13. Local impacts: Surry Hills Precinct

Chapter 13 details the existing character and environment of the Surry Hills Precinct (refer Figure 13.1), 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).

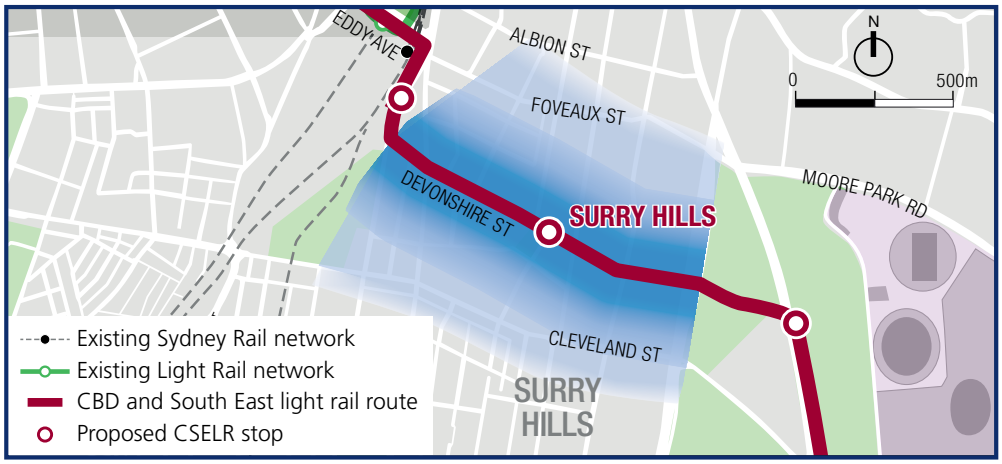
13.1 Key characteristics of the precinct

The Surry Hills Precinct is a unique inner city neighbourhood with a vibrant and active street character. Gentrification has seen this area transform from a once working-class suburb and centre for the textile industry into a popular and bohemian Sydney village. The traditional fashion and textile industry still retains a presence, but there is now an increasing focus on media, design and creative services.

The Surry Hills Precinct streetscape is an eclectic mix, where heritage terraces sit next to converted warehouses, modern developments, apartment buildings and high-rise public housing at the Northcott Estate. The increasing affluence of the area has given rise to a diverse mix of cafes, pubs, fine dining restaurants and designer shops, many of which are crowded around Crown Street, which is the suburbs main north-south spine. Popular community markets are held in Shannon Reserve on the first Saturday of every month and the annual Surry Hills Festival attracts thousands of visitors to the area every year.

Oxford Street to the north of the precinct has been the home of the Sydney Mardi Gras for over 35 years, and continues to be a hub for gay and lesbian nightlife. For this reason, Surry Hills is an attractive neighbourhood for the gay and lesbian community, further increasing the diversity of the area.

Figure 13.1 Surry Hills Precinct



13.2 Key community concerns for the precinct

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

- *Route selection* — Opposition has been raised by a number of Surry Hills residents to the selection of Devonshire Street for the proposed CSLER alignment through Surry Hills. Devonshire Street was seen as too narrow to accommodate light rail, which residents noted would impact on parking, traffic and the character of the street. Concerns were also raised about the impact on the suburb's 'village feel' with some feedback suggesting the Devonshire Street route would split the suburb.

  Stakeholders and a resident action group raised a number of alternative routes including Oxford Street, Albion Street and Foveaux Street, as well as the suggestion of a cut-and-cover (sub-surface) tunnel through Foveaux Street. In response to an alternative route presented by a Surry Hills resident action group, some non-member local residents and stakeholders expressed opposition, whereas other members of the community were supportive of the Foveaux Street cut-and-cover (sub-surface) alternative for the route through Surry Hills. Community concerns about the Foveaux Street alternative related to necessarily displacing people from their homes when alternative routes with less perceived impacts were available. The extent of property acquisition required for the proposed CSELR alignment through Wimbo Park and the Olivia Gardens apartment complex was raised as a possible reason to reconsider alternative route options.
- *Proposed alignment between Bourke Street and South Dowling Street* — Opposition to the southern option through the Olivia Gardens apartment complex was raised by some community members as it would require acquisition of residential property rather than a car park facility. Conversely, some stakeholders and community members expressed concern that the northern and central alignments would impact on the Langton Centre car park. Safety concerns for students of Bourke Street Public School were also raised as students would need to cross the light rail tracks in order to access a proposed park as part of the Olivia Gardens acquisition, should the southern or central option be pursued.
- *Traffic congestion* — In particular, concerns were raised regarding congestion on Devonshire Street due to the reduction of traffic lanes and the proposed at-grade crossing of South Dowling Street, which is already a highly congested roadway.
- *Access to residential and commercial properties* — This was identified as a key issue for local residents and businesses; in particular access for services on Devonshire Street. Related to access, loss of parking was also identified as a key issue, particularly, the loss of parking currently available on both sides of Devonshire Street.
- *Noise impacts on Devonshire Street* — Construction and operational noise impacts were identified as a key issue on Devonshire Street as the CSLER would travel in close proximity to residential properties and other sensitive receivers. Concern was also raised about noise from the numbers of people boarding and alighting from the light rail vehicles (LRVs) at the Surry Hills stop and the ringing of warning bells during operation of the LRVs.

13.3 Local traffic, transport and access

13.3.1 Existing conditions

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

Roads

Existing road network

The existing road network within the Surry Hills Precinct is shown in Figure 13.2. The key roads that would be directly affected by the CSELR proposal within the Surry Hills Precinct comprise Devonshire Street and South Dowling Street.

Devonshire Street is a two-lane local road (providing two-way traffic movements) under the care and control of City of Sydney. This road mainly serves the suburb of Surry Hills. The Devonshire Street corridor includes traffic signal control at the Elizabeth Street and Crown Street intersections. The remaining side road accesses along Devonshire Street are priority controlled. The corridor features pavement marking, a 40 kilometres per hour posted speed limit to the east of Riley Street and a 50 kilometres per hour limit to the west.

South Dowling Street, in the vicinity of the CSELR alignment, is a divided four-lane sub-arterial road (providing two traffic lanes in each direction) under the control of NSW Roads and Maritime Services. The South Dowling Street corridor includes a signalised pedestrian crossing (and associated bridge crossing over the Eastern Distributor) between the Mort Street and Nobbs Street intersections, a kerbside parking lane on the western side of the corridor, as well as a northbound on-ramp onto the Eastern Distributor. The posted speed limit on this section of South Dowling Street is 60 kilometres per hour.

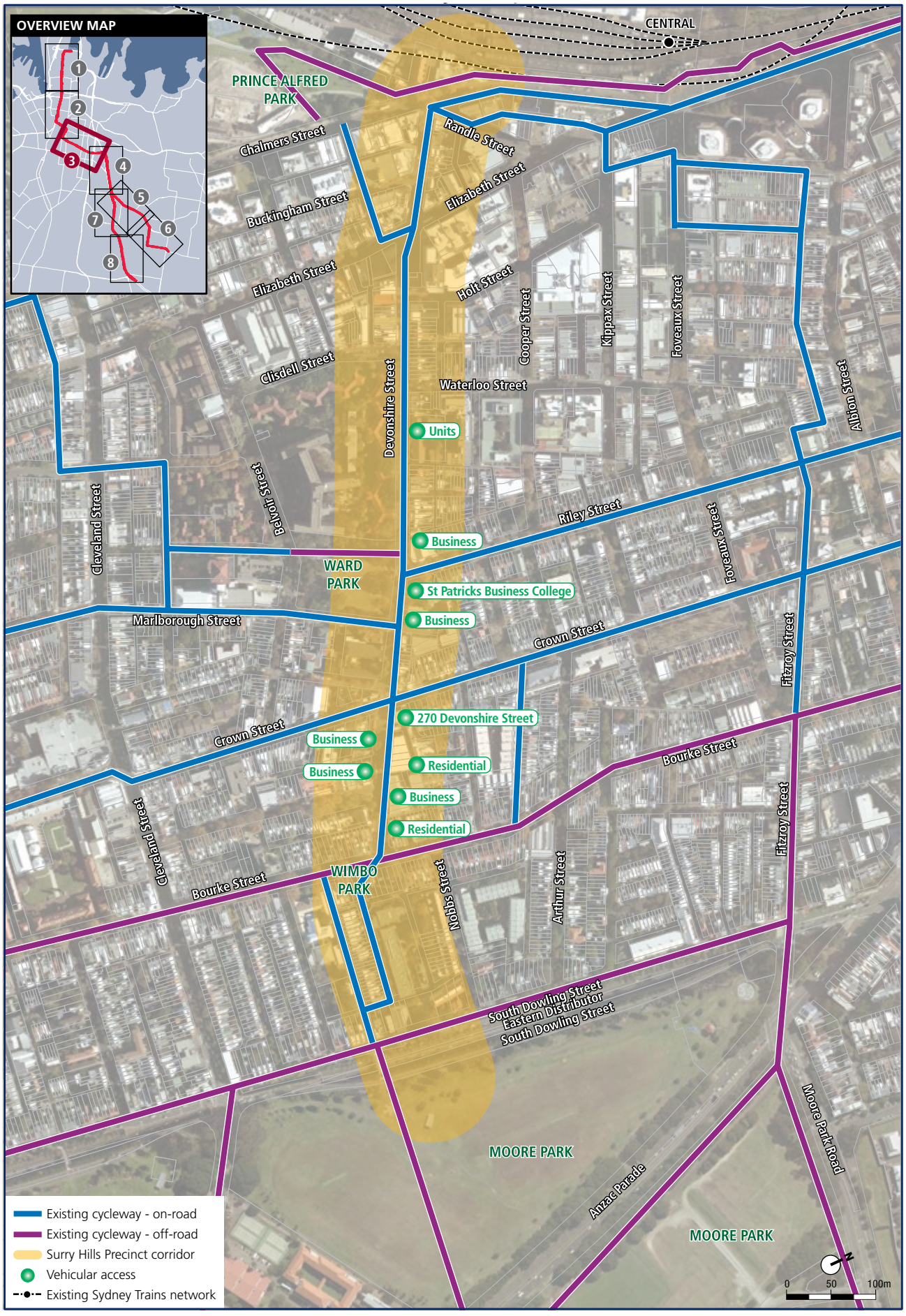
Existing traffic operating patterns

Traffic and transport operations in the Surry Hills Precinct are characterised by the interaction of public and private transport through key links entering and bypassing the CBD, such as Cleveland Street, Eddy Avenue, Elizabeth Street and Chalmers Street.

Devonshire Street is one of a number of east-west connections through Surry Hills between Chalmers and Bourke streets. Traffic travelling along Devonshire Street is mainly generated by the medium to high density residential terraces and apartments, along with smaller commercial (office) premises, cafes, restaurants and retail facilities within Surry Hills. (Land use is discussed further in section 13.4).

The traffic on Devonshire Street also provides an alternative east-west corridor to Cleveland Street for through-traffic. There are provisions for intermittent parking along both sides of the street and a number of property accesses that mainly serve residential and small business uses.

Figure 13.2 Surry Hills Precinct – Existing traffic, transport and access



Existing peak hour traffic volumes and composition

A summary of the peak traffic volumes travelling along Devonshire Street is provided in Table 13.1. Total traffic volumes along Devonshire Street are around 574 vehicles during the morning peak and 631 vehicles during the afternoon peak hour. The composition of the traffic (i.e. types of vehicles) on Devonshire Street is outlined in Figure 2-20 of Technical Paper 1. Light vehicles make up the majority of vehicles travelling along Devonshire Street.

Table 13.1 Average weekday morning and afternoon peak traffic volumes – Surry Hills 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
Devonshire Street (near Riley Street)	338	236	59% inbound	278	353	44% outbound

Source: *Table 2-22 of Technical Paper 1 – Transport Operations Report, Volume 2.*

Parking and kerbside access

Existing parking supply on the CSELR corridor

On-street parking is widespread within the wider Surry Hills Precinct, with multiple restrictions, serving the mix of land uses identified within the study area (as discussed in section 13.4). A loading zone is located on Devonshire Street east of Waterloo Street and another east of Holt Street. Devonshire Street also has several kerbside loading zones between Chalmers Street and Elizabeth Street, as well as a mail zone and late night taxi zone.

The number of existing parking spaces and other kerbside access zones within the Surry Hills Precinct are described in Table 13.2. The distribution of these spaces within the study area is shown in Figure 2.21 of Technical Paper 1.

Table 13.2 Existing special kerbside uses and parking supply – on the CSELR corridor in the Surry Hills Precinct

KERBSIDE RESTRICTION	SPECIAL KERBSIDE USES AND PARKING SUPPLY WITHIN THE SURRY HILLS PRECINCT BY TIME PERIOD		
	PRE-MORNING PEAK[1]	INTERPEAK[1]	POST-AFTERNOON PEAK[1]
Car share, hospital, mail zone	3	3	3
Disability parking	5	5	5
Loading zone	15	15	15
Taxi zone	0	0	0
Total – Special Kerbside Use	**23**	**23**	**23**
Short stay parking (≤ 1P)	54	72	72
Long stay parking (restricted)	48	48	48
Long stay parking (unrestricted)	26	8	8
Total – General Parking	**128**	**128**	**128**

Source: *Table 2-23 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 Surry Hills Precinct

The distribution of unrestricted and time restricted parking spaces within the Surry Hills Precinct is shown in Figures 6.2 and 6.3 of Technical Paper 1.

A parking occupancy survey was undertaken for the Surry Hills Precinct during May 2013. The survey extent is shown in Figures 13.3 to 13.5 and includes the proposed CSELR corridor, streets parallel to the corridor and within a potential walking catchment of the 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
- interpeak — between 10.00 am and 2.00 pm
- post-afternoon peak — after 6.30 pm.

The parking supply and demand quantities used to calculate the average occupancy were based on parking spaces available for general parking use. Average occupancy was assessed for both time restricted parking and non-restricted parking only. Ancillary special kerbside use, such as loading and bus zones, were not considered to avoid skewing the analysis.

The precinct was divided into six zones — as shown in Figures 13.3 to 13.5 — to develop summary measures for parking demand and turnover for sub-precinct zones individually, as well as at the overall precincts level.

The occupancy survey results for the Surry Hills Precinct are illustrated in Figures 13.3 to 13.5, with summary data outlined in Table 13.3. The key trends from the parking occupancy analysis of the existing Surry Hills network include:

- General parking supply within the Surry Hills Precinct is greater during the interpeak (10.00 am to 2.00 pm) where the least number of parking restrictions apply (i.e. due to peak hour bus lanes and clearways).
- The post-afternoon peak (after 6.30 pm) occupancy rates are highest for all sub-precinct zones, with five zones having a recorded average occupancy of between 81 per cent and 89 per cent.
- The occupancy rates are generally lower for the western extent of the study area (sub-precinct zones 1, 2, 4 and 5), west of Crown Street, particularly during the pre-morning peak (before 7.30 am) with average rates of occupancy between 58 per cent and 72 per cent.

Property access

A total of nine vehicle accesses and driveways are present on Devonshire Street. The majority (seven) of these are located on the northern side of the road and are generally associated with small local businesses, St Patrick's Business College and some residential off-street parking driveways. The locations of these property accesses are shown in Figure 13.2.

Bus services

The section of Devonshire Street east of Crown Street is part of an existing bus route (Route 355) and bus stops are provided at Crown Street and Bourke Street for eastbound travel.

Figure 13.3 Average pre-morning peak (before 7.30 am) parking occupancy and parking survey zones – Surry Hills Precinct

Source: Adapted from Figures 6.22 and 6.18 of Technical Paper 1 - Transport Operations Report

Figure 13.4 Average interpeak (10 am–2 pm) parking occupancy and parking survey zones – Surry Hills Precinct

Source: Adapted from Figures 6.22 and 6.18 of Technical Paper 1 - Transport Operations Report

Figure 13.5 Average post-afternoon peak (after 6.30 pm) parking occupancy and parking survey zones – Surry Hills Precinct

Source: Adapted from Figures 6.22 and 6.18 of Technical Paper 1 - Transport Operations Report

Table 13.3 Parking supply, demand and occupancy – Surry Hills 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	129	221	58%	163	221	74%	158	221	71%	48%
Zone 2	292	440	66%	357	440	81%	390	440	89%	41%
Zone 3	438	540	81%	399	540	74%	452	540	84%	25%
Zone 4	147	204	72%	253	328	77%	167	204	82%	42%
Zone 5	254	388	65%	278	388	72%	314	388	81%	31%
Zone 6	210	262	80%	201	262	77%	221	269	82%	23%
Total	**1,470**	**2,055**	**72%**	**1,651**	**2,179**	**76%**	**1,702**	**2,062**	**83%**	**37%**

Source: *Table 6-10 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.*

Cyclists

Existing bicycle networks within the Surry Hills Precinct are located along the following key roads:

- *Devonshire Street* — Devonshire Street is an active cycling corridor. The City of Sydney bicycle route map designates Devonshire Street as an existing on-road bicycle route. This route connects with an off-road cycle path running perpendicular to Devonshire Street, along the western side of Bourke Street. The direct connection between Central Railway Station and Moore Park via Devonshire Street is currently a strong desire line for cycle travel.
- *Cooper/Arthur Street* — The City of Sydney designates Arthur Street as an on-road cycle route between Riley Street and South Dowling Street. At Riley Street, Arthur Street links with Cooper Street. Between Riley Street and Elizabeth Street, the City of Sydney does not identify Cooper Street as a current on-road cycle route; however, line marking and signage indicates a suitable route.
- *Bourke Street* — Bourke Street provides an off-road cycle route between Lachlan Street in Waterloo and Cowper Wharf Road in Woolloomooloo. Bourke Street connects with several east-west on-road cycle routes that provide direct access to the Sydney CBD. These include Devonshire Street, Campbell Street, Oxford Street and Liverpool Street.
- *Riley Street* — Riley Street is designated as an on-road cycle route between Devonshire Street in Surry Hills and Cathedral Street in Woolloomooloo. Like Bourke Street, Riley Street connects with several east-west routes that provide direct access to the Sydney CBD.

Bicycle counts collected by City of Sydney in 2013 at Bourke Street show that approximately 1,500 bicycles use this corridor on an average weekday, with some of these potentially accessing the Bourke Street cycleway via Devonshire Street.

Pedestrians

Devonshire Street is a primary pedestrian corridor providing direct legible access between Central Railway Station and the core of residential and retail land uses clustered around Crown and Bourke streets. This also provides direct connection via the Devonshire Street pedestrian tunnel to Lee Street, Railway Square buses, the Broadway education precinct and Darling Harbour. A designated shared pathway along Ward Park also provides connection to the Inner West.

A mid-block crossing at South Dowling Street and a pedestrian bridge over the Eastern Distributor provide direct connection between Surry Hills and Moore Park. This is a significant pedestrian connection during special events at Moore Park.

Existing pedestrian access along the proposed CSELR alignment within the Surry Hills Precinct is facilitated by sealed footpaths (on both sides of the road), three marked pedestrian crossings (east of Steel Street, Riley Street and Marlborough Street), and a signalised pedestrian crossing at the Crown Street/Devonshire Street intersection and kerb ramps.

Footpath capacity is constrained in a number of areas along Devonshire Street due to the presence of trees and tree roots. The provision of kerb ramps is also limited on this corridor.

13.3.2 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.

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 significant changes 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 Surry Hills Precinct as part of the CSELR proposal are shown in Figure 13.6 and described in the following sections.

Devonshire Street

The objective of the Devonshire Street functional changes is to ensure safe, reliable and efficient light rail operation, whilst also maintaining necessary access for residents and businesses (including consideration of CSELR operations during special events at Moore Park and Royal Randwick racecourse). The proposed functional changes required to accommodate the CSELR proposal along Devonshire Street comprise the following:

- provision of a single eastbound traffic lane (the existing westbound lane would be occupied by the light rail tracks and, therefore, would be closed to traffic)
- existing right turn movements for vehicles travelling eastbound along Devonshire Street and wishing to head south to be consolidated to Elizabeth Street and Crown Street
- closure of a number of local road intersections with Devonshire Street, including: Buckingham Street, Holt Street, Waterloo Street, High Holborn Street and Clisdell Street
- removal of all on-street parking on both sides of Devonshire Street
- loss of the existing on-street and off-street parking for the Langton Centre at Parkham Place.

To manage the impacts of the above functional changes would have on accessibility, the following network changes are proposed:

- The Devonshire Street/Marlborough Street intersection would be signalised.
- The Devonshire Street/Bourke Street intersection would be signalised.
- The Cooper Street connection to Riley Road would be reinstated to provide access for local residents.
- A westbound service lane connection would be introduced between Bourke Street and Crown Street.
- The affected Langton Centre car parking would be relocated within the general vicinity of the Langton Centre.

The proposed signal control at the Marlborough Street and Bourke Street intersections would improve pedestrian access to the Surry Hills stop, providing a safe, efficient interchange to Crown Street buses and ensuring light rail and traffic interactions are effectively managed.

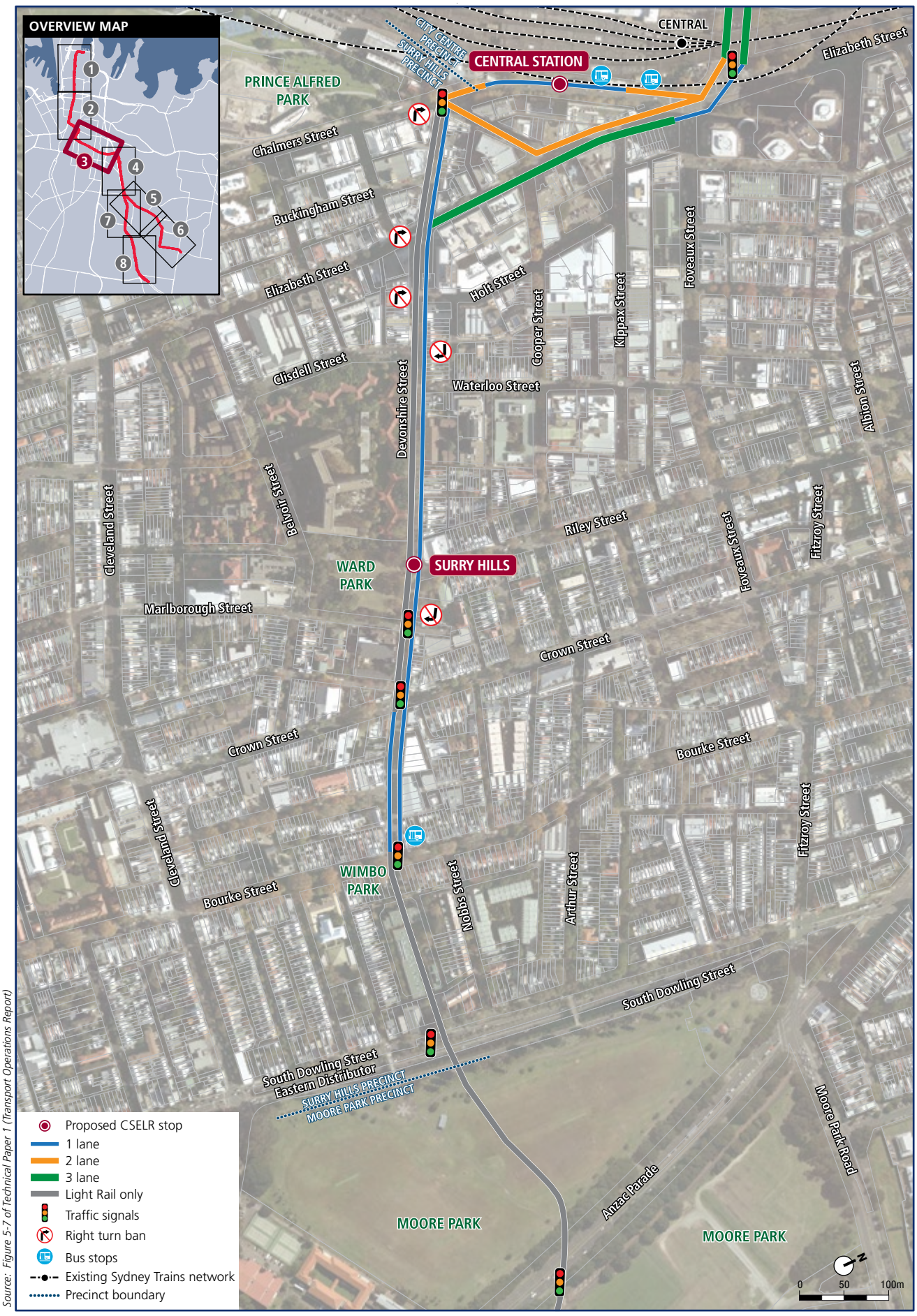
The consolidation of direct traffic access onto Devonshire Street would reduce the potential for general traffic and light rail conflicts. The closure treatments have been designed to include appropriate turnaround facilities or service road access to adjacent streets.

Uncontrolled intersections along Devonshire Street would generally be limited to left-in left-out operation only; with the exception of Chalmers Lane, which is proposed to become a one-way northbound road with a right turn east onto Devonshire Street.

Swept path turning assessments have been undertaken at the side roads to identify potential impacts associated with the reduced cross-section available to general traffic. The swept path assessments identified the following issues:

- Kerb adjustments would be required at Adelaide Place, Steel Street and Little Riley Street to provide light vehicle access to minor lanes without encroaching on the light rail alignment.
- Service vehicles would be capable of undertaking left-in left-out turning movements from the significant side road accesses, namely Elizabeth Street, Riley Street, Marlborough Street, Crown Street and Bourke Street.
- Heavy rigid vehicles (12.5 metres) may potentially encroach onto the eastbound light rail alignment when entering or exiting side roads.
- The provision of a service lane connection on the southern side of Devonshire Street, between Bourke Street and Crown Street, would provide access for Nickson Street and Nickson Lane (left-in left-out movements would be permitted).

Figure 13.6 Functional changes to the road network – Surry Hills Precinct



Source: Figure 5-7 of Technical Paper 1 (Transport Operations Report)

South Dowling Street and the Eastern Distributor crossing

The CSELR proposal crosses South Dowling Street at-grade (also see section 5.2.1), passing over the Eastern Distributor on a new bridge prior to entering the proposed tunnel across Moore Park. To manage light rail conflicts with pedestrian and traffic movements, signalised control of the South Dowling Street southbound and northbound traffic lanes would be provided. The existing pedestrian/cyclist bridge and associated crossings located adjacent to Parkham Street would be relocated to the proposed light rail bridge structure.

An assessment of the traffic capacity impacts of an at-grade light rail crossing of South Dowling Street has been undertaken. This considered normal CSELR operations and special event operations (when 90 metre LRVs may be utilised). This assessment is provided in section 9.2.2.

Light rail stop access and egress

A detailed access plan for the proposed Surry Hills light rail stop (including key actions to improve access) is provided in section 7.3.11 of Technical Paper 1. In summary, key actions proposed to resolve multimodal access issues for the proposed Surry Hills stop include the following:

- Implement pedestrian priority improvements to reduce pedestrian wait times at key signalised intersections, such as Devonshire Street and Crown Street.
- Reduce capacity of Devonshire Street for vehicular traffic and give priority to east-west movements of LRVs and pedestrians, and investigate the need for a surface treatment to discourage cyclists.
- Signalise Devonshire Street and Marlborough Street to provide customers with safe, direct access to light rail platforms.

Operational impacts on property access

There are nine existing vehicle accesses and driveways present on Devonshire Street, with the majority (seven) located on the northern side of the road. The locations of these property accesses are shown in Figure 13.2.

Property accesses along Devonshire Street would be maintained during the operational phase of the CSELR proposal; however, access arrangements to some properties may change.

The existing Langton Centre off-street and on-street parking affected by the CSELR proposal would be replaced with a similar number of spaces within the vicinity of the Langton Centre. Replacement parking could be provided within the former Olivia Gardens site. The final location and number of replacement parking spaces would be determined in consultation with the Langton Centre and City of Sydney.

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

The City of Sydney currently designates Devonshire Street as an on-road cycle route. Devonshire Street does not have sufficient available width to accommodate the proposed CSELR alignment as well as a dedicated cycle facility. Chalmers Street (at the western end of Devonshire Street) is currently a challenging traffic environment for cyclists and would become more so following the implementation of the CSELR proposal. Alternative parallel cycle corridors with better gateway entries to the CBD have been assessed by NSW Roads and Maritime Services (RMS, 2013). The preferred alternative route is via Cooper Street and Arthur Street.

Arthur Street is already classified as an on-road cycle route by the City of Sydney. It connects Surry Hills to Moore Park via an existing pedestrian/cycle bridge over South Dowling Street. In order to make the new east-west corridor more legible for cyclists, Cooper Street would require pavement markings, paint and signage to function as an on-route cycle route. The Cooper Street/Elizabeth Street intersection would also need to be reconfigured to be safer for cyclists. Randle Street would provide access to Cooper Street from the south and west, with Elizabeth Street the northern connection.

The existing pedestrian and cycle crossing linking Arthur Street to Moore Park would be retained to provide a continuous cycle link between Moore Park and Central Railway Station through Surry Hills. Appropriate signposting would be provided to direct cyclists from the crossing location at Devonshire Street and Bourke Street.

Operational impacts on pedestrians

The Devonshire Street corridor would continue to provide a strong east-west pedestrian connection through Surry Hills during the operational phase of the CSELR proposal. Pedestrians would benefit from improved amenity, particularly where streets are closed at their intersection with Devonshire Street, as this presents an opportunity to reduce road crossings and increase footpath area.

During special events, 90 metre LRVs may be in operation between Central Railway Station and Moore Park (comprising two 45 metre LRVs coupled together). To ensure traffic and pedestrians are not adversely affected by the queuing of these larger vehicles at traffic signals (which could block adjacent intersections), it is proposed that LRVs are given priority over other traffic along Devonshire Street. LRVs detected on their approach to the Devonshire Street corridor would be given priority through the signalised intersections to ensure the LRVs do not stop at any of the signalised intersections along Devonshire Street.

Operational impacts on buses

No bus services would be affected during the operational phase of the CSELR proposal. As discussed in section 13.3.3, there is only one bus stop on Devonshire Street (near Bourke Street) utilised by the 355 (Marrickville – Bondi Junction). While an alternative route for bus route 355 would be required during the construction of the CSELR proposal (as described in section 13.3.3), this bus route would revert back to its current operations at the completion of construction.

Operational impacts on parking and kerbside access

The CSELR proposal requires the removal of all existing on-street parking along Devonshire Street to accommodate the proposed light rail tracks and a single eastbound traffic lane (although two traffic lanes would be retained between Crown and Bourke streets). Parking spaces that would be impacted by the CSELR proposal are detailed in Table 13.4.

The key parking supply impacts within the Surry Hills Precinct include:

- All 128 general parking spaces would be removed along Devonshire Street.
- Five disability parking spaces would be impacted along the southern side of Devonshire Street in the vicinity of Clisdell Street.
- The parking supply affected by the CSELR proposal along Devonshire Street would mainly comprise short stay and long stay (restricted) spaces.

Table 13.4 On-street special kerbside uses and parking supply impacted by the CSELR proposal – Surry Hills Precinct

KERBSIDE RESTRICTION	SPECIAL KERBSIDE USES AND PARKING SUPPLY IMPACTED WITHIN THE SURRY HILLS PRECINCT BY TIME PERIOD					
	PRE-MORNING PEAK[1]		INTERPEAK[1]		POST-AFTERNOON PEAK[1]	
	NUMBER OF SPACES IMPACTED	NUMBER OF SPACES RETAINED	NUMBER OF SPACES IMPACTED	NUMBER OF SPACES RETAINED	NUMBER OF SPACES IMPACTED	NUMBER OF SPACES RETAINED
Car share, hospital, mail zone	3	0	3	0	3	0
Disability parking	5	0	5	0	5	0
Loading zone	15	0	15	0	15	0
Taxi zone	0	0	0	0	0	0
Total – Special Kerbside Uses	**23**	**0**	**23**	**0**	**23**	**0**

Table 13.4 cont

KERBSIDE RESTRICTION	SPECIAL KERBSIDE USES AND PARKING SUPPLY IMPACTED WITHIN THE SURRY HILLS 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
Short stay parking (≤1P)	54	0	72	0	72	0
Long stay parking (restricted)	48	0	48	0	48	0
Long stay parking (unrestricted	26	0	8	0	8	0
Total – General Parking	**128**	**0**	**128**	**0**	**128**	**0**

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

Section 6.3.5 of Technical Paper 1 provides a high level analysis of the demand, supply and weighted occupancy for parking spaces within the Surry Hills Precinct that is predicted to occur after the removal of all parking spaces along Devonshire Street to accommodate the CSELR proposal.

The existing parking demand in the proposed CSELR corridor along Devonshire Street (which would be directly impacted by the proposal) varies throughout the day between 98 and 119 vehicles. Existing demand is broken down by zone:

- Zone 1 includes impacted parking on Devonshire Street between Chalmers Street through to Waterloo Road. Demand on this section of Devonshire Street is between 39 and 52 vehicles.
- Zone 2 includes impacted parking on Devonshire Street between Waterloo Road and Crown Street. Demand on this section of Devonshire Street is between 38 and 45 vehicles.
- Zone 3 includes impacted parking on Devonshire Street between Crown Street and Bourke Street. Demand on this section of Devonshire Street is between 18 and 22 vehicles.

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

- Available capacity of up to 232 spaces even during the busiest peak period (equivalent to 11 per cent of overall capacity post implementation).
- Parking demand and supply across the precinct is forecast to operate at an 'effective' capacity during the busiest peak period, however with increased availability during the inter peak periods.
- The general pattern of parking demand and supply (peak at effective capacity and off-peak at increased availability) is affected at a more local level in each of the sub-precincts individually.

As outlined in section 13.9, the loss of parking spaces from Devonshire Street would likely have the greatest impact to businesses (such as convenience stores) that rely on customer access, along with uses that have less mobile customers and clients, such as childcare centres and medical centres/medical specialists.

Adoption of appropriate parking management measures to balance supply and demand would be considered. The following administrative controls are proposed through consultation with the City of Sydney to mitigate the potential impacts of the CSELR proposal on parking demand and supply in Surry Hills:

- Consolidate City of Sydney Council residential permit precincts to allow resident permit-holders to search further afield when nearby streets are occupied.

- Expand use of pay-parking (with standard resident exemptions) to encourage turnover and discourage commuting.
- Provide resident exemptions in nearby spaces where they are not currently exempt.

Transport for NSW would work through implementation of these measures to manage kerbside activity with the City of Sydney.

13.3.3 Impacts during construction

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

Construction traffic management

Within the Surry Hills Precinct, the CSELR proposal would run along Devonshire Street, crossing Elizabeth Street, Crown Street and Bourke Street. Devonshire Street would be closed to through-traffic during construction with the cross-streets of Elizabeth Street, Crown Street and Bourke Street remaining open to traffic for the duration of construction. Construction works at these intersections would be staged to allow traffic to pass adjacent to the worksites and thus ensure property and network accessibility is maintained. The staged intersection works proposed for Elizabeth Street, Crown Street and Bourke Street are presented in Appendix B.3-B.5 of Technical Paper 2.

Construction across South Dowling Street and the Eastern Distributor is proposed as staged night works due to the significance of these roads within the greater transport network. Proposed traffic diversion routes during construction at these sites are the shortest route possible to ensure motorists can access their final destinations. The proposed detour routes are presented in Appendix E of Technical Paper 2. An indicative construction staging plan for the proposed South Dowling Street regrading works is provided in section 6.10.2.

Construction impacts on property access

As outlined in in section 13.3.1, a total of nine vehicle accesses and driveways are present on Devonshire Street (as shown in Figure 13.2). In addition to these property accesses, the properties on Marlborough Street (north of Devonshire Street) and driveways on Nickson Lane are accessible only via Devonshire Street.

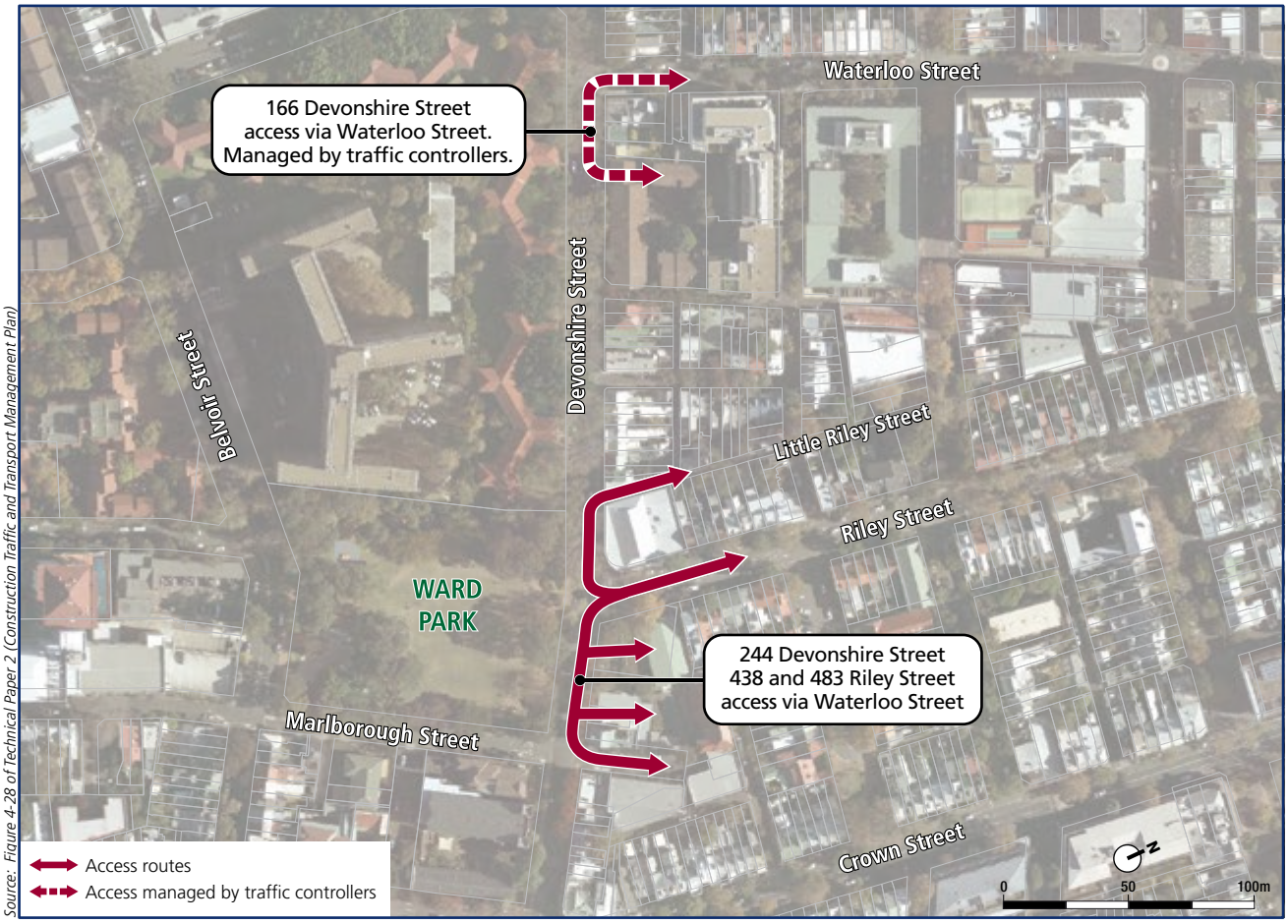
As Devonshire Street is proposed to be closed to through-traffic during construction, the properties with vehicle access from Devonshire Street would require mitigation measures. To ensure accessibility to these properties during construction, Waterloo Street and Riley Street would remain open as shown in Figure 13.7.

Since the light rail would be aligned within the northern edge of Ward Park, sufficient road widths could be maintained adjacent to Riley Street to facilitate safe separation, with concrete barriers, between the worksite and vehicles accessing the properties. However, safe separation could not be provided adjacent to Waterloo Street for vehicles accessing 166 Devonshire Street. Therefore, traffic controllers would be required to guide the vehicles between the driveway and Waterloo Street when works are undertaken adjacent to Waterloo Street.

It is proposed that traffic controllers would manage access to Nickson Lane as shown in Figure 13.8, due to the limited lane width.

With the closure of Devonshire Street, the residents within the Surry Hills Precinct may experience increased travel distances. However, vehicle access to all adjacent properties would be maintained during the closure of Devonshire Street. The proposed precinct access plans are contained within Appendix A.2 of Technical Paper 2.

Figure 13.7 Alternative access to properties on Devonshire Street during the closure of Devonshire Street – Surry Hills Precinct



Source: Figure 4-28 of Technical Paper 2 (Construction Traffic and Transport Management Plan)

Figure 13.8 Alternative access to properties on Nickson Lane during the closure of Devonshire Street – Surry Hills Precinct

Source: Figure 4-29 of Technical Paper 2 (Construction Traffic and Transport Management Plan)

Consistent with the operational phase of the CSELR, the light rail alignment would remove existing on-street and off-street parking for the Langton Centre at Parkham Place. During construction, suitable alternative parking would be provided within the general vicinity (refer to section 13.3.2).

Construction impacts on on-street parking

As discussed in section 13.3.2, all on-street parking along Devonshire Street would be removed to accommodate the CSELR proposal. The impact of removing parking from Devonshire Street is discussed in section 13.3.2. The same impacts would apply during the construction phase.

In summary, the parking assessment indicated that with appropriate parking management, there would be sufficient capacity within the adjacent road network to absorb the displaced parking demands. and loss of parking supply

Construction vehicles would be contained within the Ward Park worksite. Construction staff would travel to Surry Hills by shuttle bus from staff parking facilities away from the CBD and Surry Hills, potentially within the Moore Park and/or Royal Randwick racecourse worksites (refer to section 6.8).

Construction impacts on existing bus services

Due to the right turn ban at the intersection at Baptist Street and Cleveland Street, the inbound bus route 355 utilises Crown Street, Devonshire Street and Bourke Street to enter the eastbound lanes of Cleveland Street. During construction works, right turn movements into Devonshire Street from Crown Street south would not be maintained for large vehicles, such as buses. Therefore an alternate route would be required for bus route 355, as shown in Figures 13.9 (Option A) and 13.10 (Option B).

The diversion shown in Figure 13.9 (Option A) proposes to divert the buses via Lansdowne Street and Marlborough Street to enter Cleveland Street, west of Crown Street. The roads on this route are generally local streets with residential developments and capture portions of the existing catchment area without deflecting too far the existing route.

The diversion shown in Figure 13.10 (Option B) comprises both inbound and outbound diversion routes. The inbound route is proposed to be diverted via Redfern Street and Chalmers Street whereas the outbound route would travel directly between Cleveland Street and Elizabeth Street. Option B is a major departure from the existing bus route as it would not service the developments adjacent to Phillip Street and Bourke Street.

Both Options A and B are viable temporary options and would be subject to further consultation with the City of Sydney and Sydney Buses to discuss potential operational and community impacts.

Figure 13.9 Proposed bus route 355 diversion – Option A – Surry Hills Precinct

Source: Figure 4-31 of Technical Paper 2 (Construction Traffic and Transport Management Plan)

Figure 13.10 Proposed bus route 355 diversion – Option B – Surry Hills Precinct

Source: Figure 4-31 of Technical Paper 2 (Construction Traffic and Transport Management Plan)

Construction impacts on pedestrians and cyclists

Existing pedestrian footpaths along Devonshire Street would be retained at all times and protected from the worksite with barriers. There may be some temporary diversions at times in response to construction works such as adjacent to Ward Park, at which point pedestrians could be diverted to the northern footpath.

During intersection staging works, pedestrian crossing facilities would be maintained either by providing an alternate crossing opportunity adjacent to the workzone or maintaining the existing pedestrian facilities.

Marked crossings are located adjacent to Steel Street, Riley Street and High Holborn Street along Devonshire Street. Given the proximity of these locations and the low traffic environment during construction, these crossings would be consolidated to a single location. The new pedestrian crossing would be located adjacent to Riley Street, to the west of Ward Park.

Devonshire Street is recognised as an on-street cycle route with intermittent signposting of cycles. During construction, cyclists would be prohibited from accessing Devonshire Street. Cyclists would be redirected to alternate parallel routes along Cooper Street and Arthur Street.

Arthur Street is recognised as an on-road cycle route by the City of Sydney, and Cooper Street a former on-road cycle route. The segregated Bourke Street off-road cycleway provides a suitable alternative route for access to the CBD via Campbell Street.

To facilitate the cycle route along Arthur Street and Cooper Street, improvements to the connection at Riley Street would need to be implemented as part of the early CSELR works to ensure a clear through path. Line marking, kerb ramps and directional signage along the route would need to be installed where required to further reinforce the cycle route.

During construction, the reconfiguration of Randle Street would allow for two-way cycle movements, providing a connection from Cooper Street through to Prince Alfred Park (inner south) and Belmore Park (southern CBD).

Construction impacts on emergency vehicle access

It is proposed that emergency vehicles would be able to access the construction vehicle paths adjacent to the worksites when attending to emergencies within Chalmers Street and Devonshire Street. Access would be facilitated by traffic controllers to the location of the emergency. However, during certain loading/unloading and construction activities, a clear path may not be available through the length of the block to permit through travel. The contractor(s) would work with emergency services to develop response plans and communication protocols to ensure emergency services are aware of the required alternate access routes.

Construction impacts on taxis

As present, taxi zones exist along Devonshire Street, between Chalmers Street and Elizabeth Street, as well as on Chalmers Street, adjacent to the Foveaux Street and Elizabeth Street intersection. With the closure of Chalmers Street and Devonshire Street, these zones would be consolidated into one location adjacent to Central Railway Station in Chalmers Street, south of Devonshire Street, consistent with the functional road network changes proposed for the operational phase of the CSELR proposal.

13.3.4 Management and mitigation

Operation

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

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

- The Devonshire Street/Marlborough Street would be signalised.
- The Devonshire Street/Bourke Street intersection would be signalised.
- The Cooper Street connection to Riley Road would be reinstated to provide access for local residents.
- A westbound service lane connection would be introduced between Bourke Street and Crown Street.
- Uncontrolled intersections along Devonshire Street would generally be limited to left-in left-out operation only; with the exception of Chalmers Lane, which is proposed to become a one-way northbound road with a right turn east onto Devonshire Street.
- Signalised control of the South Dowling Street southbound and northbound traffic lanes at the CSELR crossing point would be provided at the proposed CSELR crossing to manage light rail conflicts with pedestrian and traffic movements.
- The existing pedestrian/cyclist bridge and associated crossings located adjacent to Parkham Street would be relocated to the proposed light rail bridge structure.
- Property accesses along Devonshire Street 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.
- The existing Langton Centre off-street and on-street parking affected by the CSELR proposal would be replaced with a similar number of spaces within the vicinity of the Langton Centre. The final location and number of replacement parking spaces would be determined in consultation with the Langton Centre and City of Sydney. Access to this facility would be maintained at all times
- The existing pedestrian and cycle crossing linking Arthur Street to Moore Park would be retained to provide a continuous cycle link between Moore Park and Central Railway Station through Surry Hills. Appropriate signposting would be provided to direct cyclists from the crossing location at Devonshire Street and Bourke Street.
- LRVs would be given priority over other traffic along Devonshire Street to ensure traffic and pedestrians are not adversely affected by the queuing of longer LRVs at traffic signals during special events (which could block adjacent intersections).
- Adoption of appropriate parking management measures (parking controls) to balance supply and demand would be considered. Transport for NSW would work through implementation of these measures to manage kerbside activity with the City of Sydney.
- 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 this EIS. The following additional management and mitigation measures would be implemented to further minimise construction traffic, transport and access impacts within the Surry Hills Precinct:

- The Elizabeth Street, Crown Street and Bourke Street intersections with Devonshire Street would remain open to traffic for the duration of construction. Construction works at these intersections would be staged to allow traffic to pass adjacent to the worksites and thus ensure property and network accessibility is maintained.
- Construction across South Dowling Street and the Eastern Distributor would only be undertaken as staged night works. Proposed traffic diversion routes during construction works at these sites, as presented in Appendix E of Technical Paper 2, would be the shortest routes possible to ensure motorists can access their final destinations.
- Vehicles access to all adjacent properties would be maintained during the closure of Devonshire Street. Waterloo Street and Riley Street would remain open during the closure of Devonshire Street. Traffic controllers would be used to guide private vehicles between their driveways and Waterloo Street when works are undertaken adjacent to Waterloo Street.
- During construction, suitable alternative parking for the Langton Centre would be provided within the general vicinity of the Langton Centre. Access to this facility would be maintained at all times.
- Construction vehicles would be contained within the Ward Park worksite, while staff would utilise potential parking facilities located within designated construction compounds at Moore Park and the proposed Randwick stabling facility.
- Opportunities to implement time-restricted loading zones on Holt Street, Waterloo Street and Riley Street would be investigated during detailed design, in consultation with the City of Sydney, to facilitate access to the adjacent retail and commercial businesses.
- Transport for NSW would consult with the City of Sydney and Sydney Buses to determine the most viable option for diverting bus route 355, as shown in Figures 13.9 (Option A) and 13.10 (Option B).
- Existing pedestrian footpaths along Devonshire Street would be retained at all times and protected from the worksite with barrier protection, with the exception of during works undertaken adjacent to Ward Park, where pedestrians may need to be diverted to the northern footpath.
- During intersection staging works, pedestrian crossing facilities would be maintained either by providing an alternate crossing opportunity adjacent to the workzone or maintaining the existing pedestrian facilities.
- During construction, the reconfiguration of Randle Street would allow for two-way cycle movements, providing a connection from Cooper Street through to Prince Alfred Park (inner south) and Belmore Park (southern CBD).
- Opportunities to consolidate the existing taxi zones along Devonshire Street (between Chalmers Street and Elizabeth Street) and Chalmers Street (adjacent to the Foveaux Street and Elizabeth Street intersection) into one location adjacent to Central Railway Station in Chalmers Street (south of Devonshire Street, as per the functional road network changes proposed for the operational phase of the CSELR proposal) would be investigated during detailed design in consultation with the City of Sydney.

13.4 Local property and land use

13.4.1 Existing conditions

Existing land use patterns, land use features and an overview of the potential future developments within the Surry Hills Precinct area are described below. Figure 13.11 identifies the major existing land uses in the Surry Hills Precinct adjacent to the proposal.

Existing property and land uses within the vicinity of the proposal

The Surry Hills Precinct typically includes two main land uses, defined by the western and eastern portions of the precinct. Towards the western portion of the precinct, the land use is dominated by medium-density commercial buildings and associated retail facilities such as restaurants and cafes. These land uses provide an interface between the commercial core of the CBD to the west (including the City Centre Precinct) and the adjoining area of Surry Hills.

The eastern portion of the Surry Hills Precinct (generally to the east of Holt Street) comprises predominantly residential development with some mixed use commercial developments along the main roads within the precincts including Devonshire Street, Riley Street and Crown Street. Housing within the Surry Hills Precinct ranges from small single-storey dwellings and traditional and historic terraced townhouses to high-density residential apartment buildings. Medium and high-density residential buildings within the Surry Hills Precinct include the existing public housing development adjacent to the west of Ward Park (Northcott Estate) and the Olivia Gardens apartment complex (containing 69 units) located to the east of Wimbo Park. Commercial and retail uses within the precinct include small cafes and bakeries as well as art galleries, antique dealers, fashion outlets and offices for a range of professional services.

The Surry Hills Precinct is also characterised by a number of parks and open spaces, including the Devonshire Street Reserve (located at the corner of Devonshire Street and Elizabeth Street), Ward Park (located on the southern side of Devonshire Street) Wimbo Park (located at the eastern end of Devonshire Street) and a series of other smaller open space areas, primarily located along Riley Street and Crown Street to the north of the CSELR alignment. Additionally, a number of community land uses are located within the precinct including Bourke Street Public School, St Vincent's Children's Hospital Centre (school), Surry Hills Library, and a range of churches and community meeting halls.

Photographs of the typical land uses within the Surry Hills Precinct are shown in Figures 13.12 to Figure 13.15.

Figure 13.11 Surry Hills Precinct – Land use and property

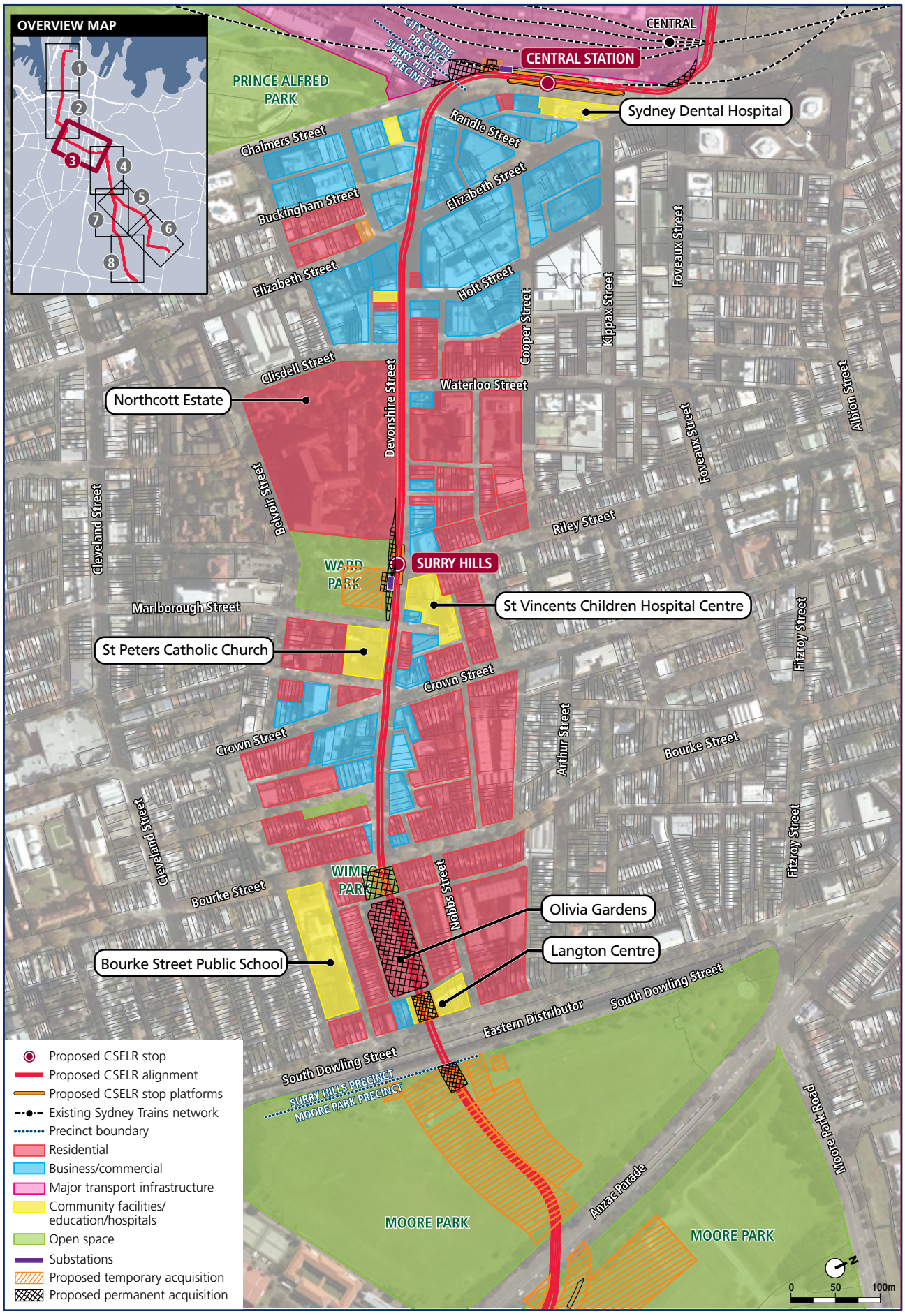


Figure 13.12 Photograph of the existing land use along Devonshire Street looking from the intersection of Elizabeth Street towards Central Railway Station

Source: Parsons Brinckerhoff 2013

Figure 13.13 Photograph of the existing high density public housing development (Northcott Estate) along Devonshire Street to the west of Ward Park

Source: Parsons Brinckerhoff 2013

Figure 13.14 Photograph of the existing Olivia Gardens residential development

Source: Parsons Brinckerhoff 2013

Figure 13.15 Photograph of the existing parks within the Surry Hills Precinct including Ward Park (left) and Wimbo Park (right)

Source: Parsons Brinckerhoff 2013

Planning controls

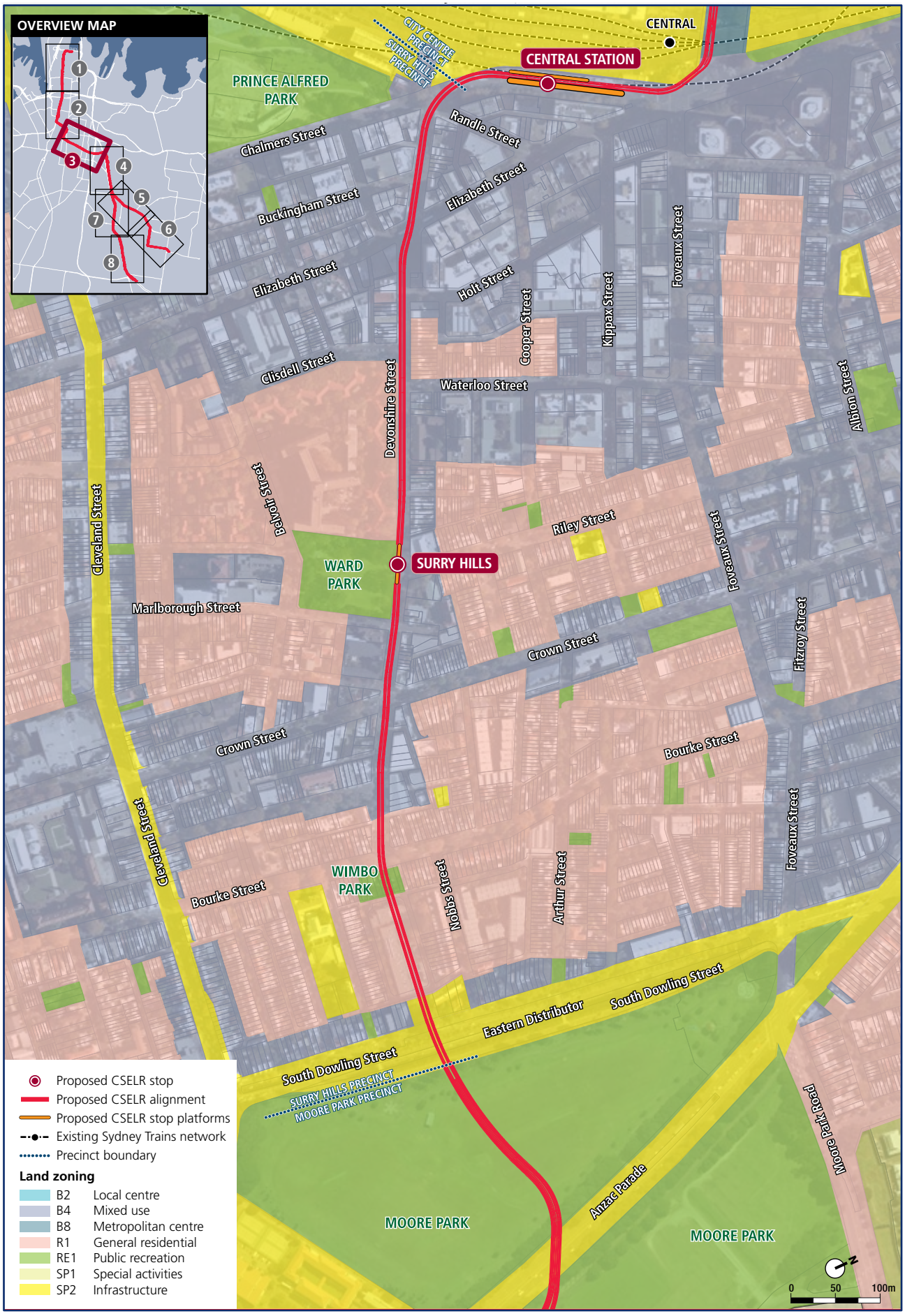
The *Sydney Local Environmental Plan 2012* (Sydney LEP) describes the land use zoning within the Surry Hills Precinct (refer to Figure 13.16). The land within the Surry Hills Precinct is characterised by two main zones: 'B4 – Mixed Use' (predominantly to the western portion of the precinct and along the alignment of Devonshire Street; and 'R1 – General Residential' (generally to the north and south of Devonshire Street and the eastern portion of the precinct).

The 'B4 – Mixed Use' zone generally aims to integrate suitable business, office, residential, retail and other development in accessible locations so as to maximise public transport patronage and allow for developments that assist in supporting the viability of individual town centres. As described in section 12.4.1, this land use provides an interface between the commercial centre of the CBD and the main residential area of Surry Hills to the east. The 'R1 – General Residential' zone provides for a series of residential housing types throughout the precinct as described above. A series of other zones are also dispersed throughout the Surry Hills Precinct including open space areas, an area of 'B2 – Local Centre' zone which supports the mixed use zone along Devonshire Street, and a number of special use zones providing for a number of the land uses described above including the Bourke Street Public School and the Langton Centre.

Building height controls within the precinct are typically limited to those provided by current uses, and allow for building heights ranging from nine to 15 metres east of the CBD interface area around Elizabeth Street and Holt Street. Within the interface zone between the Surry Hills Precinct and the City Centre Precinct, building heights are generally greater, allowing for developments up to about 27 metres, except for the Devonshire Street interface which maintains a smaller street façade between nine and 12 metres. An exception to building heights within the residential zone of Surry Hills is the public housing development located adjacent to Ward Park, which allows for an overall building height of up to 30 metres. Based on existing land uses, the existing permissible building heights indicate that the potential for increased densities across the precinct is limited, with redevelopments likely to occur at a similar scale to the existing built form of the precinct of around three storeys.

Additionally, the Heritage Conservation Area that covers a majority of the precinct would also likely limit the ability to increase the height and density of the existing built form within the precinct (refer to Figure 13.24).

Figure 13.16 Surry Hills Precinct – Existing land use zoning



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, no major land use developments have been identified within the Surry Hills Precinct. The CSELR proposal would however be developed within the vicinity of two proposed major developments as described below and shown on Figure 9.15.

Redfern Waterloo Authority Built Environment Plan Stages 1 and 2

The Built Environment Plan was developed primarily to stimulate economic and social progress for the Redfern, Waterloo, Eveleigh and Darlington region and to improve the urban design, traffic, public access, public transport and affordable housing within this area through a series of urban renewal projects. The first stage of the plan was released in August 2006 to provide a planning framework to encourage future economic growth within the region through the creation of up to 18,000 jobs and 2,000 new dwellings (including a new town centre) throughout Redfern and Waterloo.

The second stage of the plan was exhibited for consultation in early 2011 and is currently being finalised. It proposes planning controls for land use, height and floor space to support the renewal of a series of Housing NSW sites within the eastern part of Redfern and Waterloo, including South Eveleigh to the south of the CSELR proposal, over a 20 to 25 year timeframe. The Draft Stage 2 plan aims to provide a mix of private, affordable and social housing, comprising approximately 60 per cent private and affordable housing and 40 per cent social housing. The overall redevelopment would provide for an increase of residential housing within the region by approximately 2,000 dwellings.

13.4.2 Impacts during operation

Direct operational impacts on land use and property

The permanent footprint of the CSELR proposal within the Surry Hills Precinct would be largely within the existing road corridor along Devonshire Street other than a widening required for the Surry Hills stop. Although the proposal would result in a change in the composition and intensity of transport uses along this street, the primary land use would be maintained. As identified in section 5.3 and on Figure 13.11, some portions of land would be required to be permanently acquired as a result of the proposal.

For the Surry Hills Precinct, these comprise:

- Acquisition of a portion of the northern boundary of Ward Park (landscaped open space) and a small area of private property (existing residential property to the west of Ward Park) to accommodate the proposed Surry Hills stop. The proposal would result in the loss of about 750 square metres of land between the two sites and the resultant removal of the existing landscaping. An additional area of approximately 250 square metres would be required to accommodate the proposed Surry Hills substation. The precise location of this substation would be determined during the detailed design process.
- Acquisition of part of Wimbo Park (approximately 1,100 square metres) adjacent to the eastern end of Devonshire Street at the intersection of Bourke Street, resulting in a change in land use from the existing open space park to part of the main light rail corridor (a transport use). This park is currently owned and maintained by the City of Sydney.
- Acquisition and demolition of the residential property known as Olivia Gardens, which contains 69 units and associated underground car parking. The alignment of the CSELR requires the demolition of the buildings (refer to Chapter 4 regarding the options assessment for the Olivia Gardens alignment). This site would be used as a construction compound site.
- Acquisition of the Langton Centre car park.

A small portion of the existing Devonshire Street Reserve (located at the corner of Devonshire Street and Elizabeth Street) would be impacted by the realignment of Devonshire Street at this location to accommodate the proposed CSELR and an eastbound traffic lane. However, the majority of the existing reserve would be retained as part of the operation of the CSELR proposal.

Land use integration and amenity

Changes to the traffic regime on Devonshire Street may result in changes to the mix of activities within the Surry Hills Precinct in the long-term. There is the potential for a greater diversity of commercial and retail activity in the area, but the intensification of the current scale of development may be limited in the short-term by existing land use and zoning controls.

The CSELR proposal would result in an overall reduction in traffic volumes along Devonshire Street. This reduction would have the potential to result in the following benefits to the Surry Hills Precinct:

- reductions in traffic noise and vehicle emissions
- the potential for a change in the mix of activities undertaken at ground floor levels of existing buildings due to improved amenity as a result of the reduced traffic levels along Devonshire Street and improved access to the Surry Hills Precinct.

The Devonshire Street corridor would continue to provide a strong east-west pedestrian connection through Surry Hills during the operational phase of the CSELR proposal. Pedestrians would benefit from improved amenity, particularly where streets are closed at their intersection with Devonshire Street, as this presents an opportunity to increase footpath area. Additionally, there would be the potential to create a new park or open space area within the site of the current Olivia Gardens apartment complex following completion of construction. The final use of this site would be determined during detailed design.

No property severance impacts are anticipated to occur within the Surry Hills Precinct and access to existing services from the surrounding area is not anticipated to be impacted by the proposal. Access between both sides of Devonshire Street would continue in a similar manner as existing arrangements.

The removal of a number of street trees (refer to section 13.6) and undergrounding of electricity supply along Devonshire Street and at the intersection of Devonshire Street and Bourke Street (refer to section 13.7) would result in a change to the character of this precinct. Mitigation measures to reduce this impact are provided in section 13.7.4.

Operational impacts on future land uses and developments

Two major future developments and urban renewal sites have been identified within the vicinity of the Surry Hills Precinct (refer to section 13.4.1). Both of these sites are currently at different stages of planning development assessment and may be affected by, or impact upon, the CSELR proposal. Operation of the CSELR proposal is anticipated to influence these future land uses and urban design by:

- providing a public transport option that would be available to potentially support the transport needs of the anticipated residential and employment populations associated with the Redfern Waterloo Built Environment Plan; potential opportunities exist to develop transit-orientated developments around this future urban development area
- encouraging renewal and increasing activation of the existing retail and café/restaurant uses within the precinct, in particular along Devonshire Street, Elizabeth Street and Crown Street.

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.

13.4.3 Impacts during construction

Direct construction impacts on land use and property

Construction of the CSELR proposal would require the temporary use of land outside of the permanent proposal footprint. The construction footprint is identified in Chapter 6 and Figure 6.2a to Figure 6.2h for a range of activities. Within the Surry Hills Precinct, these areas of temporary land take for proposed construction compound sites would comprise:

- a temporary site compound in Ward Park
- a temporary site for the construction of the proposed substation in Ward Street.

Existing pedestrian footpaths along Devonshire Street would be retained at all times and protected from the worksite with barriers, with the exception of works undertaken adjacent to Ward Park, where pedestrians could be diverted to the northern footpath.

The location of these temporary land uses are shown on Figure 13.11. The use of these sites would be subject to consultation with the City of Sydney as the manager of Ward Park and with the relevant property owner where relevant.

Construction amenity impacts on existing land uses within the vicinity of the proposal

The proposed worksite along the length of Devonshire Street, in addition to the proposed construction compounds located in Ward Park and Wimbo Park, would affect the amenity of the Surry Hill Precinct in differing amounts throughout the expected four-year construction period between 2014 and 2018. The effects would result from a combination of construction noise, dust, general disturbance and disruption to access arrangements to properties affected by the construction activities.

This would potentially have an adverse effect on those businesses that rely heavily on pedestrian traffic, such as the various retail outlets and cafes located towards the western end of the precinct centred around Elizabeth Street, and other retail and night-time attractions, such as hotels, cafes and bars located along the length of Devonshire Street and Crown Street. Residents of the area would also experience disturbance from construction activities, particularly those undertaken at night (where required) due to the proximity of residences to the proposed worksites.

Although amenity within the Surry Hills Precinct would be affected by the construction activities, this is unlikely to influence land use changes in the short or long-term including open spaces such as Devonshire Street Reserve, Ward Park and the proposed revitalised Wimbo Park. The construction sequencing for the works within the Surry Hills Precinct outlined in Chapter 6 would also provide opportunities to undertake potentially adverse construction activities (such as activities that generate a substantial amount of noise) during appropriate times of the day. This would help to minimise impacts to surrounding land uses and ensure that access to retail and residential properties along Devonshire Street is maintained throughout the construction period.

Further detail regarding the potential amenity impacts resulting from the construction of the CSELR proposal are discussed as part of the traffic and socio-economic assessments of the Surry Hills Precinct in section 13.3 and section 13.9.

13.4.4 Management and mitigation

To minimise the land use and property impacts of the CSELR proposal within the Surry Hills Precinct, consultation would occur with the surrounding businesses, the local community and key stakeholders, to advise them in advance of proposed works and any temporary access arrangements that may be required.

Consultation would also be undertaken prior to and throughout construction with other agencies, such as the City of Sydney regarding potential land use impacts to community facilities such as Ward Park and Wimbo Park, utilities providers, and other potential stakeholders, to minimise ongoing impacts to existing land uses.

Additionally, the overall construction footprint would be refined during detailed design to identify areas where the footprint could 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.

13.5 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 Surry Hills Precinct.

13.5.1 Existing conditions

To outline the existing noise environment and determine likely impacts, noise catchment areas (NCAs) were defined. Figure 13.17 shows the extent of the NCA considered for the Surry Hills Precinct, as well as noise monitoring locations (BG03 and BG04). Noise and vibration sensitive receptors within the Surry Hills Precinct include residences, commercial premises, other special uses including a school, a business college, a childcare centre, the Langton Clinic (drug and alcohol rehabilitation clinic), two places of worship, recording studios and Ward Park.

Table 13.5 presents results of the unattended background noise monitoring at locations BG03 and BG04. The background monitoring results are presented in the form of the Rating Background Level (RBL) and averaged (L_{Aeq}) noise levels for the day, evening and night-time periods. These noise levels display a diurnal trend, with noise levels at night lower than during the day and evening periods, which is mainly associated with the associated decrease in traffic volumes in the area.

Table 13.5 Unattended noise monitoring results – Surry Hills Precinct

NOISE MONITORING LOCATION (REFER FIGURE 13.17)	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}
BG03 (158 Devonshire St)	53	63	51	62	47	59
BG04 (44 Parkham St)	44	60	43	52	39	46

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

Note: *dBA = A-weighted decibels*

Figure 13.17 Surry Hills Precinct: noise catchment area and noise monitoring locations

Attended noise monitoring was also undertaken at BG03 and BG04 to measure the maximum noise level occurring during a noise event (L_{Amax}) in the existing environment. The results of the attended monitoring confirmed the influence of road traffic noise (including truck deliveries and garbage collection), aeroplanes, birds, pedestrians and other noise sources within the Surry Hills Precinct. The highest maximum noise levels (L_{Amax}) were observed for road traffic on Devonshire and Waterloo streets (up to 92 dBA) and truck deliveries (up to 75 dBA).

13.5.2 Impacts during operation

Potential noise and vibration impacts in the Surry Hills 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 the Surry Hills stop and the potential substation next to the Surry Hills stop.

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, the operational road traffic changes proposed within the Surry Hills Precinct (refer section 13.3.2) would not be expected to increase traffic numbers or road traffic noise impacts in the precinct. In fact, the removal of westbound traffic would be expected to reduce existing road traffic noise along Devonshire Street. (Noise from the addition of light rail is discussed separately below).

The noise impacts of any changes to bus routes and daily bus movements that may be proposed in the Surry Hills 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 originate from the wheel-rail interface, as well as operation of warning bells and auxiliaries such as air-conditioning units and power converters.

Residential receptors

Predicted noise levels at residential receptors in the Surry Hills Precinct that would experience the highest airborne noise levels during a regular daily service are summarised in Table 13.6 for the following two scenarios, without noise mitigation:

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

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

The predicted noise levels demonstrate that rail noise levels would not be expected to change between the at-opening 2021 and future 2036 operating scenarios. Where exceedances of the average and maximum (L_{Aeq} and L_{Amax}) noise trigger levels under the *Rail Infrastructure Noise Guideline* (the RING) Environment Protection Authority, (EPA 2013) are predicted, they are indicated in Table 13.6 in bold. To assess and manage potential noise from light rail proposals, the RING provides non-mandatory airborne noise triggers for residential and other sensitive receptors. Where rail noise levels are above the noise triggers the noise assessment is required to identify feasible and reasonable mitigation to achieve a desired objective of airborne noise within the trigger levels.

Table 13.6 Predicted worst-case airborne operational noise levels at residential receptors in Surry Hills Precinct – without mitigation

NCA (REFER FIGURE 13.17)	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 Noise trigger level (dBA)	60	50	80	60	50	80
NCA02.1	**62**	**55**	**83**	**62**	**55**	**83**

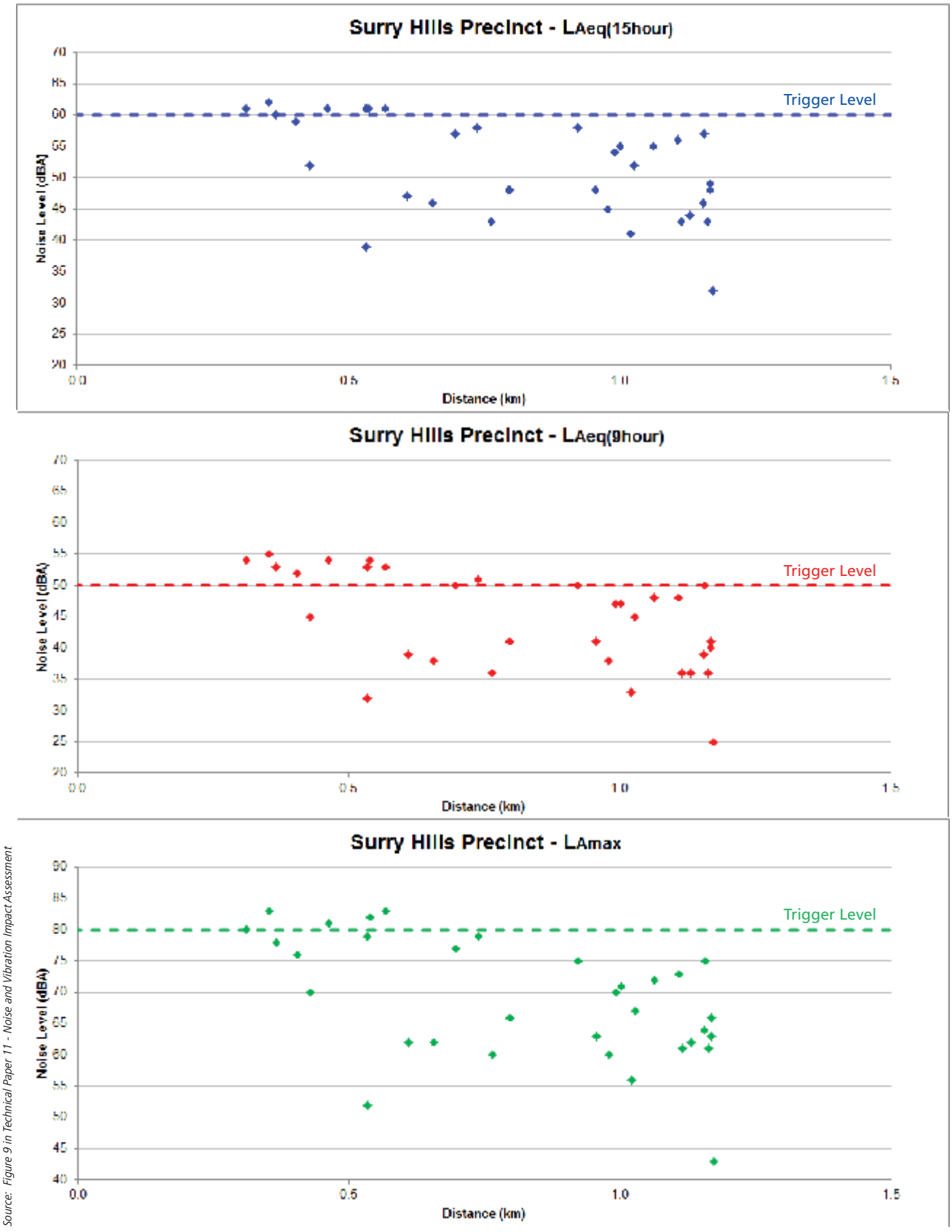
Source: *Table 12 in Technical Paper 11 – Noise and Vibration Impact Assessment, Volume 6*

These results are shown graphically for the 2036 future scenario in Figure 13.18, where the dashed line indicates the applicable noise trigger level and the dots represent individual residential receptors. The distance is measured in kilometres 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.

As indicated in Table 13.6 and Figure 13.18, in the 2036 future scenario, operational average (L_{Aeq}) noise levels at residential receptors on Devonshire Street west of Marlborough Street are predicted to be up to 62 dBA and 55 dBA during the daytime and night-time, respectively. This equates to exceedances of the noise trigger levels of up to 2 dB and 5 dB, respectively. Exceedances of the L_{Amax} trigger level of up to 3 dB were also predicted.

Importantly, existing noise levels in this area of Devonshire Street are above the predicted light rail noise contribution (refer Table 13.6). Existing maximum noise levels associated with road traffic movements on Devonshire Street are also above the predicted light rail maximum noise levels.

Figure 13.18 Plots of predicted Surry Hills Precinct residential operational airborne noise for the 2036 future scenario (without mitigation)



Source: Figure 9 in Technical Paper 11 - Noise and Vibration Impact Assessment

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 Surry Hills Precinct. For just over half of these receptors, compliance with the relevant external noise trigger levels was predicted. Those locations where the predicted noise levels exceed the adopted trigger levels are summarised in Table 13.7. The predicted exceedances of the noise trigger levels are shown in bold.

Table 13.7 Predicted airborne operational noise trigger level exceedances at other sensitive receptors in the Surry Hills Precinct – without mitigation

SENSITIVE RECEPTOR	TYPE	EXTERNAL NOISE TRIGGER LEVEL (dBA)	MAXIMUM PREDICTED NOISE LEVEL (dBA)	
			2021 AT-OPENING SCENARIO	2036 FUTURE SCENARIO
		$L_{Aeq(1hr)}$	$L_{Aeq(1hr)}$	$L_{Aeq(1hr)}$
Twinkle Twinkle Child Care	Childcare	50	**61**	**61**
St Vincent's Hospital Child Care	Childcare	50	**51**	**52**
SalesITV	Recording studio	45	**63**	**63**
Quaker Service Australia	Place of Worship	50	**62**	**62**
St Peter's Catholic Church	Place of Worship	50	**58**	**59**

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 majority of the predicted exceedances result from the conservative assumption that receptors outside of the City Centre Precinct would have open windows and hence an outside-to-inside attenuation of only 10 dB. Given the proposed CSELR alignment is along or adjacent to existing roads, many of the above identified locations may have fixed glazing and provision of alternative ventilation such as air-conditioning.

In all cases, the existing ambient noise levels are likely to be similar to or higher than the predicted light rail noise levels.

Special event services

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

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

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

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

For events where 90 metre LRVs are required after the event to clear crowds in the target one hour time, the impact on daytime average (L_{Aeq}) noise levels would remain minimal — up to 0.6 dB higher than on days without special event services. If 90 metre LRVs are used for special event services for one hour in the night-time period after 10.00 pm, the resulting night-time average ($L_{Aeq(9hour)}$) noise levels would be up to 3.0 dB higher than the level on nights without special events.

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

The noise impacts of special event services are considered acceptable in the context of the short duration of special event services, typically on one or two occasions each week. By providing more transport options, the CSELR proposal also has the potential to reduce noise impacts from pedestrians moving through Surry Hills to Central Railway Station after special events, although this benefit is difficult to quantify.

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 deliveries), the existing noise levels in the busier parts of the Surry Hills Precinct are already above the predicted L_{Aeq} and L_{Amax} 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. It is understood that 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. However, short-term external levels around 75 dBA occur frequently in the precinct (for example due to cars passing).

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 Surry Hills Precinct or elsewhere. For the Surry Hills Precinct, the 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$^{1.75}$.

One potential exceedance of the 82 dBV screening criterion for potential vibration sensitive equipment has been predicted at the Langton Centre, as shown in Table 13.8. The property owners would be consulted further during the detailed design phase of the proposal to confirm this site contains vibration-sensitive equipment, and the form of mitigation required to avoid vibration impacts (refer mitigation discussion in section 13.5.4).

Table 13.8 Surry Hills Precinct - potential exceedances of screening criteria for vibration sensitive equipment

ADDRESS	DESCRIPTION	MAXIMUM 1/3 OCTAVE BAND FACADE VIBRATION LEVEL (dB re 10^{-9} METRES PER SECOND)
591 South Dowling Street, Surry Hills	The Langton Centre	87

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

Predicted operational ground-borne noise impacts

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

Where necessary, ground-borne noise is controlled by specifying trackforms that incorporate vibration-isolating components. This approach would be applied to the CSELR (at detailed design stage) and was assumed in the ground-borne noise modelling undertaken. In the Surry Hills 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. The high density of receptors in the Surry Hills Precinct means that ground-borne noise may be masked in the front room of buildings, but may be noticeable in rooms set back from the façades.

Very high attenuation trackform may also be required at the Surry Hills Precinct locations in Table 13.9 to control ground-borne noise at these particularly sensitive receptors. This would be assessed in more detail at detailed design stage, and mitigation confirmed in consultation with the owners of these facilities (as explained in section 13.5.4).

Table 13.9 Ground-borne noise sensitive receptors in Surry Hills Precinct

ADDRESS	DESCRIPTION	GROUND-BORNE NOISE LEVEL L_{ASmax} [1] (dBA) (TRIGGER LEVEL)[2]
127 Devonshire Street, Surry Hills	SalesITV	40 (NR15 or approximately 20 dBA)
41 Holt Street, Surry Hills	JMC Academy (Audio and Visual Design)	27 (NR15 or approximately 20 dBA)

Note 1: *LASmax refers to the maximum noise level not exceeded for 95 percent of rail pass-by events and is measured using the 'slow' response setting on a sound level meter*

Note 2: *Predicted noise levels include nominal 5 dB attenuation due to resilient track forms*

Source: *Table 24 in Technical Paper 11 – Noise and Vibration Impact Assessment, Volume 6*

Noise from substation operations

A potential substation site has been identified in Ward Park, near the Surry Hills stop as identified in Figure 13.17. Table 13.10 indicates the nearest noise sensitive receptors, controlling noise goals and predicted L_{Aeq} noise levels from the substation operations.

However, this substation is proposed to be located underground which was not considered in the initial modelling. Hence, the noise goal should be readily achieved at this location.

Table 13.10 Predicted noise levels from substation operations – Surry Hills Precinct

SUBSTATION	RECEPTOR TYPE	OPERATIONAL NOISE (dBA)		COMMENTS
		L_{Aeq} CONTROLLING NOISE GOAL[1]	PREDICTED L_{Aeq} NOISE LEVEL	
Ward Park	Residential	49	44	Complies with the noise goal
	Passive recreation	50	63	Exceeds the noise goal – however this substation would be underground; hence noise impacts would be much less than shown.

Note 1: *Predictions include a 5 dB penalty for tonality/low frequency and do not include any shielding of transformers*

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

Operational noise at the Surry Hills stop

As discussed in Chapter 12 (section 12.5.2), the proposed public address (PA) systems would be the only notable operational noise source at light rail stops.

These systems can be readily designed to comply with the *NSW Industrial Noise Policy* (EPA 2000) (INP) intrusiveness and sleep disturbance criteria at all locations. The infrequent nature of the announcements would also likely result in minimal subjective noise impacts at the stop.

Notwithstanding likely compliance with the INP criteria, PA systems at stops have the potential to cause annoyance to nearby sensitive receivers. At the proposed Surry Hills stop, the nearest residential receptors would be approximately 17 metres from the stop platforms. There is, therefore, potential for annoyance if the noise from the PA system is audible at these residences.

Proposed mitigation to address the issue of subjective noise impacts from PA systems is outlined in section 13.5.4.

13.5.3 Impacts during construction

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

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

- construction airborne noise (general CSELR alignment, structures, demolition works 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

Construction noise has been assessed in accordance with the *Interim Construction Noise Guideline* (ICNG, DECC 2009). Airborne construction noise was predicted for the likely construction activity categories and scenarios (without mitigation), as detailed in Table 13.11 for the Surry Hills Precinct.

Table 13.11 Summary of airborne noise scenarios considered – Surry Hills 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

Table 13.11 cont.

CONSTRUCTION ACTIVITY	SCENARIOS	SCENARIO SOUND POWER LEVEL (dB)	APPROXIMATE DURATION OF WORKS AT ANY LOCALITY[1]
Structures – stops	Excavation of existing pavement	119	1 week
	Formwork and reinforcement	109	2–3 weeks
	Footings	105	2 weeks
	Concreting	109	1 week
	Finishing works	115	2–3 weeks
	Street reconfiguration	113	3–4 weeks
Moore Park cut-and-cover tunnel (impacting eastern edge of Surry Hills Precinct)	Temporary road diversion works	114	Unknown
	Clearing and grubbing	110	No longer than 1 week
	Install temporary dewatering	110	1 week
	Guidewalls and diaphragm walls	119	12 weeks
	Excavation	111	16 weeks
	Propping works	100	2-3 weeks
	Install roof slab	110	
	Install tunnel services	102	2 weeks
	Install waterproofing	109	16 weeks
Structures – Eastern Distributor bridge	Laydown pad, temporary platforms	105	4 weeks
	Unload and pre-assemble truss bridge	102	2–4 weeks
	Piling	113	1 week
	Abutments	110	1–2 weeks
	Erection of bridge truss	104	Less than 1 week
	Erection bridge decking	104	2–3 weeks
Demolition of Olivia Gardens	Building demolition - Olivia Gardens	118	14 months[3]
	Crushing building materials - Olivia Gardens	120	

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

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

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

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

The predicted construction airborne noise impacts in the Surry Hills Precinct (exceedances of the adopted noise management levels or NMLs) associated with the activities and scenarios in Table 13.11 are summarised in Table 13.12 below.

Table 13.12 Summary of airborne construction noise level exceedances of NMLs – Surry Hills 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	7–41	3–51
Commercial	1–29	1–29
Other sensitive receptors	1–50	1–50

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

Due to the close vicinity of the works, high exceedances of the NMLs were predicted at the nearest residences to the works during standard construction hours (exceedances up to 41 dB) and out of hours work (exceedances of up to 51 dB). Commercial and other sensitive receptors were also predicted to be subject to high NML exceedances of over 20 dB.

Within the Surry Hills Precinct, the most noise intensive works would be the demolition works at Olivia Gardens, and road excavation activities along the alignment which may require use of a rockbreaker. With reference to Table 13.11 demolition activities would occur over approximately 14 months, while road excavation activities along the alignment are expected to last for about two weeks at any single receptor. Receptors near to the proposed stop location would also be likely to be impacted by additional excavation activities over about one week as part of stop construction.

Additional noise intensive works include guidewall construction and diaphragm wall works during the construction of the Moore Park tunnel. Although these works would occur in the Moore Park Precinct, the noise impacts extend to Surry Hills receptors. These impacts are expected to last for around 12 weeks for each 200-metre length of the tunnel. The noise impacts from these works would reduce as the construction works move away from the receptors in Surry Hills and would typically occur at a greater distance from receptors than the mainline works.

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

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.

As discussed further in section 13.5.4, 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 Surry Hills Precinct, a number of roads are proposed to be used as construction haulage and access routes, as described in Chapter 6 and Table 65 in Technical Paper 11. The additional road traffic is not predicted to create a discernible increase in road traffic noise at any locations in the Surry Hills Precinct as the increases are all well under 2 dB, and would comply with the applicable noise criteria under 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 L_{Amax} 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 Surry Hills Precinct during rockbreaker activities at the nearest residential and commercial buildings to the works; however airborne noise levels associated with the rockbreaker 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 cinema and theatre buildings located in the Surry Hills Precinct. Results are presented in Table 13.13.

Table 13.13 Predicted ground-borne construction noise impacts at nearest internal areas of cinemas and theatres in the Surry Hills Precinct

STREET	DESCRIPTION	TYPE	INDICATIVE DISTANCE TO NEAREST WORKS (M)	PREDICTED GROUND-BORNE NOISE (dBA)
127 Devonshire Street, Surry Hills	Sales ITV.com	Recording Studio	13	64
41 Holt Street, Surry Hills	JMC Academy (Audio and Visual Design)	Recording Studio	72	29

Source: Table 66 in Technical Paper 11 – Noise and Vibration Impact Assessment, Volume 6

Within the Surry Hills Precinct, the nearest identified recording studio (SalesITV.com) is located immediately adjacent to the proposed works zones. The predicted ground-borne noise level at the nearest internal area of the building of SalesITV.com premises is 64 dBA. Internal noise levels within recording studios are typically required to be low to avoid interfering with quiet recordings.

Based on the predicted ground-borne noise levels, the internal noise levels due to rockbreaking may be audible at all recording studios listed in Table 13.13. Further assessment during detailed design is therefore required to assess the likely construction noise levels at the most affected recording rooms of all recording studios and to establish receiver specific noise goals, taking into account the type of recordings undertaken, and the existing external to internal noise insulation. Consultation with the owners or operators of recording studios would be required to establish times of particular sensitivity to ground-borne noise impacts.

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 Surry Hills Precinct. In summary, most works would be expected to comply with the relevant construction vibration guidelines.

Construction vibration is expected to be below the cosmetic damage criteria, although some items of construction equipment have the potential to be operated within the recommended safe working distances. Mitigation and management measures to address potential impacts of this are discussed in section 13.5.4. Ground-borne vibration generated during use of the heaviest plant is likely to be perceptible at times. Additionally, there is the potential for ground vibration levels to exceed the human comfort criteria depending on the duration and nature of the construction activity. Any exceedances would be expected to be of short duration. Mitigation and management measures to address potential impacts of this are discussed in section 13.5.4.

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.

13.5.4 Management and mitigation

Airborne operational noise

In Surry Hills, there is the potential for existing average road traffic noise levels to decrease with the introduction of light rail and the resulting conversion of Devonshire Street to one-way traffic. This potential reduction in existing average traffic noise levels, along with low existing background noise levels and the level of exceedance of the noise goals predicted during the night-time period (up to 5 dB during normal operations and 8 dB on special event nights), mean that the light rail noise impacts require consideration of feasible and reasonable mitigation. The airborne operational noise assessment determined that noise levels at the majority of residential and other noise sensitive receptors in the Surry Hills Precinct would comply with the noise trigger levels from the RING. However, the RING noise trigger levels are predicted to be exceeded at some receptors. An investigation of feasible and reasonable noise mitigation measures is therefore required to minimise the worst-case predicted noise levels.

In addition to residential receptors, the 'other sensitive' receivers with predicted noise goal exceedances (refer Table 13.7) would also include investigation of mitigation options. During the detailed design stage, the attenuation provided by the facade of each affected 'other sensitive' receiver would be verified to determine whether mitigation is required. This would include reference to the detailed design noise predictions following confirmation of at-source mitigation measures for residential receivers in the Surry Hills Precinct.

Potentially reasonable and feasible measures include:

- more stringent specification of LRV noise emissions in the procurement process
- speed restrictions during the night-time between the Central Station and Surry Hills stops
- higher absorption track forms
- minimising wheel and rail roughness
- property treatments.

Noise barriers are not appropriate in the light rail context where access is required across embedded tracks for pedestrians and other road vehicles. Even with a combination of these measures, residual exceedances of the noise goals of 1 dB to 2 dB may still remain. Acceptance of minor 1 dB to 2 dB exceedances of the trigger levels is proposed in recognition that, in all cases, the predicted light rail noise levels are below the existing ambient level at the affected receptors.

A summary of the potentially reasonable and feasible mitigation measures is provided below. Greater detail is provided in Technical Paper 11 — *Noise and Vibration Impact Assessment.* In all cases, the final form of the proposed mitigation measures would be determined during detailed design.

Specification of LRVs

It may be possible to specify more stringent noise levels for LRVs during the procurement process. The modelled levels are based on a combination of measurements of the existing light rail system and understanding of best practice in Europe, but it may be possible to target lower levels, possibly by up to 2 dB, particularly for L_{Amax}. However, the L_{Amax} criterion is a 95th percentile criterion, meaning 19 out of 20 LRV passbys are required to be quieter than the criterion in any case. This approach would introduce a risk that the rolling stock options available may be restricted, or that some aspects of the rolling stock may need to be customised, possibly increasing cost or requiring compromise in other areas of performance. This approach would only be recommended following consultation with rolling stock providers to establish whether more stringent noise specifications could feasibly be achieved.

Speed restrictions

It may be possible to restrict speeds between the Central Station and Surry Hills stops outside of peak periods, particularly at night (with the exception of during special events). At present, typical speeds of 40 kilometres per hour are proposed in the uphill direction, and 45 kilometres per hour in the downhill direction. If speeds through this area were restricted to 30 kilometres per hour (for example), reductions of up to 3 dB to 4 dB in L_{Aeq} and 4 dB to 5 dB in L_{Amax} would be expected. A noise benefit would be achieved at locations between Holt Street and Ward Park. West of Holt Street, speeds would be lower anyway due to intersections with road traffic.

The feasibility of restricting speeds to 30 kilometres per hour at night in Surry Hills would be investigated during the detailed design stage. This mitigation measure would address the most significant exceedances of the noise goals in the most sensitive time period for residential receptors. It is noted that speed restrictions during special event services are unlikely to be possible even at night.

Higher absorption track forms

Absorptive paving trackforms — At this stage, no examples of constructed embedded light rail tracks incorporating absorptive paving materials have been identified in the market or in existing light rail systems. It is normal for other vehicles to be able to drive over the embedded tracks, meaning that standard road surface paving materials are more common with embedded rail systems. Some porous, concrete-type sound-absorptive products that can be driven on by maintenance vehicles are available for use in tunnels or on slab track, but as these would normally be installed on segregated rail lines, the durability of the products is unknown for the purpose of use in a road context. The feasibility of this option and the potential noise benefit would require more investigation during the detailed design stage. Further discussion on embedded rail track form options is given below in the context of ground-borne noise mitigation.

Vegetated trackforms — These are essentially a form of absorptive paving, which has been proven to be feasible in Europe but is not in common use elsewhere. Research indicates vegetated tracks are inherently quieter than paved track. The potential noise attenuation achieved would be dependent on regular upkeep of the vegetated track to maintain the absorptive surfaces during all seasons. Feasibility and reasonableness concerns exist in relation to this option because of high maintenance requirements, watering requirements in Australian conditions and the options for irrigation systems on sloping track along some sections, like Devonshire Street in Surry Hills. The feasibility of this option and the potential noise benefit would require more investigation during the detailed design stage.

Minimise wheel and rail roughness

The specifications for CSELR operations could include requirements for maintaining the rail surface (via rail grinding) and train wheel condition (via a wheel lathe) in accordance with defined acceptance standards. This would ensure defects are identified quickly and then rectified to minimise potential noise impacts.

Property treatments

Individual property treatments remain an option in the event that the above alternatives are determined as not feasible or reasonable. If required, property treatments would likely be limited to the provision of mechanical ventilation to meet building code airflow requirements with windows closed. While there would be a change in noise character of the environment with the introduction of a new noise source (LRVs), the predicted noise levels are generally less than the existing noise levels and for this reason provision of upgraded glazing may not be justified.

Even with a combination of the measures listed above, residual exceedances of the noise goals of 1 dB to 2 dB may still remain in this precinct. Acceptance of this level of impact is proposed, noting that the existing night-time L_{Aeq} levels in this part of Devonshire Street are noticeably higher than the predicted light rail noise levels.

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

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

Ground-borne operational noise and vibration

Some potential exceedances of ground-borne operational vibration criteria have been identified at locations that potentially contain vibration sensitive equipment, including the Langton Centre. 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 throughout the Surry Hills Precinct to minimise ground-borne noise impacts at locations where sensitive receptors line the route. Very high attenuation track may be required in localised sections to attenuate impacts to particularly sensitive receptors such as recording studios.

To manage potential ground-borne operational noise impacts on sensitive receivers, consultation with the receptors identified in Table 13.9 (which equates to Table 24 in Technical Paper 11) would be required during the detailed design phase to confirm the sensitivity of these locations to ground-borne operational noise. Investigations would establish the internal noise level achieved by these 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 these locations and confirm the appropriateness of the ground-borne operational noise design goals. Alternative track forms are described in section 12.5.4.

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

The Ward Park substation is proposed to be below ground and hence no mitigation is necessary.

Noise from the PA systems at the Surry Hills stop can be controlled comply with the INP intrusiveness and sleep disturbance criteria at all locations to minimise potential impacts at the nearest receptors to the stop. 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.

Changes in operational road traffic noise

Road traffic noise levels are anticipated to decrease in the Surry Hills Precinct. Therefore, no specific mitigation is proposed.

Construction noise and vibration

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

The site specific CNVPs described in section 12.5.4 would also be prepared for the Surry Hills 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 Surry Hills 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 Surry Hills 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 locations listed in Table 13.13 of this chapter (which equates to Table 66 in Technical Paper 11). This would include further assessment of the likely construction noise levels at the most affected recording rooms of all recording studios and to establish receiver-specific noise goals, taking into account the type of recordings undertaken, and the existing external to internal noise insulation. Consultation with the owners/operators of these facilities would be undertaken as part of this process.

During construction, attended measurements would be undertaken at the commencement of rockbreaking activities in the vicinity of the premises listed in Table 13.13 (which equates to Table 66 in Technical Paper 11), 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 affected communities.

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.

13.6 Planted trees

This section provides a summary of the existing planted trees within the Surry Hills 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.

13.6.1 Existing conditions

The Surry Hills Precinct contains approximately 190 planted trees within the 'tree study area' along the CSELR alignment (refer Figure 13.19), which typically comprise a mix of recently planted juvenile deciduous trees, aging Poplars, Plane Trees, Brush Boxes, Casuarina species and a Moreton Bay Fig.

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

The distribution of the trees throughout the precinct is shown in Figure 13.19, and generally occurs at the following locations:

- along Devonshire Street
- within Ward Park
- in the vicinity of the Devonshire Street/Bourke Street intersection
- within Wimbo Park, the Olivia Gardens apartment complex site and the Langton Centre car park.

Discussion on the key characteristics of the trees throughout the precinct is provided in Table 13.14. 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.

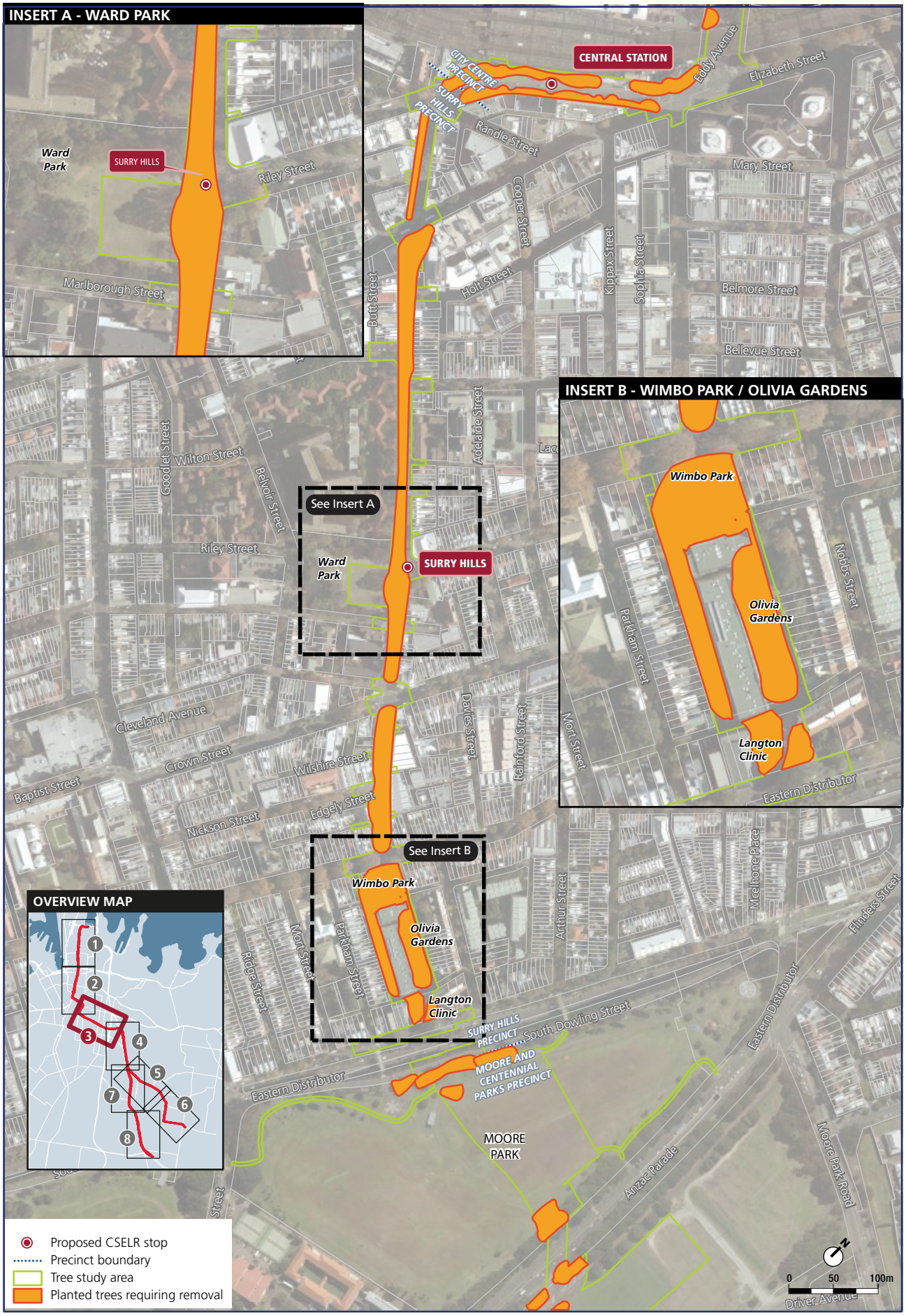
Table 13.14 Overview of planted trees within the Surry Hills Precinct

AREA	OVERVIEW OF PLANTED TREES
Devonshire Street	Devonshire Street contains approximately 130 trees within the tree study area, which generally comprise a mix of recently planted juvenile deciduous trees and aging Poplars that are approaching over-maturity. Many of the trees have had their structure and form modified as a result of past pruning activities to provide clearances to existing overhead electricity wires and vehicles travelling along Devonshire Street. A number of the trees on the southern side of Devonshire Street lean towards the road carriageway. The condition of the trees on Devonshire Street typically range from good to average, with many of the trees displaying declining vigour. Notwithstanding this, the trees make a substantial contribution to the visual amenity of the public domain along Devonshire Street, particularly during summer when the deciduous trees are in leaf. As discussed in section 13.8.2, the street trees along the southern side of Devonshire Street are listed on the City of Sydney (2013b) *Register of Significant Trees.* The City of Sydney has assessed that a number of the Devonshire Street trees are reaching the end of their safe and useful life and the City has begun a replacement planting program along the rest of Devonshire Street with a species with similar attributes. It is noted that a number of private properties fronting onto Devonshire Street also contain large mature trees, such as the Northcote Estate. These trees also contribute to the visual amenity of the public domain along Devonshire Street.
Ward Park	Ward Park contains approximately 20 trees within the tree study area, which generally comprise semi-mature to mature introduced native species that are typically in good condition. These trees contribute to the visual amenity of the public domain along Devonshire Street and the surrounding area and provide shade for park users.
Devonshire Street/ Bourke Street intersection, Wimbo Park, Olivia Gardens and the Langton Centre car park	This area of the proposed CSELR alignment contains approximately 40 trees within the tree study area. The area adjacent to the eastern side of the Devonshire Street/Bourke Street intersection contains large mature Plane Trees and Brush Boxes, which are typically considered to be in good condition, displaying healthy well-formed crowns. These trees make a substantial contribution to the visual amenity of the locality. As discussed in section 13.8.2, the street trees along Bourke Street between the intersections of Arthur and Cleveland streets are listed on the City of Sydney (2013b) *Register of Significant Trees.* The Bourke Street significant trees are identified as significant as a group of plantings and not as individual specimens. Trees within Wimbo Park are predominantly introduced Casuarina species that are typically considered to be in good condition; however, are of limited significance in terms of their contribution to the landscaped amenity of the locality. The Olivia Gardens property contains a number of large mature trees that are generally located on private property. However, some of the trees are located outside the fenced boundary of Olivia Gardens, adjacent to the northern kerb of Parkham Lane. Trees within and adjacent to Olivia Gardens appear to typically be in good condition. The Langton Centre car park contains a large mature Moreton Bay Fig adjacent to the western footpath on South Dowling Street. This tree is in good condition, displaying a structure, form and health typical of a mature Moreton Bay Fig (i.e. displaying adult characteristics). The Moreton Bay Fig makes a substantial contribution to the visual amenity of the locality. The car park also contains several semi-mature to mature trees (including Eucalypts) which also contribute to the amenity of the locality.

Source: Based on Technical Paper 9, Volume 5

It is noted that a number of the planted trees within the Surry Hills Precinct are listed on City of Sydney's (2013) *Register of Significant Trees*, and/or contribute to the significance of listed heritage items (refer to section 13.8). 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 13.8 and 13.7, respectively.

Figure 13.19 Impacts to planted trees – Surry Hills Precinct



13.6.2 Direct impacts to planted trees

Construction of the CSELR proposal would require the removal of up to approximately 140 planted trees within the Surry Hills Precinct, or approximately 74 per cent of the trees within the tree study area. The majority of impacted trees are located along Devonshire Street, Wimbo Park, the Olivia Gardens site and the Langton Centre car park.

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

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

Trees within Wimbo Park would generally be impacted by the proposed CSELR tracks and associated infrastructure (e.g. overhead wiring), as well as a temporary diversion of Bourke Street, which would be required during intersection works at the Bourke Street/Devonshire Street intersection and the proposed extension of Parkham Lane to Bourke Street. Trees within the Olivia Gardens apartment complex site would be removed during or prior to demolition of the buildings.

Trees directly impacted within the Langton Centre car park would include the large mature Moreton Bay Fig adjacent to the western footpath on South Dowling Street. The removal of this tree is considered to represent a substantial impact due to the age and size of this tree, which makes a major contribution to the visual amenity of the locality.

Trees within Ward Park directly adjacent to Devonshire Street that would be directly impacted by the proposed CSELR permanent works (e.g. overhead wires, substations, Surry Hills stops, kerb realignments, etc.), or that would significantly impinge on required clearances to infrastructure, would be removed to allow for the safe operation of the CSELR. However, no trees within the proposed construction compound at Ward Park would be impacted. While the compound would include a number of mature tree species within the site boundary, construction activities would be excluded from the drip line to prevent damage to root zones or branches (refer to section 13.6.3). Similarly, no trees would be impacted on Nickson Street or within the small park adjacent to Nickson Street.

It is noted that a number of private properties fronting Devonshire Street contain large mature trees, such as the Northcote Estate. There is the potential that some of these trees may also be directly impacted by the CSELR proposal due to pruning to provide clearances to overhead wires and other infrastructure. Potential impacts to these trees would be further investigated during detailed design, in consultation with affected land owners.

13.6.3 Mitigation measures

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

- The layout of the construction compound at Ward Park would be designed to minimise impacts to significant trees within the park. Exclusion fencing would be established around the drip lines of each tree to be retained to minimise the risk of impact to the viability of the trees. Where impact to the drip line area cannot be avoided (due to space constraints), opportunities to raise construction facilities (e.g. demountable) above the ground level would be investigated so as to

avoid impacting on the underlying tree roots, in accordance with Australian Standard AS 4970 *Protection of Trees on Development Sites.*

- Vehicle access to the Ward Park construction compound would be provided from Devonshire Street via the southern side of Ward Park. This vehicle access would be designed so as to avoid impacting on trees that would not already be impacted by the proposed permanent works (e.g. the light rail stop and substation).
- The proposed construction vehicle access to Wimbo Park would be designed to avoid impacts to larger street trees along Bourke Street that would not already be removed to accommodate the proposed permanent works (e.g. light rail track and associated overhead wires), the temporary diversion of Bourke Street and the extension of Parkham Lane to Bourke Street.

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

- *Liriodendron tulipifera* (Tulip Tree) are proposed along Devonshire Street.
- The design strategy for Ward Park would incorporate a new frontage to Devonshire Street to replace the existing landscaped seating area and new tree plantings — likely to comprise *Jacaranda mimosifolia* (Jacaranda) and *Gleditsia triacanthos* 'Sunburst' (Honey Locust). More detailed concepts would be developed for Ward Park during detailed design, in consultation with the City of Sydney.
- Wimbo Park and the Olivia Gardens site would be re-designed as a public park, providing a pedestrian and cycle connection between Devonshire Street and Moore Park. The design strategy would be developed through the detailed design stage, but could include an urban square facing Bourke Street, with planting around the perimeter to provide open and clear sight lines to the CSELR alignment. A wide path would connect Wimbo Park, through a new grassed area, to the new pedestrian and cycle bridge through to Moore Park. Plantings are likely to include *Liriodendron tulipifera* (Tulip Tree), *Elaeocarpus reticultatus* (Blueberry Ash), *Tristaniopsis laurina* (Water Gum) and *Allocasuarina littoralis* (Black She Oak). Plantings in the new Wimbo Park and Olivia Gardens public park would also be considered in the context of providing privacy screenings for surrounding residents.

Note: Consistency with the City of Sydney's (2011) *Street Tree Master Plan* is detailed in Appendix F.

13.7 Visual and landscape character

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

13.7.1 Existing landscape character and visual conditions

Surry Hills Precinct is characterised by its topography and inner city heritage values. Devonshire Street rises steeply eastwards from Chalmers Street, passing a highly active retail and commercial precinct including shop fronts, cafes, pubs, and hotels, as well as numerous terrace houses towards a crest near Ward Park. The street then descends to cross Crown Street and terminates at Bourke Street. The street, approximately 850 metres long, generally has small scale commercial development in the west and a residential character in the east. The CSELR proposal alignment continues beyond Devonshire Street eastwards through Wimbo Park and the Olivia Gardens apartment complex to South Dowling Street.

The built form of this precinct contrasts noticeably from the City Centre Precinct, and is marked by a diversity of architectural styles. The buildings are predominantly two-storey terraces with little or no setback from the footpath, and commercial frontages often with awnings. There are several larger buildings, particularly between Chalmers Street and Holt Street. Between Holt Street and Crown Street are mostly terrace houses on the northern side, with small gardens creating a setback from the street.

Between Clisdell Street and Ward Park, the Northcott Estate, a post-war residential public housing estate, comprises a four-storey brick unit complex on the southern side of Devonshire Street, and up to 14 storey towers behind. The buildings adjacent to Devonshire Street have a zig zag layout that creates pockets of open space alongside the street. The complex is visually softened in the streetscape by established and mature internal tree planting along its northern boundary. The canopies of these trees merge with the street trees on Devonshire Street and create areas of almost continuous canopy cover over the street, reducing the perceived massing of the buildings.

Devonshire Street is further characterised by the numerous cross streets and side laneways. These create small breaks in Devonshire Street on the northern side, and further reinforce the morphology of inner Sydney. Many of the side streets and laneways provide access to rear laneways.

At the highest point of the precinct is Ward Park, a high quality public park in Surry Hills. Ward Park contains a cluster of mature trees above formal hedges and low brick garden walls creating a formal edge to the park. This major local park includes two playground areas, opportunities for recreation, informal sports activities, picnicking and barbeques. Smaller local parks also connect to Devonshire Street including Nickson Street Park and Wimbo Park.

Finally, at the eastern end of the precinct, a large Fig tree is located in the vicinity of the alignment at South Dowling Street. This fig is very large and provides a significant visual marker along South Dowling Street.

Generally, view corridors are constrained by the tight cross section of Devonshire Street, including the established street and private domain trees, the zero setbacks of housing and buildings, together with the rising and falling topography. In the south of the precinct, glimpses of the Central Railway Station former Railway Institute building, which sits adjacent to the station entry, are possible in winter from Devonshire Street near Holt Street; however the majority of views into and out of Devonshire Street are short and local views.

13.7.2 Visual sensitivity

The visual sensitivity of the precinct is predominantly influenced by the inner city residential Victorian terraces and tree lined leafy streets. A summary of visual sensitivity for the main viewing areas across the study area is provided below:

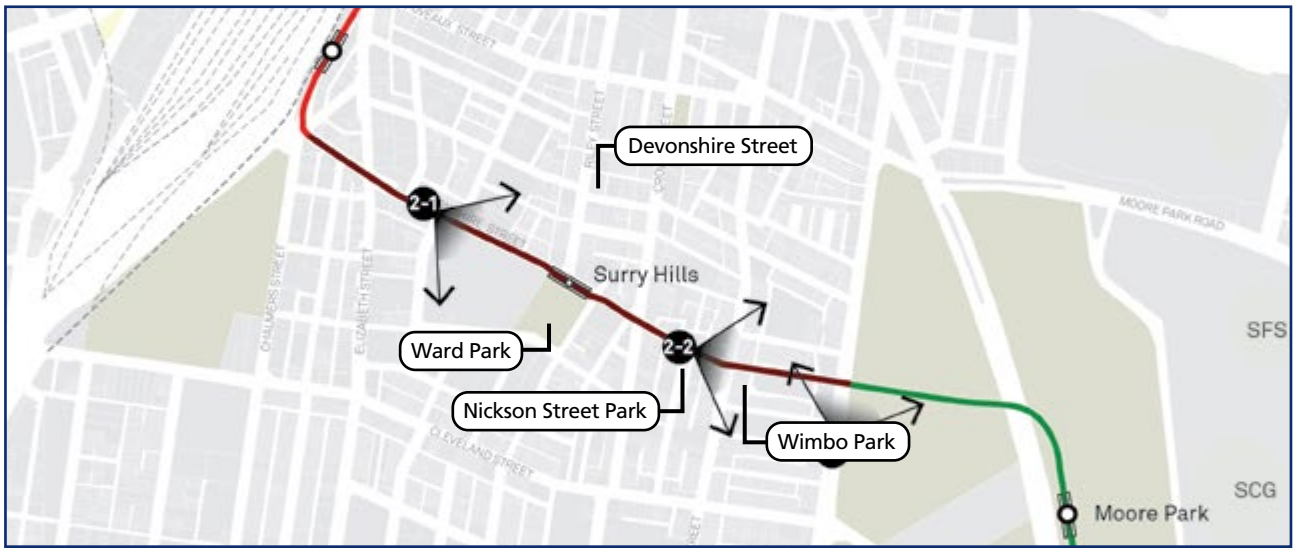
- The landscape and visual amenity of Devonshire Street is considered to be of local level sensitivity as it an important area for the Surry Hills community and includes a number of parks and commercial uses. This street is also a main thoroughfare between Central Railway Station and the Moore Park entertainment and sports complex.
- The landscape and visual amenity of Ward Park is considered to be of local level sensitivity as this is an important local park with both passive and active recreational uses. This is an important recreational resource for the Surry Hills community.
- Wimbo and Nickson Street parks are smaller neighbourhood parks. The landscape and amenity of these parks are considered to be of neighbourhood level sensitivity as they are important amenity resources for the Surry Hills community.
- The landscape and visual sensitivity of South Dowling Street is considered to be of regional level sensitivity as this is a major distributor road, channelling traffic from the south-eastern suburbs of Sydney. This corridor also includes the Eastern Distributor which links the CBD with Sydney Airport, including a tunnel which emerges at Surry Hills.

These sensitivity levels were applied throughout the impact assessment for the Surry Hills Precinct.

13.7.3 Landscape character areas

The landscape character areas within the Surry Hills Precinct identified as potentially affected by the proposal are shown on Figure 13.20. The impact of the CSELR proposal on these four landscape character areas is summarised in section 13.7.5 and section 13.7.6.

Figure 13.20 Surry Hills Precinct – Key landscape character areas

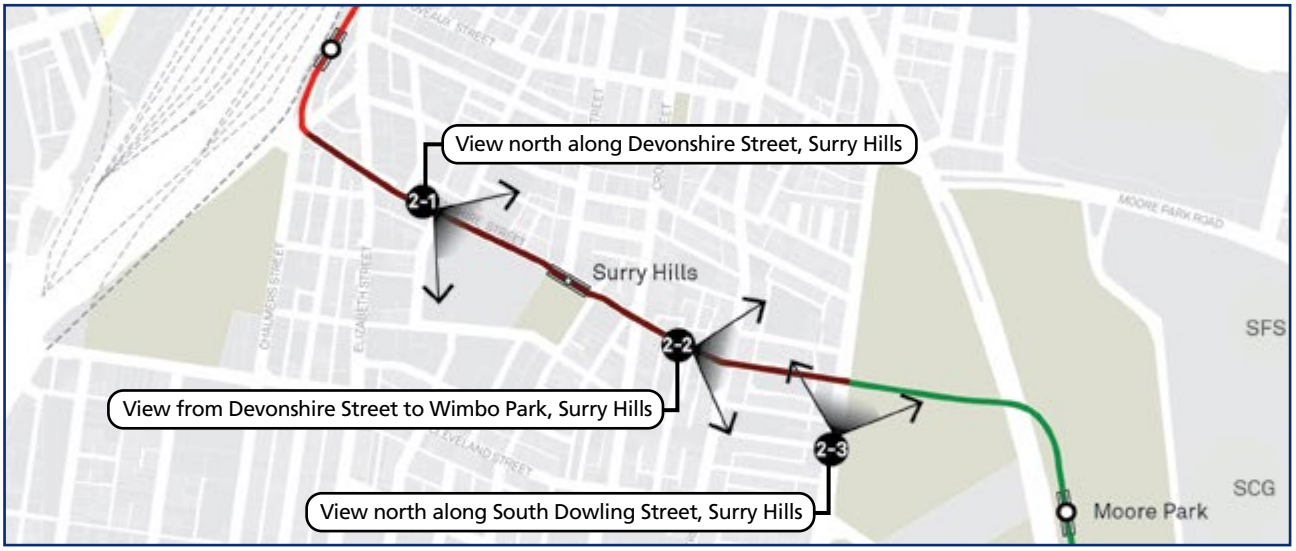


Source: Based on Technical Paper 10 – Visual and Landscape Assessment

13.7.4 Representative viewpoints (daytime)

The viewpoints which were selected as representative of the range of views to the CSELR proposal within the Surry Hills Precinct are shown in Figure 13.21. The impact of the proposal on these viewpoints is summarised in section 13.7.5 and section 13.7.6.

Figure 13.21 Surry Hills Precinct – Key viewpoints



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

13.7.5 Impacts during operation

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

- introduction of light rail tracks within the road surface along the length of Devonshire Street
- overhead wiring along the length of the CSELR proposal
- removal of street trees along Devonshire Street
- generally removal of one lane of vehicular traffic for the majority of Devonshire Street between Elizabeth Street and Crown Street.

Assessment of landscape impacts (daytime)

Landscape and visual impacts for this precinct would generally be less than in the City Centre Precinct due to the lower visual sensitivity levels of these locations. Nonetheless, moderate landscape impacts would occur along Devonshire Street during operation, largely due to the removal of the mature grouping of street trees (which are fundamental to the character of the street) and direct impacts on Ward Park and Wimbo Park during construction, due to the loss of trees and reduced use and amenity of these parks. Significant landscape improvements would occur through the revitalisation of Wimbo Park and Ward Park.

A summary of the potential landscape impacts of the CSELR proposal during operation is provided in Table 13.15.

Table 13.15 Surry Hills Precinct – Assessment of landscape impacts (operation)

LANDSCAPE CHARACTER (REFER FIGURE 13.20)	POTENTIAL IMPACT	ASSESSMENT OF IMPACT
1. Devonshire Street	Minor adverse landscape impact	• The function of Devonshire Street and its intersecting streets would be maintained for pedestrian movements during operation of the proposal and any impacts on building entries and footpath continuity required for construction would be restored. • It is expected that the street trees removed during construction would be replaced on Devonshire Street in accordance with the Transport for NSW '*Vegetation Offset Guide*' (2013d), along with a range of public realm improvements to create a high quality pedestrian street. These street trees, however, would be smaller and less mature, and located only on the northern side of the street. This would provide some landscape amenity, but not the same sense of visual enclosure as the double avenue which currently exists. • A wider footpath would be provided along the northern side of Devonshire and would connect more directly to Moore Park in the east. • With the closure of some streets intersecting with Devonshire Street, there would be opportunity for the creation of a number of additional pocket parks along Devonshire Street.
2. Ward Park	Minor beneficial landscape impact	• The recreational function of Ward Park would be restored during operation. • Adjustments to the character and function of the park would change with the introduction of the light rail stop. This would result in the loss of a portion of the park which would now be occupied by a transit plaza with moving and stationary LRVs activating the edge of the park. • Trees would be removed along the park frontage to Devonshire Street (as part of construction); however a high quality plaza design would provide amenity in this area.

Table 13.15 cont.

LANDSCAPE CHARACTER (REFER FIGURE 13.20)	POTENTIAL IMPACT	ASSESSMENT OF IMPACT
3. Nickson Street Park	Negligible impact	• The function of Nickson Street Park would be maintained during operation of the proposal. • Trees along the frontage of Devonshire Street would be removed. • General public realm improvement works would be undertaken including provision of a uniform paving scheme along the footpath of Devonshire Street, the park's primary frontage. • The closure of Nickson Street would create an opportunity to revitalise the pocket park. On balance, the loss of trees in the road reserve and improvements to the public realm are changes that are compatible with the surrounding urban landscape.
4. Wimbo Park	Negligible impact	• The function of Wimbo Park would be restored during operation of the proposal with the exclusion of the southern portion, which would be used to accommodate the track infrastructure. • Wimbo Park would be expanded with a new public park that would extend into the Olivia Gardens site. The park would include new trees and planting to a high quality open space design.

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

Assessment of representative viewpoints (daytime)

During operation, the CSELR proposal would generally have an impact on existing viewpoints within the Surry Hills Precinct including views towards and from existing public spaces such as Ward Park. Whilst one lane of traffic would be removed from Devonshire Street, this would be replaced by the LRVs, which would result in a similar, intermittent impact to viewpoints. The loss of trees along Devonshire Street would open up some existing viewpoints between the buildings on the northern side of the street and those on the southern side of the street, in particular within the vicinity of Northcott Estate. The provision of overhead wiring along Devonshire Street would also impact on existing views. However, the proposed revitalisation of public spaces within the Surry Hills Precinct such as Ward Park and the proposed replacement of Wimbo Park (refer to section 5.2.8) is expected to have a positive impact on some viewpoints within the Surry Hills Precinct.

A summary of the potential daytime visual impacts of the CSELR proposal during operation identified as part of the representative viewpoint assessment is provided in Table 13.16.

Table 13.16 Surry Hills Precinct – Assessment of representative viewpoints (operation)

VIEWPOINT (REFER FIGURE 13.21)	POTENTIAL IMPACT	ASSESSMENT OF IMPACT
View north along Devonshire Street (View 2–1)	Moderate adverse visual impact	• Traffic would be reduced to one lane eastbound along Devonshire Street allowing for local access, and the footpath on the northern side of the street would be widened (refer to Figure 13.22 and Figure 13.23). • The large trees which would be removed during construction, and are essential to the character of this portion of Devonshire Street, would not be replaced. These trees would be replaced with smaller trees on the northern side of Devonshire Street in accordance with the Transport for NSW *'Vegetation Offset Guide'* (2013d), filtering views to the terrace housing. • The brick buildings of the Northcott Estate would be more visually prominent, particularly in winter. • New elements including overhead wires and catenary structures would add visual clutter within the streetscape. LRVs would be seen moving through this view, in place of a former traffic lane.

Table 13.16 cont.

VIEWPOINT (REFER FIGURE 13.21)	POTENTIAL IMPACT	ASSESSMENT OF IMPACT
View from Devonshire Street to Wimbo Park (View 2–2)	Negligible visual impact	• The street corridor would be altered to accommodate two lanes for local traffic and two light rail lines in the foreground. • The light rail corridor would continue into the background of the view, running through the southern portion of Wimbo Park and the former Olivia Gardens complex which would be removed during construction. These sites would be seen as a newly established local park, visually filtering the light rail corridor. The creation of this new park would result in some improvement to the existing viewpoint at this location after the revitalisation of the area has been completed (refer to section 5.2.8 for additional details). • Safety fencing, overhead wires and catenary structures, would add visual clutter to the view. • However, the view towards a potential new park on the site of the Olivia Gardens complex would assist in mitigating potential visual impacts.
View south along South Dowling Street (View 2–3)	Minor adverse visual impact	• A new contemporary light rail bridge structure is proposed at the Eastern Distributor. The bridge would be visually prominent in this area, and consistent with the scale and character of this roadway. • There would be a loss of trees along the berm at the edge of Moore Park to allow for bridge abutments, and some existing trees within the corridor where the bridge crosses. Owing to the high degree of visual modification within an already modified landscape, the bridge structure would not markedly contrast with the Eastern Distributor; however there would be a noticeable change in the amenity of these views as overhead elements are introduced.

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

Assessment of night-time visual impacts

Additional light in the corridor would come from lighting at the light rail stop at Ward Park as well as headlights on the LRVs. The LRV alignment would be relatively straight and therefore the lights from the headlights and carriages of the LRV would be seen travelling across the view during operation, and there would be limited opportunity for direct light intrusion into any private properties. Currently, vehicle lights point in the same direction.

Light sources within the rail corridor would be partially filtered by the surrounding parkland. In locations where there are bends and corners in the CSELR alignment, the LRV headlights may be directed into adjacent properties, such as in the vicinity of the intersection with Elizabeth Street. The LRV headlights would be similar to the headlights of cars, currently seen in the street, but would be seen less frequently and would involve a more predictable direction. During operation, there would also be lighting on the bridge structure across the Eastern Distributor.

It is not expected that there would be any perceived increase in skyglow (the illumination of the night sky or parts of it, typically as a result of artificial light) as a result of the proposal. Generally, in the areas of high district brightness, no noticeable reduction or improvement in amenity is anticipated, resulting in an overall negligible visual impact for the precinct during evening hours.

Figure 13.22 Indicative view looking west along Devonshire Street near Northcott Estate

Figure 13.23 Indicative view looking west along Devonshire Street towards Ward Park

13.7.6 Impacts during construction

Construction of the CSELR proposal in the Surry Hills Precinct would require works including utility relocations, intersection modifications, track slab construction and other systems works (installation of wiring etc.). As part of the works, some sections of streets and footpaths would be closed to pedestrians and general traffic (refer to section 13.3). Civil and systems works would include construction of the track slab and rail installation. Track construction would occur in linear sections between intersecting streets, with the intersections constructed separately during weekends and week nights.

General vehicle traffic along Devonshire Street would generally be closed off during construction, with local traffic only permitted at this time, minimising the visual impact of traffic along this street. During this time, construction equipment such as slip track machinery, cherry pickers, mobile cranes and trucks would be seen within the precinct. A series of construction compounds would also be located within the Surry Hills Precinct including within Ward Park, Devonshire Street, Wimbo Park and the current Olivia Gardens apartment complex. Further detail regarding the proposed construction of the CSELR proposal is provided in Chapter 6.

Assessment of landscape impacts (daytime)

Moderate landscape impacts would occur along Devonshire Street during construction largely due to the removal of the mature grouping of street trees. Direct impacts are also expected on Ward Park during construction, due to the loss of trees and reduced use and amenity of the park.

A summary of the potential landscape impacts of the CSELR proposal during construction is provided in Table 13.17.

Table 13.17 Surry Hills Precinct – Assessment of landscape impacts (construction)

LANDSCAPE CHARACTER (REFER FIGURE 13.20)	POTENTIAL IMPACT	ASSESSMENT OF IMPACT
1. Devonshire Street	Moderate adverse landscape impact	• Along Devonshire Street, a number of intersecting streets would be closed and Devonshire Street would become a construction site. It is likely that north-south pedestrian movement would be diverted and connectivity and legibility in this part of Surry Hills may be impacted. • A large number of street trees would be removed from Devonshire Street, between Chalmers and Crown streets. This includes, in particular, a number of mature trees between Clisdell Street and Ward Park whose canopy cover and enclose the road visually.
2. Ward Park	Moderate adverse landscape impact	• Ward Park would be directly affected as approximately 3,200 square metres of the park (in the north-eastern corner immediately adjacent to the Northcott Estate) would be used to accommodate a number of construction related activities, followed by construction of the Surry Hills stop itself. • A number of trees would be removed to accommodate the construction site, including a number of trees on the Surry Hills stop site. • Users of the park would be displaced during construction, the types of activities suitable for this location altered, and the general amenity of the park would be diminished. • There is also likely to be a reduced legibility of the area due to impacts on the view corridor along Riley Street, and impacts on the amenity and directness of the north-south pedestrian movements between Moore Park and Central Railway Station.
3. Nickson Street Park	Negligible landscape impact	• The Nickson Street Park would not be directly impacted. However, when construction works are occurring on Devonshire Street, adjacent to the park, much of the street would become a construction site. It is likely that the flow of pedestrian movement, accessibility to the park, and general amenity would be impacted.

Table 13.17 cont

LANDSCAPE CHARACTER (REFER FIGURE 13.20)	POTENTIAL IMPACT	ASSESSMENT OF IMPACT
4. Wimbo Park	Minor adverse landscape impact	• Wimbo Park would be directly impacted to accommodate construction of the light rail corridor and associated laydown area. • Users of the park would be displaced as the park would be greatly reduced in size and the amenity impacted by construction activity. A number of existing trees and planted areas would be removed and the visual connectivity and legibility around the park would be impacted.

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

Assessment of representative viewpoints (daytime)

During construction, the CSELR proposal would generally result in an adverse impact to existing viewpoints within the Surry Hills Precinct. This would result primarily from impacts associated with removal of the existing trees along Devonshire Street during construction, the creation of worksites surrounded by hoardings, and the general movement of plant and equipment which would intermittently impact existing views.

A summary of the potential daytime visual impacts of the CSELR proposal on representative view points during construction is provided in Table 13.18.

Table 13.18 Surry Hills Precinct – Assessment of representative viewpoints (construction)

VIEWPOINT (REFER FIGURE 13.21)	POTENTIAL IMPACT	ASSESSMENT OF IMPACT
View north along Devonshire Street (View 2-1)	Moderate adverse visual impact	• This view would change during construction as service relocations begin, and Clisdell Street is closed. Impacts would increase as the street trees which characterise this view are progressively removed, and the view becomes focused on a construction worksite. • In this narrow street, the worksite would comprise much of the ground plane of the view, the additional construction traffic would be perceived, and cross street visibility reduced.
View from Devonshire Street to Wimbo Park (View 2-2)	Minor adverse visual impact	• The view of this public open space would change during early works, as the view becomes focused on a construction worksite surrounded by site hoardings. The works in this area would be considerable and there would be equipment and trucks seen accessing the site. • The Olivia Gardens apartment complex in the background of the view would be removed. This change to the view would not be visually consistent with the character of this area and surrounding urban landscape of Devonshire and Bourke streets. • During construction, work would occur at intersections separately to the inter-block areas and therefore the construction of the CSELR corridor itself would be progressively visible.
View south along South Dowling Street (View 2-3)	High adverse visual impact	• This view would change during construction of early works, as utility relocation and minor road adjustments are undertaken and the large Fig tree in the centre of the view is removed. • Following this, the bridge structure would be progressively installed, impacting existing views during construction.

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

Assessment of night-time visual impacts

During construction there may be times when construction sites operate 24-hours. Night works require brightly lit areas providing a safe work environment for construction activities. Headlights would be visible from construction related traffic (including trucks) accessing the site. It is expected that lighting on the site would be brighter than the current traffic and street lighting; however additional skyglow would be managed by cut-off light fittings and directed lights for the construction tasks.

Views to the construction works in this area would be unfiltered by vegetation and in close proximity to adjacent commercial and residential properties. This additional lighting would create a considerable reduction in the amenity of the areas between Bolt Street and Crown Street where the street becomes predominantly residential. There would also be a noticeable reduction in the areas of high district brightness in other areas along Devonshire Street.

When proposed, night construction activities would generate additional light and may have a visual effect that is not compatible with the existing predominantly residential night scene. This may cause a temporary reduction in the amenity of the Surry Hills Precinct.

13.7.7 Management and mitigation

A series of mitigation measures have been designed to mitigate the potential visual and amenity impacts of the CSELR proposal during construction and operation. Mitigation measures for the Surry Hills Precinct are presented in Table 13.19 and Table 13.20.

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

Table 13.19 Surry Hills Precinct – Visual and landscape mitigation measures (operation)

MITIGATION MEASURES	APPLICABLE LOCATIONS
• Incorporate tree planting within the Northcott Estate's northern boundary to reinforce the green edge and filtering effect of trees lost in consultation with Housing NSW.	Devonshire Street, Clisdell Street to Ward Park
• Incorporate semi mature tree specimens on the corners of streets intersecting with Devonshire Street, to restore the leafy character of this portion of the street, in consultation with the City of Sydney and in accordance with the Transport for NSW *'Vegetation Offset Guide'* (2013d).	Devonshire Street, Clisdell Street to Ward Park
• Redefine the northern edge of Ward Park through a new plaza and tree planting in consultation with the City of Sydney and in accordance with the Transport for NSW *'Vegetation Offset Guide'* (2013d).	Ward Park
• Incorporate the substation into the urban development to maintain the street edge in urban areas.	Ward Park substation
• Enhance the northern edge with tree planting (mitigate the character of those lost within the Devonshire Street road corridor) in consultation with the City of Sydney and in accordance with the Transport for NSW *'Vegetation Offset Guide'* (2013d).	Nickson Street pocket park
• Recreate Wimbo Park, together with the potential for a new Olivia Gardens park, as a high quality open space. Enhance these areas with mature tree specimens to mitigate the character of those lost, in consultation with the City of Sydney.	Wimbo Park
• Where possible any areas of direct light intrusion (glare and spill) from LRV headlights would be identified and managed.	The corner of Devonshire and Chalmers streets, Devonshire and Elizabeth streets, George and Bathurst streets, and other locations where the alignment bends
• At stops and stabling areas, cut off and directed light fittings (or similar techniques) would be used to minimise glare and light spill onto private property.	Ward Park stop

Table 13.19 cont

MITIGATION MEASURES	APPLICABLE LOCATIONS
• Ongoing consultation with the City of Sydney Council, Randwick City Council and other relevant stakeholders would continue to be undertaken throughout the detailed design phase to identify opportunities for revitalisation of existing public spaces and the public domain and to determine the most appropriate form or revitalisation for these areas.	All public spaces

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

Table 13.20 Surry Hills Precinct – Visual and landscape mitigation measures (construction)

MITIGATION MEASURES	APPLICABLE LOCATIONS
Identify opportunities for an artistic approach to treatment of the site hoarding and enclosure, in collaboration with the City of Sydney. This may involve local community groups and schools.	Ward Park; Wimbo Park and Olivia Gardens demolition site
Consolidate site equipment and facilities within one location to maximise the area of useable public green space, and maintain pedestrian permeability where reasonable and feasible.	Ward Park and Wimbo Park

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

13.8 Built and non-Indigenous heritage values

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

13.8.1 Existing conditions

Heritage context and significance

Surry Hills is characterised by a fine grained pattern of Victorian-era terraced housing, pubs and corner shops, with 19th Century warehouse and factory buildings dotted throughout. Many of the streets are lined with mature trees, listed on the City of Sydney (2013b) *Register of Significant Trees.* Much of Surry Hills is within heritage conservation areas listed on *Sydney Local Environmental Plan 2012* (SLEP 2012).

The CSELR would cross Surry Hills via Devonshire Street, which is located in the southern part of the suburb. The heritage character of Devonshire Street is typical of the suburb, with heritage items comprising a mix of terraced housing, a church, corner hotels and small industrial buildings, as well as mature street trees on both sides of the road. Devonshire Street also features the Northcott Estate, a post-war public housing complex, and the associated Ward Park. Neither of these elements are listed as heritage items, but they are landmarks along Devonshire Street, and likely to be of social value to the local community.

Wimbo Park, located at the eastern end of Devonshire Street, was formerly the City of Sydney's stone yard, where stone for the city's many sandstone buildings was dressed. A monument to this use is located in the southern area of the park. Wimbo Park also contains a mosaic mural of activities that took place in the park when it was part of larger recreational grounds. While Wimbo Park is not listed as a heritage item, these elements are also likely to be of some significance to the local community.

Olivia Gardens, the c1970s apartment block between Wimbo Park and South Dowling Street, is not listed as a heritage item and is identified in the City of Sydney *Development Control Plan — Contributory Buildings Map* as having a neutral contribution to the Bourke Street South Conservation Area.

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

Listed heritage items

A total of 48 heritage listed items were identified within, or immediately adjacent to, the proposed CSELR corridor in the Surry Hills Precinct; however, only four of these items would have the potential to be directly affected by the CSELR proposal. A summary of the heritage-listed items within or immediately adjacent to the proposed CSELR corridor is provided in Table 13.21, while the locations of these items are shown in Figure 13.24.

Table 13.21 Summary of historic heritage-listed items within or immediately adjacent to the proposed CSELR corridor – Surry Hills Precinct

ITEM	LISTING[1]	LEVEL OF SIGNIFICANCE	POTENTIAL TO BE DIRECTLY IMPACTED?
Railway Institute Building	SHR	State	No
Elizabeth Street Significant Trees	CoS RST	Local	No
Devonshire Street Significant Trees	CoS RST	Local	Yes
Bourke Street Significant Trees	CoS RST	Local	Yes
Hibernian House	SLEP 2012	Local	No
Evening Star Hotel	SLEP 2012	Local	No
Strawberry Hills Hotel	SLEP 2012	Local	No
Terrace House (Item No. I1536)	SLEP 2012	Local	No
Corner Terrace House (Item No. I1537)	SLEP 2012	Local	No
Former ANZ Bank	SLEP 2012	Local	No
Society of Friends (Quaker) Meeting House	SLEP 2012	Local	No
Terrace Group (Item No. I1517)	SLEP 2012	Local	No
Former Clarendon Hotel	SLEP 2012	Local	No
Shakespeare Hotel	SLEP 2012	Local	No
Terrace House (Item No. I1521)	SLEP 2012	Local	Yes
Terrace House (Item No. I1522)	SLEP 2012	Local	Yes
St Peter's Roman Catholic Church group	SLEP 2012	Local	No
Terrace group (Item No. I1523)	SLEP 2012	Local	No
Shop and Residence group	SLEP 2012	Local	No
Former Hotel Victoria	SLEP 2012	Local	No
St Clair Flats	SLEP 2012	Local	No
Terrace group (9–15 Pawley Street)	SLEP 2012	Local	No
Terrace group (2–6 Edgely Street) including interiors	SLEP 2012	Local	No
Terrace group (8–10 Edgely Street)	SLEP 2012	Local	No

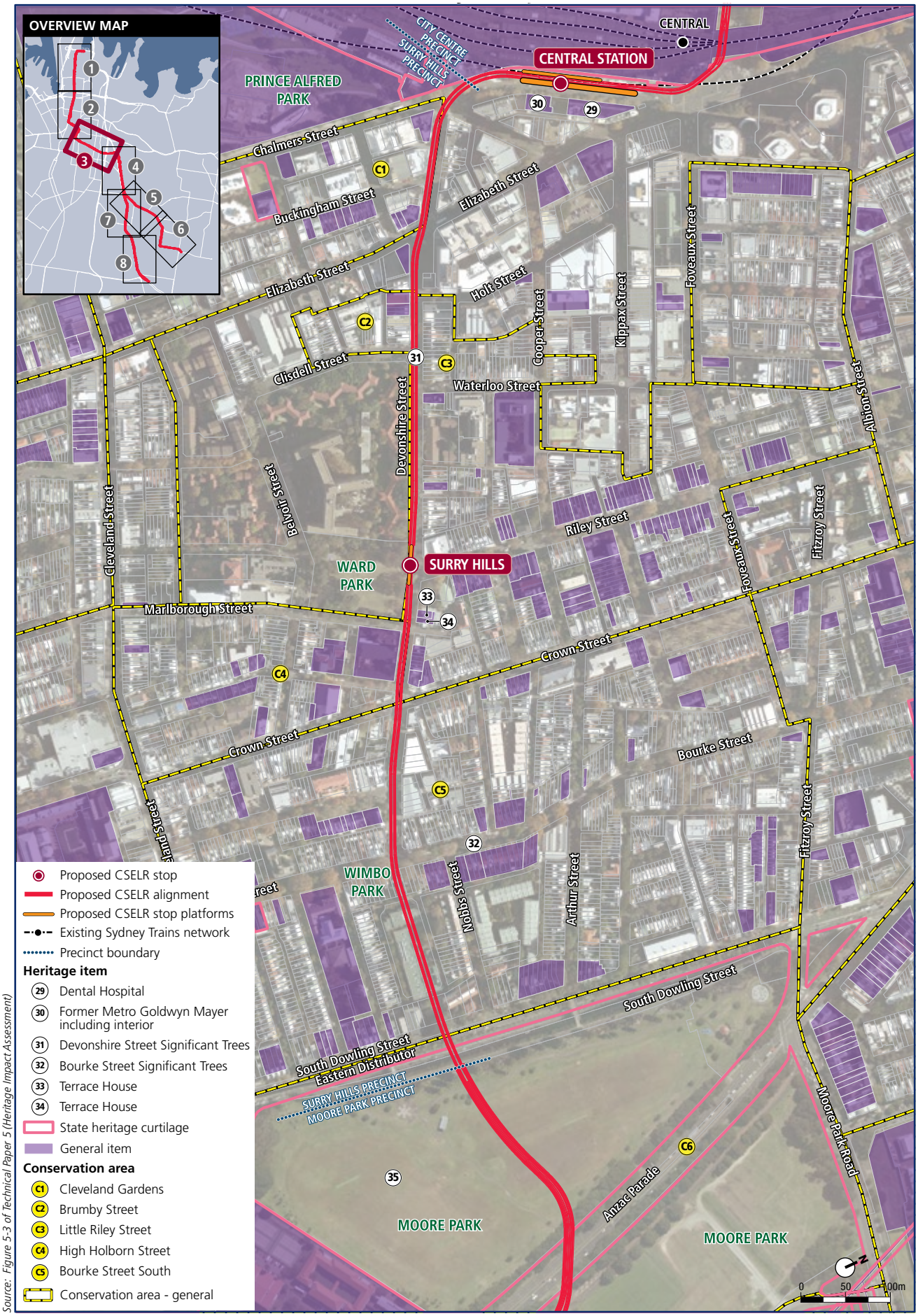
Table 13.21 cont.

ITEM	LISTING[1]	LEVEL OF SIGNIFICANCE	POTENTIAL TO BE DIRECTLY IMPACTED?
Terrace house (12 Edgely Street)	SLEP 2012	Local	No
Terrace group (14–14A Edgely Street)	SLEP 2012	Local	No
Terrace group (16–20 Edgely Street)	SLEP 2012	Local	No
Terrace group (Item No. I1530)	SLEP 2012	Local	No
Terrace group (Item No. I1578)	SLEP 2012	Local	No
Terrace houses (Item No. I1579)	SLEP 2012	Local	No
Terrace houses (Item No. I1515)	SLEP 2012	Local	No
Former police station buildings	SLEP 2012	Local	No
House (Item No. I1451)	SLEP 2012	Local	No
Holy Trinity Greek Orthodox Church buildings	SLEP 2012	Local	No
Bourke Street Public School buildings	SLEP 2012	Local	No
Terrace houses (Item No. I1640)	SLEP 2012	Local	No
Terrace group (Item No. I1641)	SLEP 2012	Local	No
Terrace houses (Item No. I1642)	SLEP 2012	Local	No
Terrace house (Item No. I1643)	SLEP 2012	Local	No
Terrace house (Item No. I1644)	SLEP 2012	Local	No
Terrace house 'Kinkora'	SLEP 2012	Local	No
Former corner shop	SLEP 2012	Local	No
Terrace group (Item No. I1444)	SLEP 2012	Local	No
Terrace group (Item No. I1439)	SLEP 2012	Local	No
Terrace group (Item No. I1440)	SLEP 2012	Local	No
Terrace group (Item No. I1441)	SLEP 2012	Local	No
Corner shop/residence and attached terrace	SLEP 2012	Local	No
Wyee Terrace	SLEP 2012	Local	No

Source: *Adapted from Tables 5.3 and 5.4 of Technical Paper 5 – Heritage Impact Assessment, Volume 4.*

Note 1: *SHR = State Heritage Register; SLEP 2012 = Sydney Local Environmental Plan 2012; CoS RST 2013 = City of Sydney Register of Significant Trees 2013.*

Figure 13.24 Existing built and non-Indigenous heritage items – Surry Hills Precinct



Source: Figure 5-3 of Technical Paper 5 (Heritage Impact Assessment)

Heritage conservation areas

The proposed CSELR corridor would either traverse, or be located immediately adjacent to, a total of five listed heritage conservation areas in the Surry Hills Precinct; all of which have the potential to be directly affected by the CSELR proposal. A summary of the listed heritage conservation areas within the Surry Hills Precinct is provided in Table 13.22, while the location and extent of these areas is shown in Figure 13.24.

Table 13.22 Summary of listed heritage conservation areas traversed by, or located immediately adjacent to, the proposed CSELR corridor – Surry Hills Precinct

ITEM	LISTING[1]	LEVEL OF SIGNIFICANCE	POTENTIAL TO BE DIRECTLY IMPACTED?
Cleveland Gardens	SLEP 2012	Local	Yes
Brumby Street	SLEP 2012	Local	Yes
Little Riley Street	SLEP 2012	Local	Yes
High Holborn Street	SLEP 2012	Local	Yes
Bourke Street South	SLEP 2012	Local	Yes

Source: *Adapted from Table 5.5 of Technical Paper 5 – Heritage Impact Assessment, Volume 4.*

Note 1: *SLEP 2012 = Sydney Local Environmental Plan 2012.*

Areas of archaeological potential

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

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

The potential archaeological significance of the proposed CSELR corridor within the Surry Hills Precinct is shown in Figure 13.25 and described in section 4.4 of Technical Paper 5. The CSELR corridor has been divided into a number of discrete Historical Archaeological Management Units (HAMUs). Each unit has been allocated according to the nature of the potential archaeological resource in an area. These units have then been allocated a particular archaeology zoning based on the significance of the potential archaeology. This zoning would allow the varying nature and significance of the archaeological resource to be managed pragmatically and consistently throughout the development of the CSELR proposal.

As shown in Figure 13.25, the following six HAMUs were defined in the Surry Hills Precinct for the CSELR:

- Devonshire Street West (between Randle and Elizabeth streets)
- Devonshire Street Central (between Elizabeth and Crown streets)
- Ward Park
- Devonshire Street East (between Crown and Bourke streets)
- Bourke Street and South Dowling Street
- Olivia Gardens and Wimbo Park.

All of the above HAMUs were defined as having the potential to contain locally significant archaeology and are discussed in Table 13.23 below. However, in the event that archaeological evidence associated with unrecorded activities of early land grants and estates was identified, they may be assessed as being of State significance, depending on the nature and intactness of the archaeology.

Table 13.23 Description of HAMUs in the Surry Hills Precinct

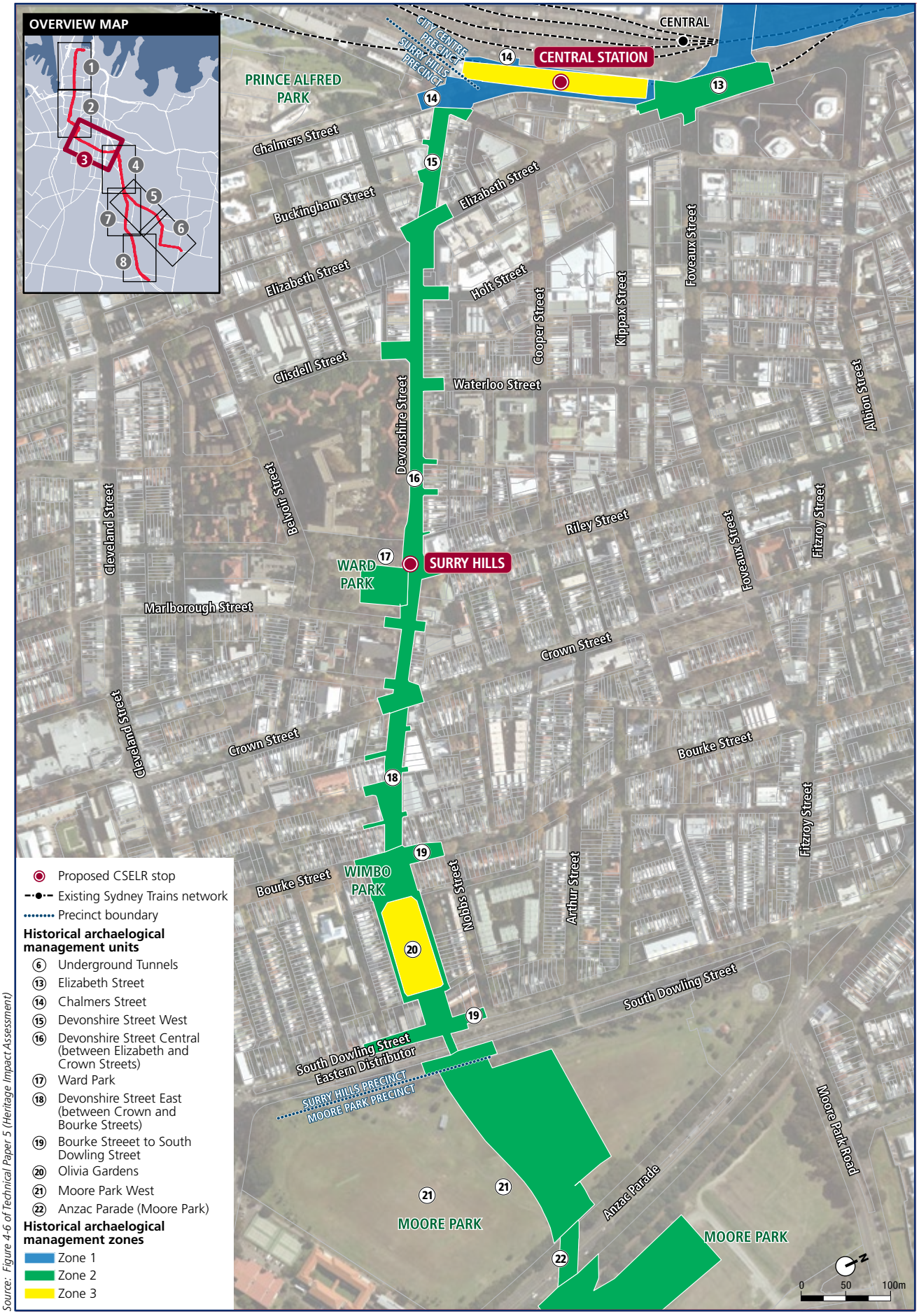
HAMU	LISTING	DESCRIPTION OF HAMU
Devonshire Street West (between Randle and Elizabeth streets)	No listings specifically reference significance of the potential historical archaeological resource within Devonshire Street West HAMU, although the *Central Sydney Archaeological Zoning Plan 1992* assumes all roadways have historical archaeological potential.	There is moderate potential for historical archaeological remains to be present, which may be associated with the following: • evidence of 19th Century development following the 1855 subdivision of the Cleveland House Estate, which may include structural remains with brick/stone/wooden foundations, postholes, yard/work surfaces • early alignment of Devonshire Street, such as sandstone kerbs, drains, early road surfaces and structural remains • evidence of 19th and early 20th Century services, such as drains, sewerage, eater and gas services constructed of stone, brick, ceramic, metal or wood.
Devonshire Street Central (between Elizabeth and Crown streets)	No listings specifically reference significance of the potential historical archaeological resource within Devonshire Street Central HAMU, although the *Central Sydney Archaeological Zoning Plan 1992* assumes all roadways have historical archaeological potential.	There is moderate-high potential for historical archaeological remains to be present such as: • evidence of 19th Century and early 20th Century development particularly buildings demolished for the John Northcott Place and Ward Park • early alignment of Devonshire Street, such as sandstone kerbs, drains, early road surfaces and structural remains indicating the alignment of the street • evidence of 19th and early 20th Century services, such as drains, sewerage, water and gas services constructed of stone, brick, ceramic or wood.
Ward Park	No listings specifically reference significance of the potential historical archaeological resource within Ward Park HAMU, although the *Central Sydney Archaeological Zoning Plan 1992* assumes all roadways have historical archaeological potential.	There is high potential for historical archaeological remains to be present, which may be associated with the following: • evidence of 19th Century and early 20th Century development particularly buildings demolished for Ward Park (including 44 residences and one pub) • early alignment of Riley Street and Miles Street, such as sandstone kerbs, drains, early road surfaces and structural remains indicating the alignment of the street • evidence of 19th and early 20th Century services, such as drains, sewerage, water and gas services constructed of stone, brick, ceramic or wood.
Devonshire Street East	No listings specifically reference significance of the potential historical archaeological resource within Devonshire Street East HAMU, although the *Central Sydney Archaeological Zoning Plan 1992* assumes all roadways have historical archaeological potential.	There is high potential for historical archaeological remains to be present including: • Pawley's Tannery (1842–c1871), including structural remains with brick/stone/wooden foundations, post holes, yard/work surfaces underfloor deposits, demolition deposits • William Pawley's residence Chesterville (1842–c1871) including structural remains with brick/stone/wooden foundations, post holes, yard/work surfaces underfloor deposits, demolition deposits • evidence of late 19th Century development (following subdivision in 1871 and extension of Devonshire Street to Crown Street in 1916) • alignment of streets constructed between the 1871 subdivision and 1916 extension of Devonshire Street (Little Devonshire Street, Wiltshire Street, Charles Street, Pawley Street) or the early alignment of the Devonshire Street Extension. • evidence of 19th and early 20th Century services, such as drains, sewerage, water and gas services constructed of stone, brick, ceramic or wood.

Table 13.23 cont.

HAMU	LISTING	DESCRIPTION OF HAMU
Bourke Street to South Dowling Street	No listings specifically reference significance of the potential historical archaeological resource within Ward Park HAMU, although the *Central Sydney Archaeological Zoning Plan 1992* assumes all roadways have historical archaeological potential.	There is moderate- high potential for historical archaeological remains to be present, which may be associated with the following: • evidence of late 19th Century and early 20th Century development (following subdivision in 1871 and extension of Devonshire Street to Crown Street in 1916) • evidence of the City of Sydney stone yard which operated at Wimbo Park between 1955 and 1981 • evidence of the early alignment of Bourke Street and South Dowling Street, or post 1890s alignment of Olivia Lane, Nobbs Lane, Parkham Lane and Parkham Place • evidence of 19th and early 20th Century services, such as drains, sewerage, water and gas services constructed of stone, brick, ceramic or wood • metal tracks and wooden sleepers in the centre of Bourke and South Dowling Streets, associated with the tram lines.
Olivia Gardens	No listings	Very little to no potential for historical archaeological remains to be present.

Source: *Section 4.4 in Technical Paper 5 — Heritage Impact Assessment, Volume 4*

Figure 13.25 Draft historical archaeological management units – Surry Hills Precinct



Source: Figure 4-6 of Technical Paper 5 (Heritage Impact Assessment)

13.8.2 Impacts on heritage listed items

The CSELR proposal has the potential to directly affect four heritage listed items and five heritage conservation areas within the Surry Hills Precinct (as indicated in Table 13.24). Heritage impact assessments for each individual heritage item and conservation area are provided in section 5.7.2 of Technical Paper 5 and summarised in Table 13.24. The Devonshire Street and Bourke Street Significant Trees are also described further in section 13.6.

Generally, the potential for heritage impacts resulting from the CSELR proposal in the Surry Hills Precinct derives from the various permanent structures in the public realm affecting the visual setting of heritage items and heritage conservation areas. These structures include stops and associated weather shelters, poles and catenary wires. Physical impacts may result from the removal of significant trees and the visual impact of the establishment and operation of worksites during construction.

Environmental management measures that Transport for NSW proposes to implement to manage the potential heritage impacts of the CSELR proposal in the Surry Hills Precinct are described in section 13.8.4.

Table 13.24 Summary of impacts on heritage listed items and heritage conservation areas – Surry Hills Precinct

HERITAGE ITEM	IMPACT ON THE HERITAGE ITEM/CONSERVATION AREA DUE TO THE CSELR PROPOSAL
Devonshire Street Significant Trees	The street trees along the southern side of Devonshire Street are listed on the City of Sydney (2013b) *Register of Significant Trees.* Construction of the CSELR along Devonshire Street would necessitate the removal of the majority of the trees of identified significance. The Devonshire Street trees are identified as significant as a group of plantings and not as individual specimens, and therefore removal of parts of the group would result in an adverse impact on the recognised significance of the row. The City of Sydney has assessed that a number of the Devonshire Street trees are reaching the end of their safe and useful life and the City has begun a replacement planting program along the rest of Devonshire Street with a species with similar attributes. The proposed works would have a major adverse impact on this group of plantings resulting from the removal of the majority of the significant trees.
Bourke Street Significant Trees	The street trees along Bourke Street between the intersections of Arthur and Cleveland Streets are listed on the City of Sydney (2013b) Register of Significant Trees. Construction of the CSELR along Devonshire Street would necessitate the removal or extensive pruning of a number of these significant trees in front of Wimbo Park. The Bourke Street significant trees are identified as significant as a group of plantings and not as individual specimens, and therefore removal of parts of the group would result in an adverse impact on the aesthetic and historic significance and continuity of the row. This would have a moderate adverse impact on this group of plantings.
Wimbo Park, Surry Hills	The eastern end of the proposed Devonshire Street alignment of the CSELR would cross Wimbo Park. The construction of the CSELR would result in the permanent loss of at least a central corridor through the park. The park is proposed to be used as a construction works depot and laydown area for the demolition of the Olivia Gardens apartment complex, which is also a moderate adverse impact, as landscaping would be reinstated once works are completed. Although this park is not a listed heritage item, it contains two monuments as well as established plantings. The removal or substantial rearrangement of the park and its various components would have a major adverse impact upon the park and its monuments. The park it is likely to be of some social value to the local community.
Ward Park, Surry Hills	The Surry Hills stop is proposed to be located in the north-eastern corner of the park, adjacent to Devonshire Street. The Ward Park substation is proposed to be located underground within the boundary of the park, adjacent to the stop. A portion of Ward Park is proposed as construction works depot during construction of the CSELR. The Surry Hills stop would be of neutral impact on the potential social value and aesthetic quality of the park as an open space. The construction works depot would have a moderate adverse impact, although temporary, on the aesthetic significance of Ward Park on any social value that Ward Park would have for the local community. Although the substation is proposed to be located underground, there is likely to be a minor adverse visual impact on the aesthetic significance of the park due to the installation of ventilation shafts, access hatches, and other infrastructure necessary to service the substation.

Table 13.24 cont.

HERITAGE ITEM	IMPACT ON THE HERITAGE ITEM/CONSERVATION AREA DUE TO THE CSELR PROPOSAL
242 and 244 Devonshire Street, Surry Hills	The Surry Hills stop is proposed to be located on the southern footpath of Devonshire Street immediately adjacent to the north-east corner of Ward Park. The stop would have a minor adverse visual impact on the setting and appreciation of the listed terraces at 242 and 244 Devonshire Street. The Ward Park construction works depot is proposed to be located in the northeast corner of Ward Park. The works depot would also have a minor adverse visual impact on the setting and appreciation of the listed terraces at 242 and 244 Devonshire Street, albeit temporary.
Surry Hills heritage conservation areas (Brumby Street, Little Riley Street, High Holborn Street and Bourke Street South)	The proposed CSELR alignment runs from Chalmers Street into Devonshire Street. The proposed route would intersect or run adjacent to the heritage conservation areas of Brumby Street, Little Riley Street, High Holborn Street and Bourke Street South. The potential impacts include additional visual clutter caused by new permanent structures for the light rail including the Surry Hills stop; additional poles for supporting overhead wiring; and the removal of trees; all of which would affect the streetscape character of the area and the setting and appreciation of significant and contributory buildings. The impacts on the heritage conservation areas along Devonshire Street generally would be a moderate adverse impact due to the change in the streetscape character, such as the removal of trees of identified significance and street plantings generally, the introduction of new infrastructure such as poles, catenary wiring and the Surry Hills stop. Construction works depots also represent a minor adverse visual impact, albeit temporary.

13.8.3 Impacts on areas of potential archaeological significance

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

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

- soil compaction associated with the installation of demountable sheds, establishment of construction compounds/work areas, material laydown and/or movement of heavy vehicles
- construction of the CSELR track slab
- installation of catenary support poles
- construction of the Surry Hills light rail stop and associated infrastructure (such as stop shelter)
- installation of the proposed substation within Ward Park
- regrading of the ground to achieve final track and stop levels
- service/utility relocations
- tree removal
- footpath reconstruction and landscaping.

Each HAMU and the potential impacts to them as a result of the proposal is summarised in Table 13.25.

Table 13.25 Heritage impact assessment for HAMUs in the Surry Hills Precinct

HAMU	HERITAGE IMPACT ASSESSMENT
Devonshire Street West (between Randle and Elizabeth Streets)	Construction of the CSELR track slab would involve excavation below the current ground surface. These works are likely to have a moderate adverse impact on the potential historical resource. Other ground disturbance activities within the Devonshire Street West HAMU (i.e. service relocation, tree removal) would be likely to have localised impacts on the historical archaeological resource. These works are likely to have a minor to moderate adverse impact on the potential historical archaeological resource, depending on the extent and nature of the proposed works. Use of Devonshire Street West HAMU as a construction zone — where it will not involve the removal of the existing ground surface and/or excavation — is unlikely to have an impact on the historical archaeological resource.
Ward Park	Ward Park is proposed as the site of a construction works depot. The works depot would necessitate the occupation of a large area of the park for an extended period of time The works depot is likely to consist of a number of temporary sheds including ablution blocks and lunch rooms. Use of the laydown facility is also proposed. Proposed ground works associated with the works depot have not yet been defined, but it is assumed it may involve subsurface installation of services and tree removal. Such ground works may disturb the potential historical archaeological resource and may have a moderate impact on the potential archaeological resource. Ward Park is also proposed as a location of a below ground substation. The installation of the Ward Park substation would involve ground disturbance works, including excavation for the substation and associated services. These works would have a moderate adverse impact on the potential historical archaeological resource, depending on the extent and nature of the proposed works. Compaction associated with the installation of demountable sheds or movements of heavy vehicles may also impact subsurface archaeological remains. This compaction may have a minor-moderate adverse impact on the historical archaeological resource.
Devonshire Street East	Construction of the CSELR track slab would involve excavation below the current ground surface. These works are likely to have a moderate adverse impact on the potential historical resource. Other ground disturbance activities within the Devonshire Street East HAMU (i.e. service relocation, tree removal) would be likely to have localised impacts on the historical archaeological resource. These works are likely to have a minor to moderate adverse impact on the potential historical archaeological resource, depending on the extent and nature of the proposed works. Use of Devonshire Street East HAMU as a construction zone — where it would not involve the removal of the existing ground surface and/or excavation — is unlikely to have an impact on the historical archaeological resource.
Bourke Street to South Dowling Street	Construction of the CSELR track slab would involve excavation below the current ground surface. These works are likely to have a moderate adverse impact on the potential historical resource. Other ground disturbance activities within the Bourke Street to South Dowling Street HAMU (i.e. service relocation, tree removal) would be likely to have localised impacts on the historical archaeological resource. These works are likely to have a minor to moderate adverse impact on the potential historical archaeological resource, depending on the extent and nature of the proposed works. Use of Bourke Street to South Dowling Street HAMU as a construction zone- where it would not involve the removal of the existing ground surface and/or excavation- is unlikely to have an impact on the historical archaeological resource.
Olivia Gardens	The works within the Olivia Gardens HAMU are unlikely to have an impact on historical archaeological resources as no historical archaeological resource is anticipated to be present. The works within this zone have been assessed as having a neutral impact with respect to archaeology.

Source: Section 4.4 in Technical Paper 5 - Heritage Impact Assessment, Volume 4

13.8.4 Management and mitigation

Impacts on built and landscape heritage

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

- *Devonshire Street Significant Trees* — Replanting of trees would be undertaken, where possible, following completion of construction works in accordance with the *CSELR Landscape Strategy* (Appendix F) (refer to section 13.6).
- *Bourke Street Significant Trees* — Wherever possible, significant trees along Bourke Street (near Wimbo Park) would be retained and conserved. If the trees must be removed, then suitable replacements would be planted.
- *Wimbo Park* — The mosaic mural and sandstone monument in Wimbo Park would be retained and conserved. If they cannot be retained in situ, relocation of these elements within the proposed new landscaping would be undertaken in accordance with a management plan or other approved document.
- *Ward Park* — The design of necessary substation ventilation shafts, access hatches, and other infrastructure would minimise impacts on the spatial quality of Ward Park.

Impacts on areas of potential archaeological significance

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

Mitigation measures, as outlined for Zone 2 in section 12.8.4, would generally be implemented for all of the HAMUs within the Surry Hills Precinct. The exception to this would be for the Olivia Gardens and Wimbo Park HAMUs, where mitigation measures, as outlined for Zone 4 in section 12.8.4, would also apply (as indicated in Figure 13.25).

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

- In the unlikely event that remains associated with unrecorded activities of early land grants and estates are identified and assessed as of State significance, this archaeology would be managed in accordance with Zone 1 mitigation measures.
- Works in the Devonshire Street Central HAMU (particularly in the location of the proposed substation) are likely to require some open area excavation and archival recording during site works, as well as post-excavation analysis and reporting. The nature and intactness of the archaeological resource may warrant interpretation.
- If extensive ground disturbance works are proposed within the Ward Park HAMU, they are likely to require some open area excavation and archival recording during site works, as well as post-excavation analysis and reporting. The nature and intactness of the archaeological resource may warrant interpretation.
- Works in the Devonshire Street East HAMU are likely to require some open area excavation and archival recording during site works, as well as post-excavation analysis and reporting. The nature and intactness of the archaeological resource may warrant interpretation.
- Within the Olivia Gardens HAMU, mitigation measures for areas outlined as Zone 3 within the basement footprint of the Olivia Gardens building would apply.

Heritage Interpretation Strategy

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

For the Surry Hills Precinct the key places of interest are:

- the site of the former Albion Brewery and Standard Brewery in Elizabeth Street
- the former Devonshire Street cemetery
- the location of former Mum's Sly Groggery run by major underworld figure Kate Leigh (212 Devonshire Street)
- the Shakespeare Hotel, built in the 1870s on the corner of Devonshire and Steel Streets; and the Clarendon Hotel built at the end of the 19th Century on the corner of Devonshire and Waterloo Streets
- public housing – John Northcott Place
- the site of the former Pawley's Tannery
- Wimbo Park.

The following opportunities for interpretation have been identified:

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

Heritage interpretation measures would be developed during detailed design in consultation with the City of Sydney.

Effectiveness of the mitigation measures

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

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

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

13.9 Socio-economic characteristics

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

13.9.1 Existing conditions

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

Using the ABS boundary known as Surry Hills, which closely aligns with the precinct, it was found that that the Surry Hills Precinct contained 25,161 (BTS 2011) jobs as of 2011 with 23,742 or 94 per cent of these occupied by persons who lived outside the Surry Hills Precinct.

The Surry Hills Precinct was identified to contain 9,328 employed residents as of 2011. Of these, 1,419 lived and worked within the Surry Hills Precinct while the remaining 7,909 employed persons travelled outside the Surry Hills Precinct for employment. Employment industries projected to experience the greatest growth between 2011 and 2046 are 'white collar' industries such as professional, scientific and technical services.

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

- The median population age of the Surry Hills Precinct is 33, with the most populous age bracket being 25–39 years. There are very few children between 5 and 19 years of age, suggesting that Surry Hills is popular for young professionals living alone or without children. Surry Hills also has the highest per cent of couples living without children of any CSELR precinct.
- Nearly one per cent of the population is Indigenous, similar to that of Greater Sydney, and the highest per cent Indigenous population of any CSELR precinct.
- Surry Hills has the lowest percentage of residents owning their dwellings outright, yet has a relatively high percentage of residents owning their dwellings with a mortgage. This is in line with the characterisation of Surry Hills as a recently gentrified area.
- Surry Hills has the highest percentage (approximately 10.8 per cent) of residents renting public housing, which provides further evidence of the mixed nature of the precinct. Along part of Devonshire Street is located Northcott Estate, the largest public housing estate in Australia. It comprises 591 apartments and is home to over 1,000 people, and according to census statistics has the most socio-economic disadvantaged area along the CSELR route.
- Surry Hills has a higher share of properties rented for over $650 per week and a higher median rent than Greater Sydney as a whole ($450 vs. $351 per week). It also has a higher percentage of properties rented for less than $100. The vast majority of these cheaper, public housing flats exist in the Northcott Estate to the south of Devonshire Street.
- Nearly half of households do not own a motor vehicle, with another 42 per cent owning one motor vehicle. This means less than ten per cent of Surry Hills homes own two or more motor vehicles.
- Nearly half of Surry Hills residents walk or cycle to work, with another 34.4 per cent using public transport.

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

13.9.2 Impacts during operation

The potential social and economic impacts of the CSELR on the Surry Hills Precinct during operation are summarised below and described further in Technical Paper 3 — *Social Impact Assessment* and Technical Paper 4 — *Economic Impact Assessment*.

Surry Hills would be transformed, most notably along the alignment of Devonshire Street. The CSELR proposal would bring to the area a reliable form of public transport it currently lacks. The existing character of Devonshire Street would change; however, there is potential to activate the area around the proposed Surry Hills stop at Ward Park, and provide for better integration of east Redfern to the south of Cleveland Street. Several properties would be permanently acquired, most notably the apartment block known as Olivia Gardens which would be demolished.

Social impacts during operation

The key social impacts of the CSELR proposal during operation are summarised in Table 13.26. This table provides a summary and rating of the key potential social impacts both before and after implementation of proposed mitigation measures. These mitigation measures are presented in section 13.9.4.

Table 13.26 Surry Hills Precinct – Key social impacts during operation

POTENTIAL IMPACT	KEY EFFECTS OF IMPACT	IMPACT RATING (POST MITIGATION)
Local amenity, character, environment	Slightly Positive • Pedestrians would benefit from improved amenity on Devonshire Street because of a reduction in traffic congestion; particularly where intersecting street closures allow for more generous footpaths and additional open space. • The area's character would change from a quiet part of Surry Hills to one with more activity. Such a change is likely to be viewed both positively and negatively across the community. • During major sporting events additional light rail services would run from Central to Moore Park. This would reduce the numbers of spectators using Surry Hills streets to walk to the Moore Park sports and entertainment complex. This would have a major amenity benefit for residents, as Surry Hills footpaths frequently become overcrowded on event days. • The design of the Surry Hills stop would also incorporate a new frontage to Devonshire Street for Ward Park to replace the existing landscaped seating area and new tree planting. • Additional amenity and character impacts are described in section 13.7.	Moderately Positive
Visual impact	Neutral • The visual intrusion of the light rail overhead wires and vehicles may be viewed more neutrally after operations commence and people become more used to these structures. • The removal of some street trees may be offset by appealing design structures and replanting of street trees on the north side of Devonshire Street. • Additional visual impacts are described in section 13.7.	Slightly Positive
Changes to access and local traffic conditions	Slightly Negative • Access and local traffic conditions would be permanently altered from the existing state. Some smaller cross streets would be closed off at their respective intersections with Devonshire Street. Devonshire Street would have one lane of eastbound through traffic. General traffic flows would adapt in the medium term as people adjust to the new conditions. • Parking along Devonshire Street would be removed. Improved access to the area via light rail may reduce traffic flows as presently experienced as well as reduce the demand for on-street parking. Any reduction in traffic and parking demand would assist in mitigating traffic changes and the loss of parking. • Cyclists would need to find an alternate westbound route, as Devonshire Street would only accommodate eastbound traffic. • Special arrangements would be required for deliveries to businesses directly fronting the route. Time-based loading zones could be provided on nearby streets and would be investigated during detailed design. These would effectively replace the displaced loading zones from Devonshire Street and would facilitate the loading requirements of the businesses located on the northern side of Devonshire Street between Holt Street and Riley Street. • Additional access and traffic impacts are described in section 13.3.	Neutral
Changes to local community services, Langton Clinic and Northcott Estate	Slightly Negative • Access and local traffic conditions would be permanently altered from the before-proposal state. • With clear signage and given appropriate notice, people would adjust to the new traffic conditions. Adjustment to new conditions would be accelerated if the operational conditions are implemented early on in the construction phase. This may potentially include provisions such as replacement of alternate parking for the Langton Centre as early as practicable as part of the proposal. • Access issues would remain for a number of the services fronting the route such as the childcare centres and St Peters Catholic Church.	Neutral

Table 13.26 cont.

POTENTIAL IMPACT	KEY EFFECTS OF IMPACT	IMPACT RATING (POST MITIGATION)
Access to and use of public spaces and urban connectivity	Neutral • There is the potential for no net loss of public space with the creation of new open spaces and amenity improvements to Ward Park. Establishing the Devonshire Street corridor allows for expanding east-west connections using the Devonshire Street tunnel under Central Railway Station and through to Ultimo and Darling Harbour. • Additional impacts are described in section 13.7.	Slightly Positive
Noise and vibration	Slightly Negative • Airborne operational noise trigger levels are predicted to be exceeded for some residential receivers in the Surry Hills Precinct (refer to section 13.5). • The Australian Institute of Music and the JMC Academy have been identified as potentially sensitive receptors for ground-borne noise. Some residents have also expressed concerns about use of warning bells. • Additional noise and vibration impacts are described in section 13.5.	Neutral
Property acquisition	Neutral • No subsequent acquisitions are planned for the operations phase following those planned during construction (refer to Table 5.1). • There is the potential to reinstate Wimbo Park as well as provide new public space at the former Olivia Gardens site, which would with mitigating the potential acquisition of existing open space within the precinct.	Slightly Positive
Safety and security	Slightly Positive • Potential road safety impacts may occur at the location of pedestrian crossing the light rail tracks. All streets where the light rail crosses traffic would be signalised. The intersection of Bourke Street and Devonshire Street would be signalised and have turn restrictions. The intersection of Marlborough Street and Devonshire Street would be signalised to provide safe access to the Surry Hills stop at Ward Park. • There may be privacy concerns for those in the immediate vicinity of the proposed Surry Hills stop at Ward Park that would need to be mitigated through appropriate design of the stop and its surroundings. • Some benefits may occur from increased passive surveillance following increased activation of Ward Park and around the proposed Surry Hills stop.	Neutral
Community and cultural issues	Slightly Negative • Residents of Northcott Estate and other public housing in the precinct may only use light rail services if concession fares are available. • Any plans to activate the area around the stop at Ward Park would need to consider methods to include residents of Northcott such that the corridor does not result in greater severance. • Removal of the existing fence along south of Devonshire Street at Northcott Estate could improve current perceived severance issues.	Slightly Positive
Health and wellbeing	Moderately Positive • The new light rail should encourage more walking and cycling. • The provision of bicycle parking facilities is discussed in Chapter 5.	Moderately Positive
Social sustainability and community functioning	Slightly Positive • The CSELR would encourage better access to community services and employment. • Overall social sustainability and community functioning could be improved through the creation of new public spaces and the better connections for residents, such as those at Northcott Estate, to other areas on the CSELR alignment.	Moderately Positive

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

Economic impacts during operation

The key economic impacts of the CSELR proposal during operation are summarised in Table 13.27 for the Surry Hills Precinct. This table provides a summary and rating of the key potential economic impacts both before and after implementation of proposed mitigation measures. These mitigation measures are presented in section 13.9.4.

Table 13.27 Surry Hills Precinct – Key economic impacts during operation

POTENTIAL IMPACT	KEY EFFECTS OF IMPACT	IMPACT RATING (POST MITIGATION)
Access to work, retail and leisure	Moderate Positive • The CSELR proposal would improve accessibility via public transport and connectivity with other locations within the CBD.	Moderate Positive
Loss of car parking	Moderate Negative • The proposal would result in the permanent loss of approximately 155 car parking spaces within the Surry Hills Precinct. • The loss of car parking along Devonshire Street would reduce the ability for customers and clients to park directly outside businesses (i.e. retailers and child care). This would impact the desirability of visiting some businesses especially where alternative temporary parking is not available in the same locality.	Moderate Negative
Impact to land values	Slight to Moderate Positive • Improved capacity and reliability of public transport is likely to create positive flow-on benefits to landowners.	None required
Passing trade	Slight Negative • A negative impact could be experienced by businesses that currently benefit from passing trade pre and post-special events in the Moore Park sports and entertainment complex. The operation of the CSELR would assist in moving additional commuters directly between Central Railway Station and Moore Park, reducing opportunistic purchases (i.e. drinks or food from some retailers in Devonshire Street).	Slight Negative
Amenity	Slight Positive • Improvements may occur to existing levels of visual amenity and noise levels as a result of the reduction in traffic and appropriate landscaping (including means of reducing the impact of existing tree loss). • The potential creation of pocket parks and public plazas would lead to the overall improvement of the environment to the benefit of the local business community and landowners.	Moderate Positive
Access to loading docks/ servicing areas	Slight Negative • The ability to access service and delivery areas along and adjacent to Devonshire Street may be impacted with access implications for businesses that use connecting streets.	Neutral

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

13.9.3 Impacts during construction

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

Construction would impact on businesses and facilities along Devonshire Street that rely on the existing amenity characterised within the Surry Hills Precinct such as cafes and other outdoor venues. Impacts would include noise, access, and changes to traffic conditions. Amenity impacts during construction would also include visual intrusion of construction activities along Devonshire Street within close proximity to residents.

Social impacts

The key social impacts of the CSELR proposal during construction are summarised in Table 13.28 for the Surry Hills Precinct. This table provides a summary and rating of the key potential social impacts both before and after implementation of proposed mitigation measures. These mitigation measures are presented in section 13.9.4.

Table 13.28 Surry Hills Precinct – Key social impacts during construction

POTENTIAL IMPACT	KEY EFFECTS OF IMPACT	IMPACT RATING (POST MITIGATION)
Local amenity, character, environment	Moderately Negative • Significant changes to local amenity would occur during construction due to relatively narrow streets. Part of Ward Park may be used for a construction compound. • Tree removal along Devonshire Street is likely to be the most significant issue changing the character of the area. These trees are a key aspect of the character of the area. • Construction works may also impede the operation of a number of cafes along Devonshire Street that have outdoor seating. At the same time, the construction workforce may provide the cafes and pubs with additional customers.	Slightly Negative
Visual impact	Moderately Negative • The visual intrusion of construction activities along Devonshire Street would be perceived as a negative. The removal of trees along the southern side of Devonshire Street would open up views to Northcott Estate but is likely to generally be considered negative by residents.	Slightly Negative
Changes to access and local traffic conditions	Moderately Negative • Chalmers Street would be closed to vehicle traffic between Eddy Avenue and Devonshire Street. Devonshire Street would be closed between Chalmers Street and Crown Street. • East of Crown Street, an eastbound land would be retained during the construction phase. Only local and emergency access would be provided on closed streets for general traffic. • South Dowling Street would be affected as construction proceeds on the new crossing and bridge over the Eastern Distributor. • Some smaller cross streets would also be closed off at their respective intersections with Devonshire Street. • Additional access and traffic impacts are described in section 13.3.	Slightly Negative

Table 13.28 cont.

POTENTIAL IMPACT	KEY EFFECTS OF IMPACT	IMPACT RATING (POST MITIGATION)
Changes to local community services, Langton Centre and Northcott Estate	Moderately Negative • Traffic access along Devonshire Street is likely to be severely limited during various phases of construction. This would have an impact on the childcare centre on Devonshire Street and a moderate impact on the childcare centre on Riley Street (St Vincent's Hospital Children's Centre). • There would also be impacts to existing access to the Bourke Street Public School, and St Peters Catholic Church on Devonshire Street, notably for weddings and funerals. • Vehicle access to the Langton Centre from Parkham Place would be affected. The centre's car park in Parkham Place to the rear of Olivia Gardens may be required during construction as a laydown area, which would constrain staff and patient access. • Modifications to existing parking controls on nearby streets may be required to allow patients and visitors of Langton Centre to access the facility during the day. • Maintaining access to community services will be especially important for disadvantaged residents along the route, such as public housing tenants with special needs at Northcott Estate near the proposed Surry Hills stop. Service providers should be informed of works and consulted as to access requirements to ensure continuity of service for those affected.	Slightly Negative
Access to and use of public spaces and urban connectivity	Moderately Negative • A large area of Ward Park would be used as a construction compound, which would limit recreational use of the area during construction. Wimbo Park on the western side of Olivia Gardens would also be used during construction and demolition. • Pedestrian movements along and across Devonshire Street would be generally maintained. The Bourke Street cycleway would also be interrupted. • Additional impacts are described in section 13.7.	Slightly Negative
Noise and vibration	Moderately Negative • Noise would occur at periodic intervals during construction. Residences, schools, hostels, and the Langton Centre are a few of the sensitive receivers that may be affected. • The most noise intensive works would be the demolition of Olivia Gardens and road excavation activities. Receptors near to the proposed stop location would also be likely to be impacted by additional excavation activities expected to last for no longer than one week during stop construction. • Additional noise intensive works include guidewalls and diaphragm wall works during tunnel works across Moore Park and thus may affect Surry Hills receptors at the eastern boundary of the precinct. • Additional noise and vibration impacts are described in section 13.5.	Slightly Negative
Property acquisition	Significantly Negative • Acquisition of the Olivia Gardens apartment block (69 apartments) and the Langton Centre car park to the east of Olivia Gardens would be required for the proposed CSELR alignment. This would also include loss of the adjacent Wimbo Park. • Part of Ward Park would to become a worksite, although staff would use potential parking facilities offsite (e.g. Moore Park or Royal Randwick racecourse) such that impacts to the Ward Park site would be minimal.	Slightly Negative
Safety and security	Moderately Negative • There are moderate risks to the public from entry into the construction site. These risks are pertinent for areas with high pedestrian activity, such as Chalmers Street, Devonshire Street, and Ward Park.	Neutral
Community and cultural issues	Slightly Negative • Temporary removal of cultural artefacts such as a large mosaic from Wimbo Park would impact on the cultural nature of this space. These artefacts and open spaces would likely be reinstated upon CSELR operation.	Neutral
Health and wellbeing	Slightly Negative • Potential health issues from noise and dust, among other concerns, are present at any construction site and can be addressed with proper management.	Neutral

Table 13.28 cont.

POTENTIAL IMPACT	KEY EFFECTS OF IMPACT	IMPACT RATING (POST MITIGATION)
Social sustainability and community functioning	Slightly Negative • The overall functioning of the local community may be impaired temporarily during construction due to perceived barriers to movement within the precinct as a result of ongoing construction works.	Slightly Negative

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

Economic impacts

The key economic impacts of the CSELR proposal during construction are summarised in Table 13.29 for the Surry Hills Precinct. This table provides a summary and rating of the key potential economic impacts both before and after implementation of proposed mitigation measures. These mitigation measures are presented in section 13.9.4.

Table 13.29 Surry Hills Precinct – Key economic impacts during construction

POTENTIAL IMPACT	KEY EFFECTS OF IMPACT	IMPACT RATING (POST MITIGATION)
Changes to access and local traffic conditions	Moderate Negative • Changes to vehicle access along Devonshire Street would influence the level of passing trade to businesses. • It would also have a flow-on impact to businesses in streets adjoining Devonshire Street potentially increasing travel times or reducing the attraction of visiting the area.	Slightly Negative
Amenity impacts i.e. noise and vibration	Moderate Negative • Potential impacts may occur to the operation of businesses without adequate soundproofing or businesses reliant on the amenity of outdoor areas (i.e. cafes or outdoor dining venues) along the CSELR alignment and surrounding the construction site in Ward Park.	Slightly Negative
Access to loading docks/ servicing areas	Moderate Negative • Constraints would occur to the frequency and ease of access for businesses that rely on delivery docks off Devonshire Street during construction. • Potential time delays and additional travel time may impact businesses that have used Devonshire Street as part of their travel route for deliveries and access. • Impacts may also affect businesses that have large vehicles to deliver goods (i.e. art studios) or that rely on Devonshire Street for refuse collection.	Moderate Negative
Loss of on-street car parking	Moderate Negative • The proposal would result in the removal of car parking in Devonshire Street, which may have an immediate direct impact to existing businesses and landowners as a result of lost convenience for passing trade and access, particularly where alternative parking is not available in the same locality.	Moderate Negative
Passing trade and demand for services	Slight Negative • Due to the amenity and access changes in the Surry Hills Precinct, businesses may experience a reduction in demand for trade and services. This impact may also occur during special events in the Moore Park sports and entertainment complex as visitors are directed to alternative routes to Central Railway Station other than Devonshire Street. • On a day-to-day basis, some businesses may benefit (i.e. food retailers) as a result of an increase in demand owing to construction workers. Businesses close to crossing points between construction hoardings could benefit from greater visibility; those that are located between two crossings would have a greater potential for adverse impact to trading levels.	Slightly Negative

Table 13.29 cont.

POTENTIAL IMPACT	KEY EFFECTS OF IMPACT	IMPACT RATING (POST MITIGATION)
Perceived impact and business viability	Slight Negative • Due to potential amenity impacts and access constraints during the construction period, some businesses may choose to relocate from the area, not renew their lease, or not invest in the area. This may be a short-term impact but would reduce the appeal of the area until the completion of the construction phase.	Slightly Negative
Stimulation of redevelopment opportunities	Moderate Positive • A commitment to the proposal and the commencement of works could create a positive catalyst for the redevelopment of some underutilised sites and locations in the Surry Hills Precinct.	Moderate Positive
Access to work, retail and leisure	Moderate Negative • Impacts to the perceived ease of getting to work or other land use activities could lead to the reduced attraction of working/visiting/ operating facilities in the Surry Hills Precinct.	Slightly Negative
Property acquisition	Neutral • Property acquisition during the construction of the CSELR proposal would create disturbance and costs for existing landowners affected. Transport for NSW would endeavour to acquire any property through negotiation and purchase or lease rather than compulsory acquisition.	Neutral
Visual impact	Moderate Negative • Impacts may occur to the visual amenity of Devonshire Street and to businesses reliant on the existing characteristics of the precinct (i.e. cafes).	Slightly Negative

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

13.9.4 Management and mitigation

A series of mitigation measures for the management of the social and economic impacts identified in section 13.9.2 and section 13.9.3 would be implemented as part of the CSELR proposal. Measures designed to mitigate social impacts are summarised in Table 13.30.

Table 13.30 Social construction and operational mitigation measures

POTENTIAL IMPACT	POTENTIAL MITIGATION
Operation	
Local amenity, character, environment	• Adverse local amenity and character impacts would be mitigated through urban design and/or public domain improvements. Urban design elements proposed for light rail stops would include the use of consistent materials, and new street tree plantings to side footpaths to unify the corridor. Public domain improvements could include the maximisation of open space (for example within High Cross Park) and the replanting of street trees where possible. • Details for the mitigation of amenity impacts are provided in section 13.7.
Visual impact	• The light rail stop at Ward Park would incorporate a high quality urban design that would reflect the Surry Hills Precinct. The provision of a high quality urban domain would assist in minimising impacts to visual amenity resulting from the provision of the CSELR proposal. • Further details for the mitigation of visual impacts are provided in section 13.7.
Changes to access and local traffic conditions	• Where required and feasible, special arrangements for deliveries to businesses directly fronting the CSELR alignment would be provided. This could include the provision of time-based loading zones on nearby streets. • Traffic and transport mitigation strategies for the mitigation of local access and traffic impacts during operation have been developed and are provided in section 13.3.

Table 13.30 cont.

POTENTIAL IMPACT	POTENTIAL MITIGATION
Changes to local community services, Langton Centre and Northcott Estate	• Access to local community services and open spaces would be maintained during operation of the CSELR proposal. Consultation with the operators of community services (including local childcare centres and places of worship) would be undertaken to minimise impacts to the access of these facilities. • Place managers would assist with ensuring needs of disadvantaged residents are accounted for, particularly as some residents may not have access to telephone or email facilities or may not speak English comfortably. • Details for the mitigation of access to public space and connectivity impacts are provided in section 13.7.
Access to and use of public spaces and urban connectivity	• Light rail stops would incorporate a high quality urban design that would reflect the precinct in which they would be located to assist in minimising impacts to visual amenity resulting from the provision of the CSELR proposal. • Transport for NSW would continue to work with stakeholders to identify potential opportunities to integrate CSELR public domain improvements with other city planning strategies (such as the City of Sydney's other public square projects) to improve access to local community services and further enhance the public domain along the route. • Where possible, public open spaces directly affected by the CSELR proposal would be reinstated as soon as possible.
Noise and vibration	• Details of the mitigation of noise and vibration impacts are provided in section 13.5.
Safety and security	Where feasible, the CSELR would incorporate features to maintain the safety of passengers, CSELR employees and the general public. Stops would be designed to be safe and attractive places to wait for CSELR services and would (where feasible and appropriate) incorporate light-emitting diode (LED) lighting technology, emergency calling capabilities and close circuit television (CCTV).
Community and cultural issues	• Detailed design would consider urban design and public domain improvements for the alignment and areas that would be impacted by construction of the CSELR. This would include reinstatement of parks and open space, for example Wimbo Park, as well as creation of new open spaces where available, including at Olivia Gardens. • Informational material advertising the commencement of CSELR operations would be prepared in multiple languages widely spoken by the affected community.
Social sustainability and community functioning	• The light rail and stops would be designed to promote interaction with, and facilitate access to/from, neighbouring areas.
Construction	
Local amenity, character, environment	• A construction environmental management plan (CEMP) would be prepared by the contractor(s) and would specify further mitigation measures suitable for specific impacts. • Further mitigation of amenity and character impacts are provided in section 13.7.
Visual impact	• Public space and parkland used for construction would be reinstated, including compounds/site offices, as soon as possible once these areas are no longer required for the construction of the CSELR. • Further mitigation of visual impacts are provided in section 13.7.
Changes to access and local traffic conditions	• Ongoing consultation with affected stakeholders and organisers of special events would be undertaken. Alternate routes to avoid impacting special events are to be provided where possible. Advance planning for major events should occur with the City of Sydney. • Most footpaths and cycleways would remain unaffected during construction; however in the limited cases where construction impinges on these paths, clearly marked alternatives would be provided. • Traffic and transport mitigation strategies for the mitigation of local access and traffic impacts during construction of the CSELR proposal are provided in section 13.3.
Changes to local community services, Langton Centre and Northcott Estate	• Access to local community services and open spaces would be maintained during construction of the CSELR proposal, where possible. This could include undertaking construction works in segments and stages. Where this is not possible, alternative access arrangements would be made in consultation with relevant service operators. • Access plans would be prepared in consultation with property owners and businesses.

Table 13.30 cont.

POTENTIAL IMPACT	POTENTIAL MITIGATION
Access to and use of public spaces and urban connectivity	• Sequencing of construction activities would be managed to ensure that impacts on public spaces are minimised. • Where footpaths are narrowed or closed off, local diversions would be put in place. • Pedestrians would be diverted to an alternate footpath or crossing prior to any works zone being established that would close off the footpath or crossing. • During detailed design, seek opportunities to refine construction work areas to minimise impacts on public spaces. • Provide clear signage around construction compounds utilising open spaces such as Ward Park and Wimbo Park advising of the project, timing, access arrangements and contact details for complaints. • Alternate spaces would be considered that could substitute for the use of public space required for the construction of the CSELR. • Mitigation of public domain and connectivity impacts are provided in section 13.7 and further mitigation regarding impact to public spaces is provided in section 13.6 and 13.7.
Noise and vibration	• Details for the mitigation of noise and vibration impacts are provided in section 13.5.
Property acquisition	• Where property acquisition is required, it would be acquired in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991.* A property acquisition plan would be prepared as part of detailed design.
Safety and security	• The CEMP would identify risks to safety and security on a site-by-site basis and provide appropriate mitigation measures. • Detailed design would comply with the principles of Crime Prevention through Environmental Design (CPTED). • *Disability Discrimination Act 1992* requirements would be adopted. • Construction lighting standards would be met or exceeded. • Hoarding/fence lines would be erected to maximise sight lines for pedestrians and avoid hiding places and blind spots to improve pedestrian personal security. • Any gantry arrangements would have internal lighting. • Relocation of CCTV cameras would be considered if construction obstructs their view field. • Separation barriers would be installed along the borders of worksites. • Consideration would be given to suspension of works on event days within the City Centre to minimise construction safety risks to crowds. • Safety and security impacts would be addressed as part of the CEMP.
Community and cultural issues	• The scheduling of construction activities would take into consideration major events in the City Centre to minimise impacts on the access to, and function of, these events. This would include consultation with relevant stakeholders. • Staging of works would be undertaken to minimise disruption, in consultation with local community groups, to minimise impacts to community activities and functions. • Materials promoting light rail operation and use would be prepared in multiple languages, particularly Mandarin, Indonesian, and Greek.
Health and wellbeing	• The CEMP is to identify risks to health and wellbeing on a site-by-site basis and would include appropriate mitigation measures. • The CEMP would account for cumulative impacts of construction given concurrent works in the precinct. • Health impacts would be addressed as part of the CEMP, including watering exposed areas to minimise dust impacts, using non-tonal reversing indicators, and fitting construction machinery with appropriate muffling devices.
Social sustainability and community functioning	• Staging of works to minimise disruption, ensuring that community activities and functions can still take place.

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

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

- Through liaison with businesses and landowners, access plans would be developed to establish existing servicing and delivery requirements, access periods or alternative arrangements for businesses and landowners affected by the proposal. These access plans would also identify alternative routes, specific activities or land uses (such as schools, medical centres etc.) within each precinct and would identify strategies to maintain emergency access throughout each precinct at all times. Further details regarding the proposed traffic management strategies for the Surry Hills Precinct are provided in section 13.3.4.
- A business and landowner engagement and management plan would provide ongoing information to business and landowners potentially affected by the proposal, through a variety of sources including information packs, a website, regular newsletters/brochures and email alerts. The plan would also identify effective means for ongoing cooperation and communication with the business community.
- The CEMP would outline a range of mitigation measures to minimise the level of disturbance created as a result of construction related activities. The CEMP would contain a number of additional plans to manage specific impacts such as noise and traffic. Further details regarding the CEMP for the CSELR proposal is provided in Chapter 18.