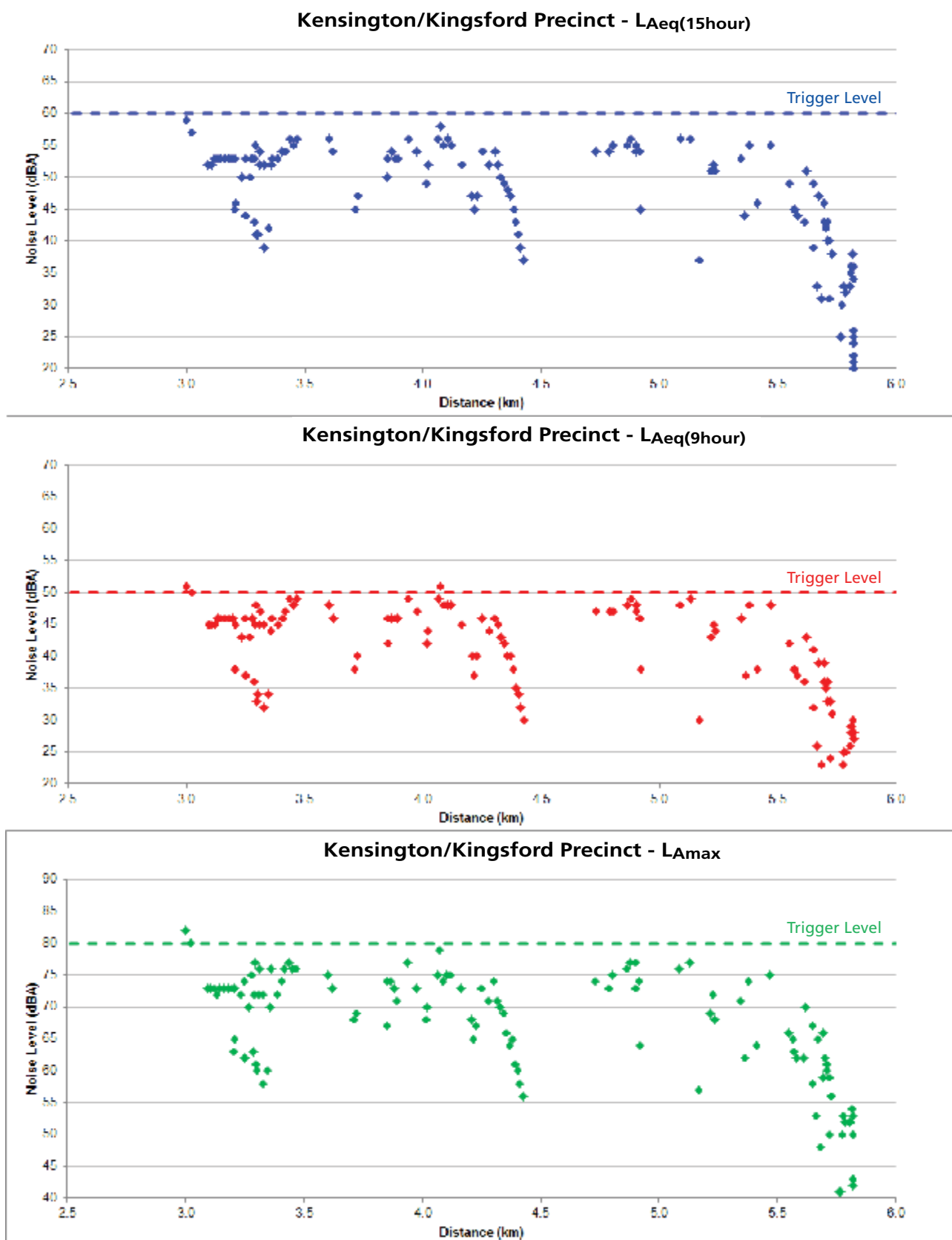
Table 16.11 Predicted worst-case airborne operational noise levels at residential receptors in Kensington/Kingsford Precinct – without mitigation

NCA (REFER FIGURES 16.17A AND FIGURE 16.17B)	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
NCA04.1	58	51	82	59	51	82
NCA04.2	57	51	79	58	51	79
NCA04.3	55	48	75	55	48	75

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 16.18, 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 16.18 Plots of predicted Kensington/Kingsford Precinct residential operational airborne noise for the 2036 future scenario (without mitigation)





As indicated in Table 16.12 and Figure 16.19 above, in the 2036 future scenario, operational L_{Aeq} noise levels at residential receptors on Anzac Parade were predicted to be within the noise goals with the exception of an exceedance of the night-time average trigger level of 1 dB and L_{Amax} by 2 dB in two locations. The affected locations are an apartment building on the south corner of Anzac Parade and Abbotford Street, and apartments (above shops) between Darling Street and Doncaster Avenue.

While noise monitoring was not undertaken on the section of Anzac Parade between Darling Street and Doncaster Avenue, the noise monitoring from other Anzac Parade locations (BG6 and BG10) confirmed that this area is exposed to high levels of road traffic noise (including from buses) at levels well above the predicted light rail noise levels. While some reduction in bus numbers along Anzac Parade would be expected with the CSELR, other road traffic is not expected to decrease.

Other noise sensitive receptors

Noise levels were also predicted for all other identified noise sensitive receptor locations adjacent to the proposed CSELR alignment in the Kensington/Kingsford Precinct. For the majority of these receptors, compliance with the relevant noise criteria (external noise trigger levels) was predicted. Predicted noise levels exceeded the adopted trigger levels at four sensitive receptor locations as summarised in Table 16.12. The predicted exceedances of the noise criteria are shown in bold.

Table 16.12 Predicted airborne operational noise criteria exceedances at other sensitive receptors in the Kensington/Kingsford Precinct – 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 – Tyree Energy Building	Educational	50	54	54
UNSW – 223 Anzac Parade	Educational	50	57	57
Masonic Temple	Place of Worship	50	53	54
NIDA	Theatre/Auditorium	50	53	54

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

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

The predicted exceedances may result from the conservative assumption that all receptors 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 busy roads, the above identified locations may have fixed glazing and provision of alternative ventilation such as air-conditioning, which would minimise noise impacts. This would be verified during the detailed design phase.

Furthermore, the existing ambient noise levels in the vicinity of these locations are higher than the predicted light rail noise levels.

Special event services

As special events services would serve the Moore Park sports and entertainment complex and Royal Randwick racecourse, these services would not have noise impacts in this precinct.

Light rail noise within the existing environment

Based on the baseline noise survey and the existing noise sources adjacent to the CSELR alignment (including road traffic and buses), the existing noise in the Kensington/Kingsford Precinct is already 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. 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 in the Kensington/Kingsford Precinct or elsewhere. For the Kensington/Kingsford Precinct, maximum VDV is estimated to be 0.05 metres per second^{1.75}, which is well below the VDV criterion of 0.1 metres per second^{1.75}.

Two potential exceedances of the 82 dBV screening criterion were predicted for locations in the precinct with potential vibration sensitive equipment, as shown in Table 16.13. The property owners would be consulted further during the detailed design phase of the proposal to confirm whether they possess vibration-sensitive equipment, and the form of mitigation required to avoid vibration impacts (refer mitigation discussion in section 16.5.4).



Table 16.13 Kensington/Kingsford Precinct - potential exceedances of operational screening criteria for vibration sensitive equipment

ADDRESS	DESCRIPTION	MAXIMUM 1/3 OCTAVE BAND FACADE VIBRATION LEVEL ¹ (dB re 10 ⁻⁹ METRES PER SECOND)
372 Anzac Parade, Kensington	St Kyrillos Medical and Dental Centre	86
Anzac Parade, Kensington	UNSW Buildings – Tyree Energy Technologies	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 5 dB 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 Kensington/Kingsford Precinct would be on or adjacent to a busy road (Anzac Parade) which, along with airborne noise from the LRVs, would be 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 Kensington/Kingsford Precinct, the assessment assumed high-resilience trackform would be required due to the concentration of noise sensitive receptors. This trackform would control ground-borne noise impacts on receptors where the façade provides a high level of attenuation to airborne noise, meaning ground-borne noise is more likely to be noticeable.

Very high attenuation trackform may also be required adjacent to the NIDA (215 Anzac Parade) to control ground-borne noise at this particularly sensitive receptor. This would be assessed in more detail at detailed design stage, and mitigation confirmed in consultation with the owner of this facility (as explained in section 16.5.4).

Noise from substation operations

Two potential traction power substation sites have been identified within the Kensington/Kingsford Precinct, as shown on Figure 16.17b. Table 16.14 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 from the Kingsford stop substation comply with the applicable noise goals.

However, for the Anzac Parade (High Street) substation a 2 dB exceedance of the night-time amenity goal was predicted. This substation can be designed to comply with the applicable INP noise goal (refer section 16.5.4).

Table 16.14 Predicted noise levels from substation operations – Kensington/Kingsford Precinct

SUBSTATION	RECEPTOR TYPE	OPERATIONAL NOISE (dBA)		COMMENTS
		L _{Aeq} CONTROLLING NOISE GOAL ¹	PREDICTED L _{Aeq} NOISE LEVEL	
Kingsford Stop	Residential	51	49	Complies with the noise goal
Anzac Parade, north of High Street	Residential	51	43	Complies with the noise goal
	Active recreation (racecourse stables)	58	60	Exceeds the noise goal of existing L _{Aeq} minus 10dB – mitigation required

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 further 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 applicable INP (EPA 2000) intrusiveness and sleep disturbance noise criteria.

At the proposed Carlton Street, Todman Avenue, UNSW Anzac Parade, Strachan Street and Kingsford stops, the nearest residential receptors are 12 to 60 metres from the stops. Existing noise levels along Anzac Parade are relatively high, and traffic noise would coexist with noise from the light rail stops. Notwithstanding likely compliance with the INP criteria, PA systems at these stops have the potential to cause annoyance to nearby residents. Passenger announcements from PA systems would be infrequent and limited to emergency situations or where notable disruptions in service occur. Given the low frequency of announcements, subjective impacts would be minimal.

Proposed mitigation to address the issue of subjective noise impacts from PA systems is outlined in section 16.5.4.

16.5.3 Impacts during construction

The beginning of section 12.5.3 in Chapter 12 provides an overview of potential construction noise impacts of the CSEL, which also applies to the Kensington/Kingsford Precinct.

Potential noise and vibration impacts in the Kensington/Kingsford Precinct were assessed in relation to the following:

- construction airborne noise (including general CSEL alignment and stops)
- construction road traffic noise
- construction ground-borne noise
- construction vibration.

These issues are discussed in turn in the following subsections.

Predicted construction airborne noise

Airborne construction noise was predicted for the likely construction activity categories and scenarios (without mitigation), as detailed in Table 16.15 for the Kensington/Kingsford Precinct.



Table 16.15 Summary of airborne noise scenarios considered – Kensington/Kingsford 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 binding	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
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

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 Appitack machine not used for this work. Appitack 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 predicted construction airborne noise impacts in the Kensington/Kingsford Precinct (exceedances of the adopted noise management levels or NMLs) associated with the activities and scenarios in Table 16.15 are summarised in Table 16.16 below.

Table 16.16 Summary of airborne construction noise level exceedances of NMLs – Kensington/Kingsford Precinct

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
Residential	1–28	3–47
Commercial	1–21	1–21
Other sensitive receptors	3–52	3–39

Source: Table 56 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, predominantly 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 applicable guideline (the *Interim Construction Noise Guideline* (ICNG, DECC 2009)) only requires the proposal to consider maximum noise levels where construction works are planned to extend over more than two consecutive nights.

Due to the close vicinity of the works, high exceedances of the NMLs were predicted at the nearest residences to the works during standard construction hours (exceedances up to 28 dB) and out of hours work (exceedances of up to 47 dB). Commercial and other sensitive receptors were also predicted to be subject to high NML exceedances of over 20 dB.

Within the Kensington/Kingsford Precinct, the most noise intensive works would be road excavation activities, which may 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 short-term peak ($L_{A1(\text{1 minute})}$) 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.

As discussed further in section 16.5.4, 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 Kensington/Kingsford Precinct, several roads are proposed to be used as construction haulage and access routes, as described in Chapter 6 (section 6.8) and summarised in Table 16.17 below.



Table 16.17 Construction road traffic noise assessment - Kensington/Kingsford Precinct

HAULAGE ROUTE	ROAD	PREDICTED TRAFFIC NOISE INCREASE (dB) ¹
North Movement	Anzac Parade	0.1
	Dacey Avenue	0.2
	South Dowling Street	0.1
	Eastern Distributor	0.5
	Wattle Street	0.2
West Movement	Cleveland Street	0.1
	City Road	0.1
	Parramatta Road	0.1
	Gardeners Road	0.2
South Movement	Anzac Parade	0.1

Source: Table 63 of Technical Paper 11

Note 1: Existing traffic noise levels based on Annual Average Daily Traffic (AADT) data available from the Roads and Maritime Services website: http://www.rta.nsw.gov.au/trafficinformation/downloads/aadtdata_dll.html

The additional road traffic is not predicted to create a discernible increase in road traffic noise at any locations in the Kensington/Kingsford Precinct as the increases are all 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.

Predicted construction ground-borne noise

Ground-borne construction noise is likely to be audible in the Kensington/Kingsford Precinct during rock breaker 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.

Notwithstanding the above, buildings with higher levels of external to internal sound insulation may mitigate airborne construction noise levels sufficiently such that internal ground-borne noise levels become dominant. As a result, additional assessment was undertaken in relation to ground-borne noise impacts at the commencement of construction at the NIDA, which predicted ground-borne noise levels of 43 dBA within the nearest internal area at NIDA. Noise levels at this magnitude could be audible during the quieter periods of shows.

While cinemas and theatres/auditoriums are considered sensitive receptors, during film screenings and shows, ambient noise levels are relatively high. Therefore the predicted ground-borne construction noise levels may be considered acceptable, considering the temporary nature of construction works. A range of mitigation options are available for addressing these impacts, as discussed in section 16.5.4.

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 Kensington/Kingsford Precinct. In summary, most works would be expected to comply with the relevant construction vibration guidelines. However, some items of construction equipment are proposed to be operated within 20 metres of residential receptors and within the recommended safe working distances for 'cosmetic damage' and 'human comfort' from construction vibration, 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 16.5.4.

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.

16.5.4 Management and mitigation

Airborne operational noise

As described in section 16.5.2, some minor exceedances of the RING operational noise trigger levels were predicted in the Kensington/Kingsford Precinct. For the CSELR, 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 Kensington/Kingsford Precinct, which is exposed to high levels of road traffic noise.

Exceedances were also predicted for some 'other sensitive' receptors in the precinct (refer Table 16.12). 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 these specific locations 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 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 that potentially contain vibration sensitive equipment, including the St Kyrillos Medical and Dental Centre and the UNSW Tyree Energy Technologies Building. 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.

High-resilience trackforms may be required to minimise ground-borne noise impacts at locations where sensitive receptors line the route.

To manage potential ground-borne operational noise impacts on sensitive receivers, consultation with NIDA would be required during the detailed design phase to confirm the sensitivity of this location to ground-borne operational noise. Investigations would establish the internal noise level achieved by the NIDA buildings at present, the location of sensitive spaces within each building and the level to which any theatres or recording studios are isolated. More detailed investigations would be conducted including measurement of existing internal and external noise and vibration levels, including ground-borne noise and vibration levels due to the existing road traffic. These investigations would inform the required resilient trackform design in this location and confirm the appropriateness of the ground-borne operational noise design goals.

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 comply with the INP intrusiveness and sleep disturbance criteria at all locations 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.

Construction noise and vibration

A construction noise and vibration management (CNVP) plan would be developed to document all necessary measures to manage and mitigation potential noise and vibration levels during standard daytime and out of hours construction activities. The typical coverage of this 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 Kensington/Kingsford Precinct.

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 Kensington/Kingsford 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 Kensington/Kingsford Precinct.

Further assessment

During the detailed design stage, construction ground-borne noise impacts would be revisited during preparation of the more detailed site-specific Construction Noise and Vibration Impact Statement for the NIDA (as per Table 66 in Technical Paper 11).

During construction, attended measurements would be undertaken at the commencement of rockbreaking activities in the vicinity of the NIDA, to assist in evaluating and managing construction ground-borne noise impacts in conjunction with the premises operators. Alternative construction methods such as smaller rockbreakers, rock saws or respite periods would be considered if required to minimise noise impacts. In the event that lower impact equipment cannot be substituted, all efforts would be made to reschedule work to less sensitive times in consultation with the NIDA.

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.

16.6 Planted trees

This section provides a summary of the existing planted trees within the Kensington/Kingsford 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.

16.6.1 Existing conditions

The Kensington/Kingsford Precinct contains approximately 220 planted trees within the 'tree study area' (refer Figures 16.19a and b), which predominantly comprise Kaffir-plum, Queensland

Kauri trees, introduced Eucalyptus, Figs, Plane Trees, Lemon Scented Gums, Casuarinas, Swamp Mahogany, and a mix of palm species.

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 the 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 16.19a and b, and generally occurs at the following locations:

- within Tay Reserve
- along Anzac Parade
- within and adjacent to the proposed UNSW stop
- at the Kingsford stop and associated construction areas south-east of the Nine Ways intersection.

Discussion on the key characteristics of the trees throughout the precinct is provided in Table 16.18. 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 16.18 Overview of planted trees within the Kensington/Kingsford Precinct

AREA	OVERVIEW OF PLANTED TREES
Tay Reserve	Tay Reserve contains approximately 10 trees, which include one Kaffir-plum, four semi-mature Queensland Kauri trees and a large mature Fig tree. The Kaffir-plum and semi-mature Queensland Kauri trees are in good condition, with the Kaffir-plum displaying a well formed healthy crown. The Queensland Kauri trees display characteristic typical of juvenile forms of this tree species. The large mature Fig tree within the reserve is in good condition, displaying a structure and form typical of the species. This tree provides a strong contribution to visual amenity of the locality.
Anzac Parade	Anzac Parade contains approximately 140 trees within the tree study area, the majority of which are located within the footpath of Anzac Parade, as opposed to the median. Three significant mature Fig trees are located at the intersection of Alison Road and Anzac Parade. These trees are in good condition, displaying structures and forms typical of these species. These Fig trees provide a substantial contribution to the visual amenity of the locality. Trees within the median of Anzac Parade are generally small evergreen trees and deciduous trees of varying age and condition, which contribute to the landscape amenity of the corridor.
UNSW	The UNSW site contains approximately 25 trees within the tree study area. A number of additional planted trees also line the adjacent University Mall (part of the UNSW site) which contribute to the visual amenity of the locality. The dominant tree plantings within the tree study area comprise mature introduced Eucalyptus species and two Fig species. The trees are well maintained by UNSW and currently make a substantial contribution to the landscape amenity of the UNSW campus and the adjacent section of Anzac Parade.
Kingsford stop, and associated construction areas south-east of the Nine Ways intersection	This section of the proposed CSELR alignment contains approximately 45 trees, which include one large mature Hills Weeping Fig and semi-mature Plane Trees, Lemon Scented Gums, Casuarinas, Swamp Mahogany, and a mix of palm species. The mature Hills Weeping Fig is considered to be in good condition, displaying a well formed healthy crown typical of this species, and forms a significant landmark in the locality. The remainder of the trees are considered to be in fair to good condition, displaying characteristics typical of their species.

Source: Based on Technical Paper 9, Volume 5

A number of the planted trees within the Kensington/Kingsford Precinct are listed on Randwick City Council’s (2007) *Significant Tree Register*, and/or contribute to the significance of listed heritage items (refer to section 16.8). 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 16.8 and 16.7, respectively.

Figure 16.19a Impacts to planted trees – Kensington/Kingsford Precinct



Figure 16.19b Impacts to planted trees – Kensington/Kingsford Precinct

