

## 6 Environmental assessment

### 6.1 Introduction

This chapter provides an environmental assessment of the proposed modification to Stage 2 of the project. The assessment identifies potential impacts resulting from the proposed modification and provides a comparison with the impacts assessed in the Environmental Impact Statement (EIS) and the Submissions and Preferred Infrastructure Report (SPIR) for the approved project. The assessment has been prepared to address the environmental assessment requirements for the proposed modification as described in **Appendix A** (Environmental assessment requirements).

### 6.2 Environmental scoping

A scoping assessment has been completed to identify the likely potential environmental impacts associated with the proposed modification.. The environmental assessment requirements were considered when completing this assessment.

Potential environmental impacts associated with the proposed modification that require assessment are identified in **Table 6-1**.

**Table 6-1 Scoping assessment**

Issue	Potential environmental impacts	Where addressed
Traffic and transport	<ul style="list-style-type: none"><li>• Potential impact to the operation of the intersection of The Crescent/Johnston Street/Chapman Road</li><li>• Potential impacts to access to the Rozelle Bay light rail stop during construction</li><li>• Potential impacts to the operation of nearby intersections including The Crescent/City West Link and The Crescent/James Craig Road associated with The Crescent overpass and related road network adjustments</li><li>• Potential impacts to bus stops located on The Crescent</li><li>• Potential changes to pedestrian and cycling connectivity between the Rozelle Rail Yards and Bicentennial Park</li><li>• Changes to turning movements permitted at The Crescent and James Craig Road intersection and at The Crescent/Johnston Street and Chapman Road intersection</li><li>• Changes to property access and on-street car parking.</li></ul>	<b>Section 6.3</b>
Air quality	<ul style="list-style-type: none"><li>• Potential change in dust generation from construction affecting nearby residential receivers</li><li>• Potential change in air quality impacts associated with the operation of The Crescent overpass.</li></ul>	<b>Section 6.5</b>
Noise and vibration	<ul style="list-style-type: none"><li>• Potential noise and vibration impacts including sleep disturbance associated with construction works</li><li>• Potential noise impacts at sensitive receivers associated with the operation of The Crescent overpass and associated road network adjustments.</li></ul>	<b>Section 6.4</b>
Urban design and visual amenity	<ul style="list-style-type: none"><li>• Potential visual impacts associated with the introduction of The Crescent overpass, shared user path bridge, and the realigned pedestrian and cycling green link ('green link')</li><li>• Potential impacts to the proposed urban design outcomes associated with the green link and shared path connection between Rozelle Rail Yards, the Rozelle Bay light rail stop and Bicentennial Park</li><li>• Potential change in the visual character of the green link.</li></ul>	<b>Section 6.6 and Section 6.7</b>

<b>Issue</b>	<b>Potential environmental impacts</b>	<b>Where addressed</b>
Contamination	<ul style="list-style-type: none"> <li>Potential to encounter additional contamination not previously assessed in the EIS.</li> </ul>	<b>Section 6.10</b>
Surface Water, drainage and flooding	<ul style="list-style-type: none"> <li>Potential impacts to receiving waterbodies from surface water from the various modification components</li> <li>Potential flooding impacts on the proposed active transport and road infrastructure.</li> </ul>	<b>Section 6.9</b>
Groundwater	<ul style="list-style-type: none"> <li>Potential to encounter contaminated groundwater during excavations associated with footings for The Crescent overpass, green link and shared user path bridge.</li> </ul>	<b>Section 6.10</b>
Non-Aboriginal heritage	<ul style="list-style-type: none"> <li>Potential impacts to the potential heritage item The Crescent Mural</li> <li>Potential impacts to State Heritage and Section 170 Listed items associated with the Glebe Railway Viaduct and Annandale (Johnston Street) Underbridge</li> <li>Potential impacts to local heritage items on Bayview Crescent and Annandale Heritage Conservation Area.</li> </ul>	<b>Section 6.8</b>
Social and economic	<ul style="list-style-type: none"> <li>Potential impacts to surrounding businesses including Crescent Timber and Hardware and surrounding maritime related industries</li> <li>Potential negative amenity issues for surrounding residents and visitors to active and passive recreational areas.</li> <li>Potential impacts to connectivity and property access during construction and operation</li> </ul>	<b>Section 6.11</b>
Utilities	<ul style="list-style-type: none"> <li>Potential impacts due to utilities relocation, protection or adjustment.</li> </ul>	<b>Section 6.12</b>
Cumulative impacts	<ul style="list-style-type: none"> <li>Potential construction fatigue experienced by nearby residents due to construction of the proposed Western Harbour Tunnel and Warringah Freeway Upgrade (Western Harbour Tunnel project)</li> <li>Cumulative traffic and road noise impacts associated with other road projects across the metropolitan road network.</li> </ul>	<b>Section 6.13</b>

A number of issues for the proposed modification would be generally consistent with the EIS and do not require further assessment. Impacts that do not require further assessment include:

- Human health risk
- Land use and property
- Soil and water quality
- Biodiversity
- Aboriginal heritage
- Greenhouse gas
- Resource use and waste minimisation
- Climate change risk and adaption
- Hazard and risk.

These issues would be managed in accordance with the existing environmental management measures as summarised in Part E of the SPIR and relevant conditions of approval for the project. Impacts to human health during construction are considered as part of the assessment of potential air quality and noise and vibration impacts for the proposed modification.

## 6.3 Traffic and transport

### 6.3.1 Assessment methodology

An assessment of potential construction and operational traffic impacts associated with the proposed modification was carried out and is included in **Appendix B** (Traffic and Transport Technical assessment). This section summarises that assessment.

The traffic impacts of the proposed road network components of the proposed modification were assessed using existing microsimulation software VISSIM traffic models previously used to assess operational impacts for the Rozelle Interchange in the EIS. The assessments were undertaken on the surrounding road network during the AM and PM peak hours in the forecast years for 2023 and 2033.

Four future year scenarios were modelled to assess the traffic impacts of the proposed modification in comparison to the approved project. These scenarios are consistent with what was assessed in the EIS, enabling a comparison in performance to be made to the approved project.

#### Interchange road network performance

##### *Network performance modelling*

Updated analysis of the network performance affected by the proposed modification compared to the EIS performance was assessed using the following modelling parameters collected and reported for the AM and PM peak hours in each scenario:

- Total vehicle demand
- Total stops made by vehicles in the network, either due to intersection controls or congestion
- Vehicle kilometres travelled in network
- Average speed of vehicles
- Vehicle time travelled approaching and in network
- Travel time for typical cross-network trips
- Total vehicles arrived
- Unreleased demand at the end of peak hour.

The VISSIM Traffic model coverage is outlined on **Figure 6-1**.

##### *Intersection level of service*

Level of service (LoS) is a measure to describe the operational conditions and efficiency of a road or intersection. The definition of LoS generally outlines the operating conditions in terms of speed and travel time, freedom to manoeuvre, traffic interruptions, comfort and convenience, and road safety. It is a qualitative measure describing operational conditions within a roadway or intersection, as perceived by motorists and/or passengers.

There are six levels of service; LoS A to LoS F. LoS A represents the best operating conditions and LoS F represents the poorest operating conditions. When the level of service of a road or intersection falls below LoS D, investigations are generally carried out to identify suitable mitigation. However, constraints in built up urban areas mean that LoS E and LoS F are regularly experienced by motorists on the Sydney road network during peak periods.

Average delay is commonly used to assess the operational performance of intersections, with LoS used as an index. An assessment of performance of the intersections associated with the proposed modification was undertaken to determine the average delay times experienced by traffic at those intersections. Each intersection was then characterised into its corresponding LoS based upon these delay times.

As in the EIS, for analysing intersection performance in this assessment, all exit blocking constraints, applied in the microsimulation models to reflect network congestion beyond the modelled network extents, were removed. This allows for an assessment of intersections within the modelled network, irrespective of any downstream queuing that would mask the actual operation of the intersection.

### 6.3.2 Existing environment

The proposed modification relates to the Rozelle Interchange and surrounding road network. The key roads in this area relevant to the proposed modification include (but are not limited to):

- City West Link (A4)
- Victoria Road (A40)
- Western Distributor and Anzac Bridge
- The Crescent
- Johnston Street
- Chapman Road
- James Craig Road.

#### Modes of travel

The proposed modification is located primarily within the Inner West Local Government Area (LGA). A small area of the City of Sydney LGA is also located on the eastern side of The Crescent near Chapman Road. Residents within the Inner West LGA use public transport more often than the wider Sydney Greater Metropolitan Area (GMA), likely due to the proximity to the Sydney CBD and frequent bus and heavy and light rail services. The largest difference to the Sydney GMA data is in 'walk only' trips, which account for 32 per cent of the trips in the Inner West LGA, compared to 18 per cent for the Sydney GMA (NSW BTS, 2014). Travel mode share for the Inner West LGA, is displayed and compared to the Sydney GMA in .

**Table 6-2 Average weekday travel mode share for Inner West LGA**

Area	Private Vehicles			Rail	Bus	Walk only	Other modes
	Driver	Passenger	Total				
Inner West LGA	36%	13%	49%	7%	8%	32%	5%
Sydney GMA	47%	22%	69%	5%	6%	18%	2%

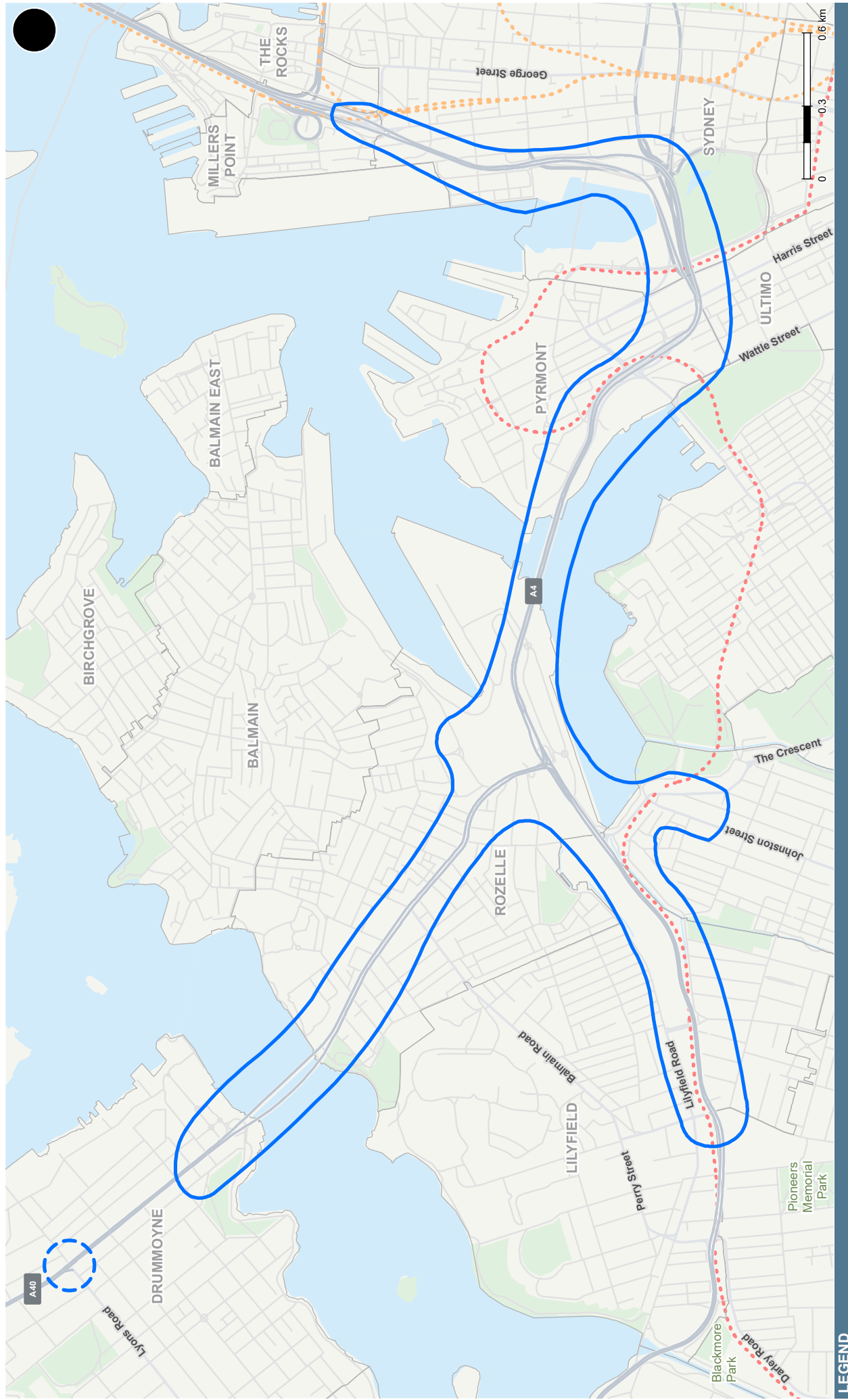
Note:

Inner West Council data has been derived by combining data from the former Leichardt, Ashfield and Marrickville LGAs  
Source: NSW Bureau of Transport Statistics (BTS), Household Travel Survey Report: Sydney 2012/13, Nov 2014 Release.

#### Public transport services

The suburbs of Rozelle and Annandale have access to light rail and bus services that provide frequent connections to key centres and transport nodes, but do not have access to the heavy rail network. The light rail service for this area is the L1 Dulwich Hill line, with the closest stops being Rozelle Bay and Lilyfield. Service scheduling is the same for early AM, late PM and off-peak with services occurring every 15 minutes. Similarly, scheduling is the same for AM and PM peak with services every 8-10 minutes. Existing access to the Rozelle Bay light rail stop from Buruwan Park is shown on **Plate 6-1**.





#### LEGEND

##### Existing features

- Waterway
- Railway
- Light rail
- Suburb boundary

##### Model boundary

- Arterial road
- Subarterial road
- Local road
- Microsimulation area
- Intersection analysis

Figure 6-1 VISSM Traffic model coverage



**Plate 6-1 Existing Rozelle Bay light rail stop access from Buruwan Park walking and cycling facilities**

There are approximately 24 bus routes that travel on key roads relevant to the proposed modification including: Victoria Road, The Crescent, City West Link and the Western Distributor. Across those routes, 22 of them operate during the AM peak period offering a total of 354 bus services. In the PM peak period 21 bus routes operate and offer a total of 371 services. The majority of these bus services, and all of those connecting with the CBD, pass along Victoria Road and Anzac Bridge.

The suburbs of Rozelle and Annandale and surrounds contain areas of public open space including Bicentennial Park, Easton Park and the Glebe Foreshores and Whites Valley Creek Parklands. This area contains active transport links such as the Bay Run, Glebe Foreshores, Anzac Bridge cycleway and the northern part of the Green Way which is the active transport connection between Cooks River and Iron Cove. Currently, there is poor pedestrian and cyclist connectivity between the suburbs of Rozelle, Annandale, Lilyfield, Glebe, Balmain and Forest Lodge. Specifically, the Rozelle Rail Yards and City West Link are significant barriers between the suburbs of Annandale, Rozelle and Lilyfield.

### **Existing traffic volumes and patterns**

Roads and Maritime traffic data from 2014 and 2016 indicate higher traffic flows in the southbound and eastbound (citybound) directions during the AM peak periods and in the opposite directions during the PM peak (complete traffic data is presented in Chapter 8 of the EIS). The sections of the Rozelle Interchange that would be most affected by the proposed modification include: City West Link, between The Crescent and James Craig Road and The Crescent, between City West Link and Johnston Street. From the data for these roads it was observed that 38,500 vehicles per day travel eastbound and 36,000 vehicles per day travel westbound on City West Link, between The Crescent and James Craig Road, while 11,500 vehicles per day travel northbound and 12,500 vehicles per day travel southbound at The Crescent, between City West Link and Johnston Street. These numbers are the average vehicle numbers over 2014 and 2016.



## Rozelle Interchange and surrounds existing performance

Table 6-3 presents the performance of the modelled road network for the Rozelle, Annandale and surrounds using the 2015 base scenario for the AM and PM peak hours (i.e. the base scenario presented in the EIS).

**Table 6-3 Rozelle Interchange network performance – 2015 AM and PM peak hour**

Total traffic demand (vehicles)	19,969	22,148
Total vehicle kilometres travelled in network (kilometre)	54,959	61,980
Total time travelled in network (hours)	4,016	3,276
Total vehicles arrived	20,298	20,714
Total number of stops	267,250	133,380
<b>Average per vehicle in network</b>		
Average vehicle kilometres travelled in network (kilometre)	2.7	3.0
Average time travelled in network (minutes)	9.6	8.2
Average number of stops	11.5	5.6
Average speed (kilometres per hour)	16.9	21.9
<b>Unreleased vehicles</b>		
Unreleased demand (vehicles)	357	823
% of total traffic demand	2%	4%

The AM and PM peak hour LoS for the key intersections that have the potential to be affected by the proposed modification were assessed in Chapter 8 of the EIS. The key intersections and their existing LoS rating are as outlined in **Table 6-4**.

**Table 6-4 Existing LoS at key intersections**

Intersection	AM peak hour LoS	PM peak hour LoS
The Crescent/James Craig Road	A	B
City West Link/The Crescent	B	D
The Crescent/Johnston Street/Chapman Road	C	F

Average travel time on City West Link and Anzac Bridge between Catherine Street at Lilyfield and Anzac Bridge ramps at Pyrmont in the AM and PM peak periods were also outlined in Chapter 8 of the EIS. In the peak directions, eastbound travel time in the AM peak averages about 10 minutes, with an average speed of about 16 kilometres per hour on a typical weekday. The westbound travel time in the PM peak averages six minutes with an average speed of about 26 kilometres per hour. The speed limit on this road is 60 kilometres per hour and 70 kilometres per hour to the west of the intersection of The Crescent and City West Link.

### 6.3.3 Assessment of potential impacts

#### Construction

A number of potential impacts related to the proposed modification would be broadly consistent with the potential impacts assessed within the EIS. These potential impacts include:

- Construction traffic volumes
- Construction contractor numbers
- Provision of pedestrian and cycle paths
- Public transport including buses and light rail
- Road safety.

No changes to construction traffic volumes from the construction sites as described in the EIS are proposed. The traffic volumes for the C6 civil site were:

- Daily: 10 heavy vehicles in and out (20 movements per day) and 20 light vehicles in and out (40 movements per day)
- AM peak hour: Two heavy vehicles in and out (four movements per hour) and no light vehicles in and out (zero movements per hour)
- PM peak hour: Two heavy vehicles in and out (four movements per hour) and five light vehicles out (five movements per hour).

No re-assessment of the 2021 construction traffic scenario was therefore required to be undertaken.

The Crescent construction ancillary facility (C6a) on the southern side of The Crescent adjacent to Rozelle Bay and to the east of the City West Link and The Crescent intersection would be used for some light vehicle parking. Nine light vehicle parking spaces are proposed and would access this site through a westbound left in, left out on The Crescent.

It is not anticipated that the low number of left-in, left-out light vehicles from The Crescent civil site (C6) would impact on traffic operations, especially as the peak hours for the construction sites are slightly different to the surrounding road network peak hours. With a shift start time of 7 am, most light vehicle arrivals would occur before the road network AM peak hour at these locations. The end of the shift is more likely to coincide with the road network PM peak hour, although some vehicles would leave before the road network PM peak hour.

Approved peak construction work estimates at The Crescent civil site (C6) include up to 50 workers per shift. It is anticipated that the modification would be undertaken within these approved worker numbers, and therefore would have no change from the EIS. Worker carparking would be managed through the Construction Parking and Access Strategy, as required by Condition E54 of the CoA.

No changes to pedestrian and cycle provision during construction are proposed to that described in the EIS. Safe pedestrian and cyclist access would be maintained during construction in accordance with Condition E57 and road safety audits would be carried during detailed design to assess the safety performance of new or modified road and pedestrian and cyclist infrastructure (including around construction ancillary facilities).

The Crescent/Johnston Street/Chapman Road intersection upgrade would temporarily remove four on-street parking spaces on the northern side of Chapman Road during construction. These spaces would be relocated to a location close to their current position at the end of the construction phase and therefore would not be permanently lost. Two on-street parking spaces at the northern end of the northbound carriage way on Johnston Street would be lost as part of the upgrade of The Crescent/Johnston Street/Chapman Road intersection.

Local access to 300 Johnston Street, just south of The Crescent/Johnston Street/Chapman Road intersection, would be within the construction zone for the proposed The Crescent/Johnston Street/Chapman Road intersection upgrade. No significant construction works are proposed adjacent to 300 Johnston Street and access would be maintained and managed in accordance with Conditions E46 and E47, which relate to property access. Construction works could be up to 12 months at The Crescent/Johnston Street/Chapman Road intersection.

Any foreseen impacts on road safety for all users during construction, including the safety impacts of the construction of the three bridge structures for pedestrians and traffic using City West Link and The Crescent, would be mitigated as much as practicable through the provision of tailored construction traffic management plans and other measures as detailed in the M4-M5 Link SPIR and in the Construction Traffic, Transport and Access Management Sub-Plan that will be prepared for the project, as required by Condition C4 of the CoA.

## Operation

This section discusses the potential traffic impacts of the proposed modification during the 'with project' scenarios. Two scenarios were modelled to assess the potential operational traffic impacts:

- **Future case with the project (2023):** The future case 'with project' assumes the NorthConnex, M4 Widening, M4 East, King Georges Road Interchange Upgrade, New M5 and the M4-M5 Link are complete and open to traffic
- **Cumulative case (2023):** Assumes NorthConnex, M4 Widening, M4 East, King Georges Road Interchange Upgrade, New M5 and the M4-M5 Link are complete and open to traffic, and in addition, the proposed Sydney Gateway and Western Harbour Tunnel project are complete and open to traffic
- **Future case with the project (2033):** The future case 'with project' includes NorthConnex, M4 Widening, M4 East, King Georges Road Interchange Upgrade, New M5 and the M4-M5 Link are complete and open to traffic, but the proposed Sydney Gateway, Western Harbour Tunnel and Beaches Link and the F6 Extension are not operational
- **Cumulative case (2033):** The future Cumulative scenario assumes NorthConnex, M4 Widening, M4 East, King Georges Road Interchange Upgrade, New M5 and the M4-M5 Link are complete and open to traffic and also assumes proposed Sydney Gateway, Western Harbour Tunnel and Beaches Link and the F6 Extension are complete and open to traffic.

### *Impacts on Sydney metropolitan road network*

Impacts to the Sydney metropolitan network are similar for the cumulative scenario as the project only scenario. For the Sydney metropolitan road network, there is minimal change in the daily traffic forecast on the network, although some increase is forecast on Anzac Bridge eastbound (about 1,500 vehicles per day) and on Johnson Street northbound (about 2,500 vehicles per day) for both 2023 and 2033.

As the northbound traffic on Johnston Street is a forecast increase in demand into the VISSIM operational models, a review of the forecast peak hour volumes was undertaken. This indicated that most of the forecast increase would occur in off peak periods, with only an additional 70-90 northbound vehicles per hour forecast during each of the AM and PM peak hours. A sensitivity test was undertaken to test the significance of this increase on the VISSIM model peak period network performance, which indicated the increase had minimal impact.

### *Impacts on network performance*

#### **AM peak hour**

**Table 6-6, Table 6-7 and Table 6-8** present a comparison of the performance of the road network, between the 2023 and 2033 EIS and modification models for the AM peak hour in the 'with project' and 'cumulative' scenarios.

In relation to network performance for the AM peak hour, the 2023 and 2033 EIS and modification models have the same demand, however, the proposed changes at The Crescent/Johnston Street/Chapman Road intersection along with The Crescent overpass at City West Link/The Crescent intersection allow more traffic into the network. For 2033, both the 'with project' and cumulative scenarios result in improved travel times on City West Link/The Crescent and increase in the traffic flow northbound on Victoria Road because of the improvements to The Crescent merge arrangement on the eastbound approach to Anzac Bridge.

In 2023, network performance metrics in the 'with project' scenario indicate an improvement in the modification model compared to the EIS model while the cumulative scenario shows that network performance metrics are comparable with negligible changes to the vehicle performance metrics. In 2033, in the modification model, the Western Distributor is forecast to be slightly more congested compared to the EIS model for the 'with project' and cumulative scenarios

In 2023 and 2033, for the 'with project' and cumulative scenarios, both the EIS and modification models indicate that the AM peak citybound movements are likely to be affected by the queues from the Bathurst Street/Cross City Tunnel exit ramp and the downstream exit blocking from the Sydney Harbour Bridge which cause flow breakdown on Anzac Bridge. This congestion on the Western Distributor and Anzac Bridge is forecast to cause queuing in the Iron Cove Link, and on the M4 exit ramp. This is not forecast to extend back to the M4-M5 Link mainline. In 2033, the network performance metrics indicate that vehicles in the modified network in the cumulative scenario travel at similar speeds but with fewer stops than in the EIS network.

**Table 6-5 Rozelle Interchange network performance – AM peak hour (2023 'with project' EIS vs 'with project' modification scenario)**

Network measure	2023 'with project' (EIS)	2023 'with project' (Modification)	Percentage change
<b>All vehicles</b>			
Total traffic demand (vehicles)	25,327	25,327	0%
Total vehicle kilometres travelled in network (km)	73,188	73,426	<1%
Total time travelled approaching and in network (hr)	6,308	5,763	-9%
Total vehicles arrived	23,799	24,070	1%
Total number of stops	274,030	266,585	-3%
<b>Average per vehicle in network</b>			
Average vehicle kilometres travelled in network (km)	3.1	3.1	0%
Average time travelled in network (mins)	9.8	9.5	-3%
Average number of stops	10.1	9.7	-4%
Average speed (km/h)	18.8	19.4	3%
<b>Unreleased vehicles</b>			
Unreleased demand (vehicles)	2,309	1,663	-28%
% of total traffic demand	9%	7%	-

**Table 6-6 Rozelle Interchange network performance – AM peak hour (2023 ‘cumulative’ EIS vs ‘cumulative’ modification scenario)**

Network measure	2023 ‘cumulative’ (EIS)	2023 ‘cumulative’ (Modification)	Percentage change
<b>All vehicles</b>			
Total traffic demand (vehicles)	29,689	29,689	0%
Total vehicle kilometres travelled in network (km)	91,329	91,252	<1%
Total time travelled approaching and in network (hr)	4,139	4,401	6%
Total vehicles arrived	29,253	29,119	<1%
Total number of stops	127,991	117,950	-8%
<b>Average per vehicle in network</b>			
Average vehicle kilometres travelled in network (km)	3.1	3.1	0%
Average time travelled in network (mins)	5.9	6.0	2%
Average number of stops	4.0	3.7	-8%
Average speed (km/h)	31.7	31.6	<1%
<b>Unreleased vehicles</b>			
Unreleased demand (vehicles)	703	809	15%
% of total traffic demand	2%	3%	-

**Table 6-7 Rozelle Interchange network performance – AM peak hour (2033 ‘with project’ EIS vs ‘with project’ modification scenario)**

Network measure	2033 ‘with project’ (EIS)	2033 ‘with project’ (Modification)	Percentage change
<b>All vehicles</b>			
Total traffic demand (vehicles)	28,023	28,023	0%
Total vehicle kilometres travelled in network (km)	77,690	77,169	-1%
Total time travelled approaching and in network (hr)	7,221	7,050	-2%
Total vehicles arrived	25,794	25,888	<1%
Total number of stops	272,544	272,460	<1%
<b>Average per vehicle in network</b>			
Average vehicle kilometres travelled in network (km)	3.0	3.0	0%
Average time travelled in network (mins)	9.3	9.2	<1%
Average number of stops	9.2	9.2	0%
Average speed (km/h)	19.4	19.4	0%
<b>Unreleased vehicles</b>			
Unreleased demand (vehicles)	2,719	2,609	-4%
% of total traffic demand	10%	9%	-

**Table 6-8 Rozelle Interchange network performance – AM peak hour (2033 ‘cumulative’ EIS vs ‘cumulative’ modification scenario)**

Network measure	2033 ‘cumulative’ (EIS)	2033 ‘cumulative’ (Modification)	Percentage change
<b>All vehicles</b>			
Total traffic demand (vehicles)	34,863	34,863	0%
Total vehicle kilometres travelled in network (km)	103,220	102,871	<1%
Total time travelled approaching and in network (hr)	5,654	5,745	2%
Total vehicles arrived	33,314	33,095	-1%
Total number of stops	151,561	136,784	-10%
<b>Average per vehicle in network</b>			
Average vehicle kilometres travelled in network (km)	3.1	3.1	0%
Average time travelled in network (mins)	6.0	6.0	0%
Average number of stops	4.2	3.8	-10%
Average speed (km/h)	31.2	31.3	<1%
<b>Unreleased vehicles</b>			
Unreleased demand (vehicles)	1,911	1,953	2%
% of total traffic demand	6%	6%	-

## PM peak hour

**Table 6-9, Table 6-10** Table 6-9 , **Table 6-11** and **Table 6-12** present a comparison of the performance of the road network, between the 2023 and 2033 EIS and modification models for the PM peak hour in the ‘with project’ and ‘cumulative’ scenarios.

For the ‘with project’ scenario, during the PM peak hour, the overall 2023 network performance is forecast to improve slightly compared to the EIS network, while the overall 2033 network performance is forecast to deteriorate slightly compared to the EIS network. In the 2033 PM modified network, more traffic is released into the network and as a result, more traffic is able to travel northbound on Victoria Road because of the improvements at the Victoria Road/The Crescent intersection. This results in longer travel times in the northbound direction on Victoria Road with a slight drop in average speeds and slight increase in average travel times. However, overall, the changes between the network performances for the ‘with project’ scenarios are small.

For the cumulative scenario, during the PM peak hour for 2023 and 2033, the overall network performance metrics are comparable to the EIS models. In 2023, there would be a slight reduction in the number of stops in the modification model, however in 2033, there would be a slight increase. Unlike in the ‘with project’ scenario, the increased number of vehicles suffer less delay reaching the Anzac Bridge and Western Distributor earlier in the peak hour because the proposed Western Harbour Tunnel project has reduced the northbound demand on the Western Distributor approach to Sydney Harbour Bridge.



**Table 6-9**      **Rozelle Interchange network performance – PM peak hour (2023 ‘with project’ EIS vs ‘with project’ modification scenario)**

Network measure	2023 ‘with project’ (EIS)	2023 ‘with project’ (Modification)	Percentage change
<b>All vehicles</b>			
Total traffic demand (vehicles)	28,109	28,109	0%
Total vehicle kilometres travelled in network (km)	80,108	81,127	1%
Total time travelled approaching and in network (hr)	5,091	5,112	<1%
Total vehicles arrived	24,261	24,472	1%
Total number of stops	179,138	169,063	-6%
<b>Average per vehicle in network</b>			
Average vehicle kilometres travelled in network (km)	3.3	3.3	0%
Average time travelled in network (mins)	7.9	7.8	-1%
Average number of stops	6.4	6.0	-6%
Average speed (km/h)	25.1	25.5	2%
<b>Unreleased vehicles</b>			
Unreleased demand (vehicles)	2,655	2,529	-5%
% of total traffic demand	9%	9%	-

**Table 6-10**      **Rozelle Interchange network performance – PM peak hour (2023 ‘cumulative’ EIS vs ‘cumulative’ modification scenario)**

Network measure	2023 ‘cumulative’ (EIS)	2023 ‘cumulative’ (Modification)	Percentage change
<b>All vehicles</b>			
Total traffic demand (vehicles)	30,805	30,805	0%
Total vehicle kilometres travelled in network (km)	96,899	96,988	<1%
Total time travelled approaching and in network (hr)	3,480	3,366	-3%
Total vehicles arrived	29,496	29,564	<1%
Total number of stops	68,692	63,069	-8%
<b>Average per vehicle in network</b>			
Average vehicle kilometres travelled in network (km)	3.3	3.3	0%
Average time travelled in network (mins)	5.1	5.1	0%
Average number of stops	2.1	2.0	-5%
Average speed (km/h)	39.0	38.9	<1%
<b>Unreleased vehicles</b>			
Unreleased demand (vehicles)	1,351	1,324	-2%
% of total traffic demand	4%	4%	-

**Table 6-11** Rozelle Interchange network performance – PM peak hour (2033 ‘with project’ EIS vs ‘with project’ modification scenario)

Network measure	2033 ‘with project’ (EIS)	2033 ‘with project’ (Modification)	Percentage change
<b>All vehicles</b>			
Total traffic demand (vehicles)	30,259	30,259	0%
Total vehicle kilometres travelled in network (km)	86,924	86,873	<1%
Total time travelled approaching and in network (hr)	5,286	5,362	1%
Total vehicles arrived	27,082	26,917	-1%
Total number of stops	92,817	99,419	7%
<b>Average per vehicle in network</b>			
Average vehicle kilometres travelled in network (km)	3.2	3.2	0%
Average time travelled in network (mins)	6.1	6.4	5%
Average number of stops	3.1	3.3	6%
Average speed (km/h)	31.3	30.3	-3%
<b>Unreleased vehicles</b>			
Unreleased demand (vehicles)	2,974	2,991	1%
% of total traffic demand	10%	10%	-

**Table 6-12** Rozelle Interchange network performance – PM peak hour (2033 ‘cumulative’ EIS vs ‘cumulative’ modification scenario)

Network measure	2033 ‘cumulative’ (EIS)	2033 ‘cumulative’ (Modification)	Percentage change
<b>All vehicles</b>			
Total traffic demand (vehicles)	34,705	34,705	0%
Total vehicle kilometres travelled in network (km)	102,632	102,145	<1%
Total time travelled approaching and in network (hr)	4,820	4,833	<1%
Total vehicles arrived	32,230	32,091	<1%
Total number of stops	81,682	83,329	2%
<b>Average per vehicle in network</b>			
Average vehicle kilometres travelled in network (km)	3.2	3.2	0%
Average time travelled in network (mins)	5.2	5.3	2%
Average number of stops	2.3	2.4	4%
Average speed (km/h)	37.1	36.2	-2%
<b>Unreleased vehicles</b>			
Unreleased demand (vehicles)	2,537	2,603	3%
% of total traffic demand	7%	8%	-

### *Impacts on intersection performance*

In the AM peak for 2023 and 2033, the performance of each of the relevant intersections (LoS rating) is forecast to be comparable or better when compared with the EIS. The most noticeable improvement is at the Victoria Road/Robert Street intersection in the 2033 AM peak hour, which is forecast to improve from LoS F to LoS C.

In the 2023 PM peak hour, all intersections are forecast to perform the same or better when compared with the EIS, especially The Crescent/Johnston Street/Chapman Road intersection, where a better LoS is forecast, and more vehicles can be accommodated. In the 2033 PM peak hour, the Victoria Road/Darling Street intersection is forecast to perform slightly worse than in the EIS model due to a higher total intersection demand. The average delay in the EIS model was at the high end of the LoS D band and the additional traffic has pushed it into the LoS E band.

**Table 6-13** presents each LoS rating for each relevant intersection during 2023 and 2033, for the with project and cumulative scenarios and comparing the results for the EIS and proposed modification.

**Table 6-13 Rozelle Interchange: key intersection performance (LoS) – Peak hour**

Key intersections	2015 Base	2023 'with project' (EIS)	2023 'cumulative' (EIS)	2023 'with project' (Modification)	2023 'cumulative' (Modification)	2033 'with project' (EIS)	2033 'cumulative' (EIS)	2033 'with project' (Modification)	2033 'cumulative' (Modification)
<b>AM peak hour</b>									
Victoria Road/Wellington Street	D	C	C	C	C	D	C	C	C
Victoria Road/Darling Street	F	F	F	F	F	F	F	F	F
Victoria Road/Robert Street	D	C	C	C	C	F	E	C	D
Victoria Road/The Crescent	B	C	C	B	B	D	D	C	C
The Crescent/James Craig Road	A	B	A	A	A	B	B	B	B
City West Link/The Crescent	B	C	C	B	B	D	C	C	C
The Crescent/Johnston Street	C	C	C	B	C	C	F	C	C
The Crescent/M4-M5 link ramps	–	B	B	A	B	B	B	B	B
<b>PM peak hour</b>									
Victoria Road/Wellington Street	B	B	B	B	B	C	C	B	B
Victoria Road/Darling Street	F	D	D	D	D	D	D	E	D
Victoria Road/Robert Street	F	C	C	C	C	C	C	C	C
Victoria Road/The Crescent	F	C	C	C	C	C	C	C	C
The Crescent/James Craig Road	B	A	A	A	A	A	A	A	A
City West Link/The Crescent	D	B	C	B	B	C	C	B	B
The Crescent/Johnston Street	F	F	F	C	C	F	F	E	D
The Crescent/ M4-M5 link ramps	–	B	B	A	A	B	C	A	B

### *Impacts on travel times*

During the AM peak hour, the proposed modification is likely to result in similar travel times compared to the EIS scenario. However, increased travel times are expected in the AM peak direction on Iron Cove Link and Victoria Road (inbound to the city). The citybound movements remain affected by the queues back from the Bathurst Street/Cross City Tunnel exit ramp and the downstream exit on the Western Distributor back from Sydney Harbour Bridge. Congestion on the Western Distributor and Anzac Bridge is reduced in the 'cumulative' scenario compared to the 'with project' scenario due to the opening of the proposed Western Harbour Tunnel project.

The proposed modification improves the flow of traffic from City West Link, removing congestion and delays for traffic travelling towards Victoria Road. However, it is likely that this congestion would move onto Victoria Road in a northbound direction and result in increased travel time at this location compared to the EIS scenario.

During the PM peak hour, the results for the proposed modification are similar to those in the EIS, with the difference considered to be minimal and non-significant.

### *Impacts on road safety*

The forecast daily changes in traffic volumes from the WestConnex Road Traffic Model indicate a minimal change in daily volumes across the network. Based on these forecasts, a minimal change in crashes is also forecast on the roads assessed in the EIS.

The proposed grade separated right turn overpass from The Crescent (northbound) to The Crescent (eastbound) at the City West Link/The Crescent intersection would remove the at grade right turn movement, which would remove safety issues with conflicting movements at the intersection.

### *Impacts on public transport services*

The bus bay on the west side of The Crescent (northbound), currently located just south of the City West Link intersection, would be relocated slightly further south on The Crescent to just north of the Johnston Street intersection. Given the low frequency of the buses using this stop (9-12 minutes in the AM peak period and 5-12 minutes in the PM peak period), the expectation is that the performance of The Crescent/Johnston Street/Chapman Road intersection would not be impacted. No change to the location of the bus stop on the east side of The Crescent (southbound) is proposed.

For the future case with the project scenarios, bus travel times in the outbound direction on Victoria Road during the AM peak are forecast to increase, for the same reason as general traffic travel times, which is: congestion on Victoria Road caused by higher traffic volumes travelling northbound due to improvements on City West Link/The Crescent. The increased traffic volumes on Victoria Road means that the queues caused by the capacity constraint to the northern end of Victoria Road are longer and therefore take longer to dissipate. In 2023, bus travel times for Victoria Road and Anzac Bridge routes are forecast to increase from about 17 minutes to about 20 minutes, while in 2033, bus travel times are forecast to increase from about 19 minutes to about 25 minutes.

For the cumulative scenarios, citybound bus travel times on Victoria Road and Anzac Bridge are forecast to marginally improve during the AM peak, which can be attributed to the proposed changes to the Anzac Bridge approaches. In the outbound direction, the bus travel time along Victoria Road is forecast to increase slightly in 2033 for the same reason that affects general traffic: congestion on Victoria Road caused by higher traffic volumes travelling northbound, impacting northbound bus travel times. By 2033, the travel time is forecast to increase from about 24 minutes to about 30 minutes.

In the PM peak hour, the citybound travel time via Victoria Road to the Anzac Bridge for all scenarios is forecast to increase slightly however the travel times are comparable with the bus travel times presented in the EIS along the same route.

The realignment of the green link to the west of The Crescent would provide an improved connection between the Rozelle Rail Yards and the Rozelle Bay light rail stop. No other impacts to the light rail are forecast.

### *Impacts on active transport facilities*

The green link and shared user path bridge would provide the same connectivity as described in the EIS for pedestrians and cyclists from the Rozelle Rail Yards to the existing Rozelle Bay light rail stop, Rozelle Bay foreshore and Bicentennial Park. With the green link realigned to the west of The Crescent, travel times to the light rail stop are likely to be shorter, while slightly longer travel times to Bicentennial Park are likely via the shared user path.

As part of the proposed upgrade of The Crescent/Johnston Street/Chapman Road intersection, the existing signalised pedestrian crossing on the western leg will be relocated to the eastern side of the intersection. Pedestrians currently accessing Bicentennial Park from Johnston Street would be required to use the new signalised pedestrian crossings.

An overview of existing and proposed active transport connectivity around the Rozelle Rail Yards and Bicentennial Park is provided in **Figure 6-2**.

### *Impacts on local property access and on-street parking*

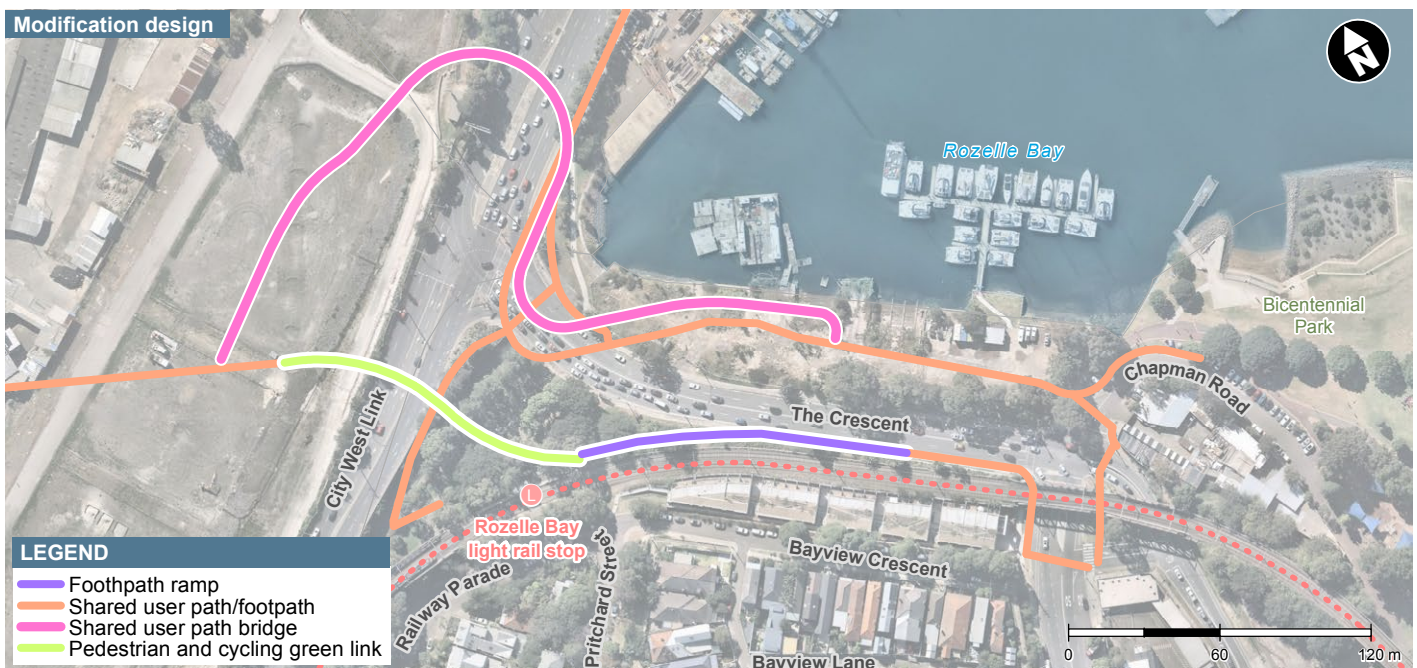
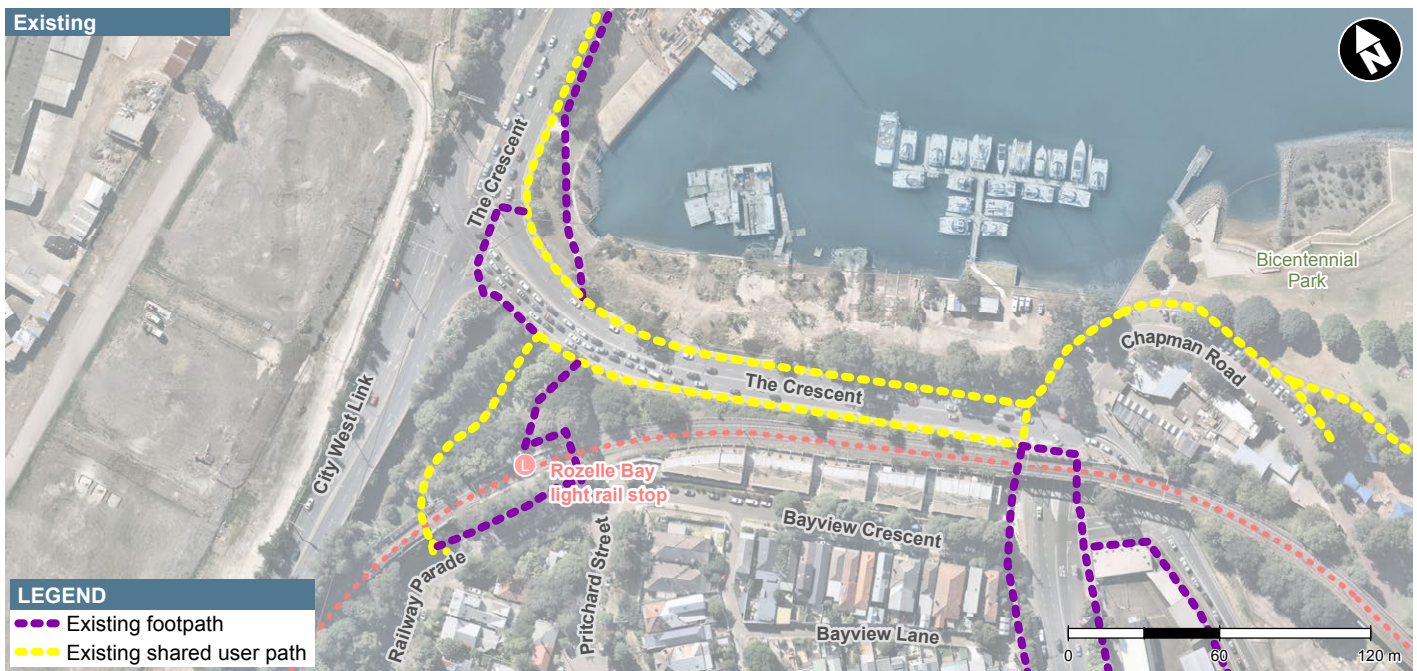
There is very little direct impact on local property access in the suburbs of Rozelle and Annandale as part of the proposed modification. Local access to 300 Johnston Street just south of The Crescent/Johnston Street/Chapman Road intersection would be affected and needs to be incorporated into the intersection design.

The proposed The Crescent/Johnston Street/Chapman Road intersection upgrade would also result in the loss of two permanent on-street parking spaces at the very northern end of the northbound carriageway of Johnston Street.



**Plate 6-2** Driveway access to 300 Johnston Street, Annandale





**Figure 6-2** Existing and proposed connectivity around the Rozelle Rail Yards and Bicentennial Park

### 6.3.4 Management measures and conditions of approval

The traffic and transport assessment has identified that the proposed modification would cause some changes to the operational performance of the surrounding road network. Impacts on traffic and transport would continue to be managed during construction and operation through the management measures contained in the CoA for the project, specifically those in the Construction Traffic Transport and Access Management Sub-Plan, as required by Condition C4 and the Construction Parking and Access Strategy, as required by Condition E54.

In accordance with environmental management measure OpTT3, Roads and Maritime will develop a strategy to ensure appropriate network integration in the areas surrounding the Rozelle Interchange to manage potential traffic impacts including:

- Capacity improvement measures
- The interface with road based public transport on the Western Distributor and Victoria Road in consultation with Transport for NSW
- Project staging options
- Demand management measures.

As required by the CoA, operational traffic and transport impacts would be managed through the preparation of a road network performance plan (Condition E63) and operational road network performance review (Condition E64). Roads and Maritime would undertake a review of network performance, in consultation with Transport for NSW and relevant councils, to confirm the operational traffic impacts of the project on surrounding arterial roads and major intersections at both 12 months and at five years after the commencement of operation of the project. The assessment would be based on updated traffic surveys at the time and the methodology used would be comparable with that used in this assessment.

The proposed modification would not require any changes or additions to the CoA or environmental management measures for traffic and transport impacts arising from the proposed modification.

## 6.4 Noise and vibration

### 6.4.1 Assessment methodology

An assessment of potential noise and vibration impacts associated with the proposed modification was carried out and is included in **Appendix C** (Noise and vibration assessment) this section summarises that assessment.

The approach taken in assessing potential noise and vibration impacts from the proposed modification matches the approach taken in the EIS for the approved project. This approach involves:

- Identifying and classifying the sensitive receivers
- Characterising the existing noise environment from unattended noise measurement previously undertaken at nearby receiver locations
- Determining noise and vibration management levels in accordance with relevant guidelines
- Modelling in SoundPLAN software to quantify the potential construction and operational noise and vibration impacts resulting from the proposed modification
- Identifying the potential changes to the impacts from the approved project and assessing the significance of potential impacts identified
- Preparing and documenting changes to the environmental management measures identified for the approved project that would be implemented during construction and operation of the modified project.



A noise model of the study area has been used to predict noise levels from the proposed construction works at all identified surrounding receivers up to around 600 metres from the works areas, sufficient to cover the area of potential impacts from the project. The model includes a digitised three-dimensional model containing local terrain, receiver buildings and structures of the construction sites and surrounding areas.

Roads and Maritime's *Construction Noise and Vibration Guideline*, August 2016 outlines Roads and Maritime's approach to assessing and mitigating construction noise. This guideline and other relevant guidelines have been used to assess potential noise and vibration impacts.

The assessment of potential sleep disturbance impacts is consistent with the approach described in the EIS which included a night time disturbance 'screening criterion' noise goal of Rating Background Level (RBL) +15 dBA. The term 'sleep criterion' indicates a noise level that is intended as a guide to identify the likelihood of sleep disturbances.

A noise model of the study area has also been used to predict noise levels from the operation of the project to all surrounding receivers. The operational model uses Calculation of Road Traffic Noise (UK Department of Transport, 1988) algorithms in SoundPLAN software.

The '**No Build**' scenarios use the existing road alignment geometry, with all existing structures and features within the road corridor being included.

The '**Build**' scenarios use the proposed design of the project, which includes all new roads, widening works, new bridges and changes to existing ground levels such as cuttings and embankments.

Specific details about the modelling parameters and traffic data used for the model are outlined in section 5.2 of the Noise and Vibration assessment (**Appendix C**).

## 6.4.2 Existing environment

The existing ambient noise environment was described in Appendix J (Technical working paper: Noise and vibration) of the EIS. This section provides details of the existing ambient noise environment specifically relating to the proposed modification.

For assessment purposes, the study area for the proposed modification has been divided into multiple Noise Catchment Areas (NCAs). These NCAs include a variety of land uses within and surrounding the project and assist in the identification of impacts upon groups of receivers likely to be affected by the same works. The NCAs are consistent with the NCAs described in the EIS.

A description of each NCA relevant to the proposed modification is provided in **Table 6-14** and shown in **Figure 6-3**.

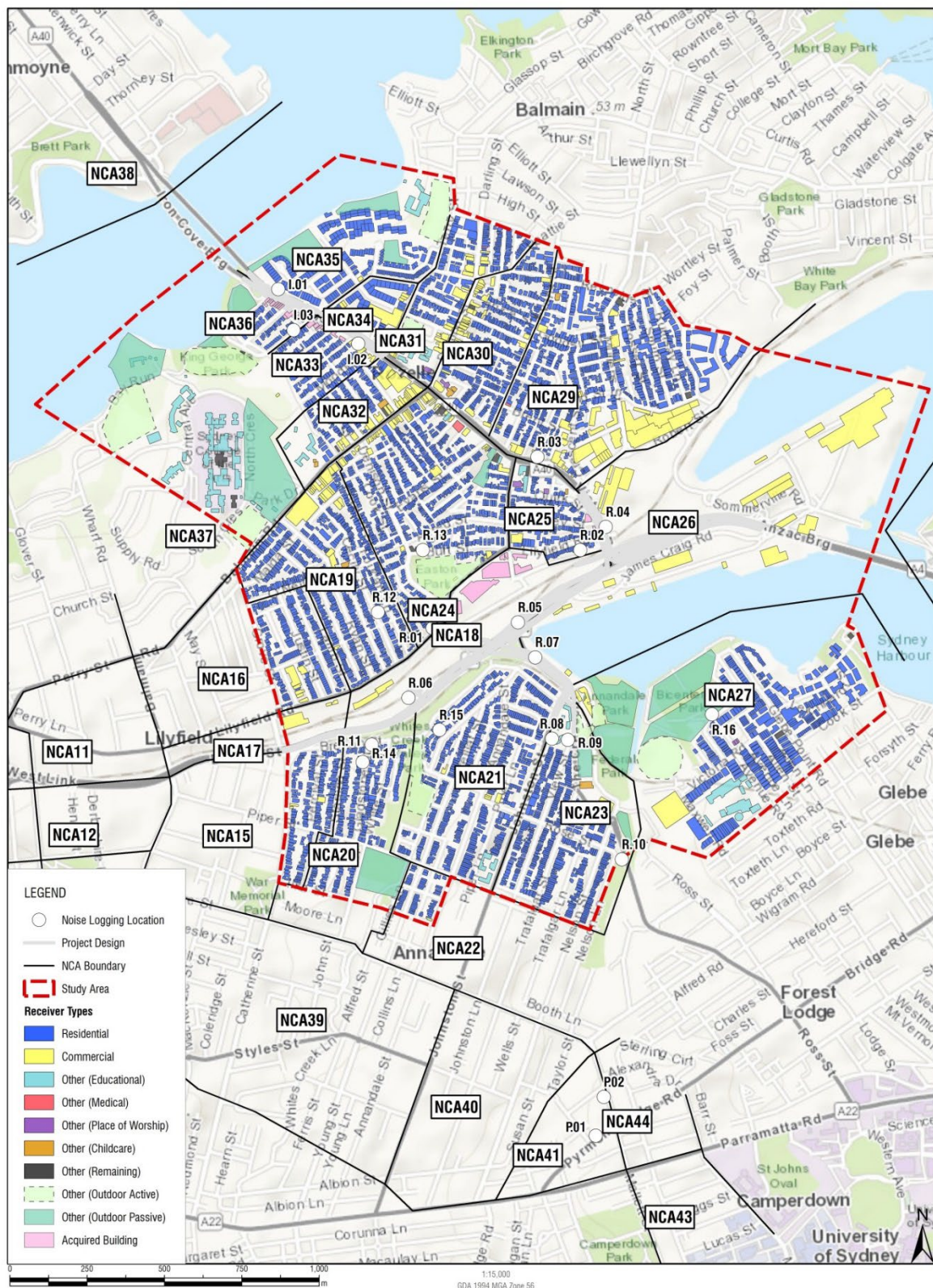
**Table 6-14 Noise catchment areas and surrounding land uses**

<b>NCA description</b>		
<b>Reference</b>	<b>Min. distance (m)<sup>1</sup></b>	<b>Description</b>
<b>Rozelle, Lilyfield, Annandale, Glebe and Pyrmont</b>		
NCA15	30	South of City West Link between Balmain Road, Moore Street and Starling Street/Paling Street. Land use comprises of a mix of residential receivers, isolated commercial receivers, a childcare centre and passive recreation area.
NCA16	35	North of Lilyfield Road between Balmain Road, Lamb Street and O'Neill Street. Land use comprises of a mix of residential receivers, isolated commercial receivers and a medical centre.
NCA17	30	North of City West Link between Lilyfield Road, Balmain Road and the boundary of the project in the Rozelle Rail Yard. Land use consists of commercial receivers and the Sydney Light Rail Lilyfield Depot.
NCA18	<5	North of City West Link between Lilyfield Road, Victoria Road and the Sydney Light Rail Lilyfield Depot. Land use consists of commercial receivers and the Rozelle Rail Yards.
NCA19	25	North of Lilyfield Road between Lamb Street, Foucart Street and Balmain Road. Land use comprises of a mix of residential receivers, isolated commercial receivers and a childcare centre.
NCA20	45	South of City West Link between Whites Creek, Moore Street and Starling Street/Paling Street. Land use comprises of a mix of residential receivers, isolated commercial receivers and passive recreation areas.
NCA21	20	West of Johnston Street between Piper Street, Railway Parade and Whites Creek. Land use comprises of a mix of residential receivers, isolated commercial receivers and an educational facility.
NCA23	90	East of Johnston Street between The Crescent, Piper Street and Johnstons Creek, including commercial premises on the east side of The Crescent. Land use comprises of a mix of residential receivers, commercial receivers, an educational facility and a passive recreation area.
NCA24	20	North of Lilyfield Road between Foucart Street, Gordon Street, Victoria Road and Darling Street. Land use comprises of a mix of residential and commercial receivers, special use facilities and active and passive recreation areas.
NCA25	<5	West of Victoria Road between Gordon Street and Lilyfield Road, including residences on the south side of Lilyfield Road. Land use comprises of a mix of residential receivers, isolated commercial receivers and special use facilities.
NCA26	<5	Catchment area adjoins either side of the western approach to Anzac Bridge, between Victoria Road, Robert Street, White Bay, Johnstons Bay and Rozelle Bay. Land use consists of a mix of commercial and industrial receivers including port facilities.
NCA27	90	East of The Crescent between Rozelle Bay and Blackwattle Bay. Land use comprises of a mix of residential receivers, isolated commercial receivers, special use facilities and active and passive recreation areas.
NCA28	400	Catchment area adjoins either side of the eastern approach to Anzac Bridge, between Johnstons Bay and Blackwattle Bay. Land use comprises of a mix of residential and commercial receivers.
NCA29	50	North of Victoria Road between Robert Street and Evans Street. Land use comprises of a mix of residential and commercial receivers and special use facilities.
NCA39	n/a <sup>2</sup>	South of Moore Street/Booth Street between Norton Street and Johnston Street. Land use comprises of a mix of residential receivers and commercial receivers, special use facilities and a passive recreation area.

NCA description		
Reference	Min. distance (m) <sup>1</sup>	Description
<b>Iron Cove</b>		
NCA30	200	North of Victoria Road between Evans Street and Darling Street. Land use comprises of a mix of residential and commercial receivers and special use facilities.
NCA31	20	North of Victoria Road between Darling Street and Wellington Street. Land use comprises of a mix of residential and commercial receivers, special use facilities and an active recreation area.
NCA32	10	South of Victoria Road between Darling Street and Moodie Street residences. Land use comprises of a mix of residential and commercial receivers and special use facilities.
NCA33	<5	South of Victoria Road between Moodie Street residences and Toelle Street. Land use comprises of a mix of residential and commercial receivers.
NCA34	<5	North of Victoria Road between Wellington Street and Terry Street. Land use comprises of a mix of residential and commercial receivers.
NCA35	10	North of Victoria Road between Terry Street and Parramatta River. Land use comprises of a mix of residential receivers, isolated commercial receivers, an educational facility and active and passive recreation areas.
NCA36	<5	South of Victoria Road between Toelle Street and Parramatta River. Land use comprises of a mix of residential receivers, isolated commercial receivers and active and passive recreation areas.
NCA37	300	North of Balmain Road between Wharf Street, Manning Street and Parramatta River. Land use comprises of a mix of special use facilities and active and passive recreation areas.
NCA38	400	Catchment area adjoins either side of Victoria Road, north of Parramatta River. Land use comprises of a mix of residential and commercial receivers, special use facilities and active and passive recreation areas.

Notes:

1. Approximate minimum horizontal offset distance from the nearest receiver building facade (receiver of any type) to the nearest point that construction works are occurring.
2. No surface works are proposed in this NCA. Receivers in this catchment would therefore only be potentially affected by impacts from tunnelling works during construction.



**Figure 6-3 Noise catchment areas and sensitive receivers**

The existing ambient noise environment across the study area around Rozelle varies; however, road noise is generally the primary contributor to background noise levels, largely due to the presence of major roads such as City West Link, Victoria Road and The Crescent. The broader road network also contributes to background noise levels, albeit to a lesser degree than major roads.

The results of the unattended ambient noise surveys are summarised in **Table 6-15**. Logging results have been included for the RBL outlined in the *Interim Construction Noise Guideline* (ICNG) for the daytime, evening and night-time periods, and the LA<sub>eq</sub> (energy averaged) noise levels from the Road Noise Policy (RNP) daytime (15-hour) and night-time (9-hour) periods. Noise monitoring locations are shown in **Figure 6-3**.

**Table 6-15 Summary of unattended noise logging results**

Noise monitoring							
Noise monitoring location	Noise level (dBA)						
	ICNG defined time periods <sup>1</sup>			RNP defined time periods <sup>2</sup>			
	Daytime RBL	Evening - RBL	Night-time - RBL	Daytime - LAeq(15hour)	Night-time - LAeq(9hour)	Daytime - LAeq(1hour)	Night-time - LAeq(1hour)
R.01	54	52	44	64	58	66	66
R.02	51	51	45	57	54	58	59
R.03	61	60	44	70	68	72	72
R.04	65	63	51	71	67	72	72
R.05	61	60	51	70	67	71	71
R.06	57	55	47	63	60	64	64
R.07	55	52	43	65	60	66	67
R.08	49	46	38	63	58	65	65
R.09	49	45	36	61	55	62	62
R.10	54	45	39	65	58	67	66
R.11 <sup>3</sup>	n/a	n/a	n/a	n/a	n/a	n/a	n/a
R.12	37	38	32	n/a	n/a	n/a	n/a
R.13	41	39	32	n/a	n/a	n/a	n/a
R.14	44	42	35	n/a	n/a	n/a	n/a
R.15	48	48	42	n/a	n/a	n/a	n/a
R.16 <sup>3</sup>	n/a	n/a	n/a	n/a	n/a	n/a	n/a
I.01	65	60	46	72	68	74	73
I.02	63	58	43	73	69	75	74
I.03	44	40	31	n/a	n/a	n/a	n/a

### 6.4.3 Assessment of potential impacts

#### Construction noise

This section considers the potential impacts during construction of the proposed modification works only. The impacts from the approved project in the wider study area were discussed in detail in the EIS and are not considered further in this assessment.

A summary of the predicted noise levels (without additional mitigation) in each of the NCAs is presented in **Table 6-18** for residential, commercial and other sensitive receivers for the following:

- Construction of The Crescent overpass, green link and shared user path bridge:
  - Piling works (W.0001)
  - General earthworks (W.0002)

- Bridge works (W.0003)
- Concrete works (W.0004)
- Road works (W.0005)
- The proposed construction ancillary facility (C6a):
  - Installation of environmental controls (W.0006)
  - Site operation (W.0007)
- The Crescent, Chapman Road and Johnston Street intersection works:
  - General earthworks (W.0008)
  - Road works (W.0009).

The noise levels are representative of impacts where works are closest to each NCA and are intended to give an overview of the noise from the proposed construction of the modified project. This assessment considers the change in the noise environment only as a result of the construction of the proposed modification. Construction of other components of the project would not be affected by the proposed modification and were assessed in the EIS.

Shading in the following tables denotes the predicted noise levels based on the exceedance of the Noise Management Levels (NMLs) during that period and for that receiver type. A qualitative description of the NML exceedance bands is given below, noting that the impact of these potential exceedances would depend on the period in which they were to occur (i.e. the night-time period is typically more sensitive to changes in noise levels than the daytime or evening for most people). The perception from the CNVG are also provided in the table.

**Table 6-16 NML exceedance bands and corresponding subjective response to impacts**

Exceedance of NML	Likely Subjective Response	CNVG Perception Category <sup>1</sup>	Shading
Compliance	Noticeable	Noticeable	
1 to 10 dB	Marginal to minor	Clearly Audible	
11 dB to 20 dB	Moderate	Moderately Intrusive	
>20 dB	High	Highly Intrusive	

Categories correspond to impacts from works during Standard Construction Hours.

For most construction activities the actual impacts at exposed receivers are expected to be lower than predicted impacts due to modelling being of the worst-case scenario.

NMLs have been determined in line with the procedures outlined in the ICNG as outlined in **Table 6-17**.



**Table 6-17 NMLs for sensitive receivers**

Land use	NML LAeq(15minute) (Applied when the property is in use)
Residential	Standard construction hours <sup>1</sup> measured RBL <sup>2</sup> + 10 dBA Outside standard construction hours RBL + 5 dBA Highly Noise affected > 75 dBA  NMLs for residential receivers are presented in the assessment section.
Commercial/Industrial	Commercial 70 dBA Industrial 75 dBA
Child care	External NML 65 dBA for play areas External NML 50 dBA for sleeping areas
Classrooms at schools and other education institutions	Internal noise level 45 dBA
Hospital wards and operating theatres	Internal noise level 45 dBA
Places of worship	Internal noise level 45 dBA
Active recreation areas	External noise level 65 dBA
Passive recreation areas)	External noise level 60 dBA
Community centres	Depends on the intended use of the centre. Refer to the recommended 'maximum' internal levels in AS 2107 for specific uses.

Notes:

1. ICNG Governing Periods – Day: 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening: 6.00 pm to 10.00 pm; Night: 10.00 pm to 7.00 am Monday to Saturday, 10.00 pm to 8.00 am Sunday
2. Measured RBL

For the purposes of determining out of hours works impacts, the standard works hours as outlined in Conditions E68 and E69 has been used. Indicatively this includes the following hours:

- 7:00 am to 6:00 pm Mondays to Fridays, inclusive
- 8:00 am to 6:00 pm Saturdays
- At no time on Sundays or public holidays.

Any works outside of the above hours is considered to be out of hours works and subject to the further requirements outlined in Conditions E73 to E78.

The predicted NML exceedances are summarised in **Table 6-19**.

The assessment presented in this table takes into consideration the assessed construction scenarios in this area. The number of receivers predicted to experience exceedances of the NMLs is shown in bands and are separated into day, evening and night-time periods, as appropriate.

Table 6-18 Predicted worst case noise levels

NCA	NML	Predicted LAeq(15minute) Noise Level (dBA)1								
		Piling works (W.0001)	General earthworks (W.0002)	Bridge works (W.0003)	Concrete Works (W.0004)	Roadworks (W.0005)	Installation of environmental controls (W.0006)	Site Operation (W.0007)	General Earthworks (W.0008)	Roadworks (W.0009)
Residential - Standard Daytime										
NCA15	54	46	49	44	39	45	40	<30	36	33
NCA16	64	45	48	43	38	45	39	<30	41	38
NCA17	-	-	-	-	-	-	-	-	-	-
NCA18	-	-	-	-	-	-	-	-	-	-
NCA19	64	54	57	52	47	52	47	36	47	44
NCA20	54	47	50	45	40	47	41	<30	36	33
NCA21	58	75	78	73	68	72	57	46	80	77
NCA22	-	-	-	-	-	-	-	-	-	-
NCA23	59	46	49	44	39	46	40	<30	60	57
NCA24	64	57	60	55	50	56	50	39	53	50
NCA25	61	59	62	57	52	58	51	40	53	50
NCA26	-	-	-	-	-	-	-	-	-	-
NCA27	59	48	51	46	41	47	42	<30	52	49
NCA28	55	<30	<30	<30	<30	<30	<30	<30	<30	<30
NCA29	71	45	48	43	38	45	40	<30	45	42
NCA30	71	45	48	43	38	44	40	<30	44	41
Residential - Evening										
NCA15	47	-	-	44	-	-	-	<30	-	33
NCA16	57	-	-	43	-	-	-	<30	-	38
NCA17	-	-	-	-	-	-	-	-	-	-
NCA18	-	-	-	-	-	-	-	-	-	-
NCA19	57	-	-	52	-	-	-	36	-	44
NCA20	47	-	-	45	-	-	-	<30	-	33
NCA21	53	-	-	73	-	-	-	46	-	77
NCA22	-	-	-	-	-	-	-	-	-	-
NCA23	50	-	-	44	-	-	-	<30	-	57



NCA	NML	Predicted LAeq(15minute) Noise Level (dBA)1								
		Piling works (W.0001)	General earthworks (W.0002)	Bridge works (W.0003)	Concrete Works (W.0004)	Roadworks (W.0005)	Installation of environmental controls (W.0006)	Site Operation (W.0007)	General Earthworks (W.0008)	Roadworks (W.0009)
NCA24	57	-	-	55	-	-	-	39	-	50
NCA25	56	-	-	57	-	-	-	40	-	50
NCA26	-	-	-	-	-	-	-	-	-	-
NCA27	54	-	-	46	-	-	-	<30	-	49
NCA28	45	-	-	<30	-	-	-	<30	-	<30
NCA29	65	-	-	43	-	-	-	<30	-	42
NCA30	65	-	-	43	-	-	-	<30	-	41
<b>Residential - Night-time</b>										
NCA15	40	-	-	44	-	-	-	<30	-	33
NCA16	49	-	-	43	-	-	-	<30	-	38
NCA17	-	-	-	-	-	-	-	-	-	-
NCA18	-	-	-	-	-	-	-	-	-	-
NCA19	49	-	-	52	-	-	-	36	-	44
NCA20	40	-	-	45	-	-	-	<30	-	33
NCA21	47	-	-	73	-	-	-	46	-	77
NCA22	-	-	-	-	-	-	-	-	-	-
NCA23	41	-	-	44	-	-	-	<30	-	57
NCA24	49	-	-	55	-	-	-	39	-	50
NCA25	50	-	-	57	-	-	-	40	-	50
NCA26	-	-	-	-	-	-	-	-	-	-
NCA27	47	-	-	46	-	-	-	<30	-	49
NCA28	40	-	-	<30	-	-	-	<30	-	<30
NCA29	49	-	-	43	-	-	-	<30	-	42
NCA30	49	-	-	43	-	-	-	<30	-	41
<b>Commercial</b>										
NCA15	70	40	43	38	33	40	34	<30	34	31
NCA16	70	43	46	41	36	42	36	<30	33	30
NCA17	70	42	45	40	35	<30	36	<30	32	<30

NCA NML		Predicted LAeq(15minute) Noise Level (dBA)1								
		Piling works (W.0001)	General earthworks (W.0002)	Bridge works (W.0003)	Concrete Works (W.0004)	Roadworks (W.0005)	Installation of environmental controls (W.0006)	Site Operation (W.0007)	General Earthworks (W.0008)	Roadworks (W.0009)
NCA18	70	-	-	-	-	-	-	-	-	-
NCA19	70	46	49	44	39	46	40	<30	44	41
NCA20	70	43	46	41	36	43	37	<30	32	<30
NCA21	70	44	47	42	37	45	38	<30	50	47
NCA22	70	-	-	-	-	-	-	-	-	-
NCA23	70	48	51	46	41	45	41	<30	61	58
NCA24	70	53	56	51	46	53	47	31	48	45
NCA25	70	53	56	51	46	54	47	31	49	46
NCA26	70	76	79	74	69	64	57	41	58	55
NCA27	70	62	65	60	55	56	48	32	83	80
NCA28	70	<30	<30	<30	<30	<30	<30	<30	<30	<30
NCA29	70	44	47	42	37	44	37	<30	46	43
NCA30	70	45	48	43	38	44	40	<30	42	39
Other Sensitive										
NCA15	Refer to note 2-	<30	<30	<30	<30	<30	<30	<30	<30	<30
NCA16		42	45	40	35	42	36	<30	<30	<30
NCA17		-	-	-	-	-	-	-	-	-
NCA18		-	-	-	-	-	-	-	-	-
NCA19		45	48	43	38	46	40	<30	40	37
NCA20		40	43	38	33	40	33	<30	31	<30
NCA21		43	46	41	36	45	36	<30	48	45
NCA22		-	-	-	-	-	-	-	-	-
NCA23		51	54	49	44	52	45	<30	81	78
NCA24		55	58	53	48	54	48	32	50	47
NCA25		49	52	47	42	49	43	<30	48	45
NCA26		-	-	-	-	-	-	-	-	-
NCA27		57	60	55	50	54	46	30	62	59
NCA28		-	-	-	-	-	-	-	-	-

NCA	NML	Predicted LAeq(15minute) Noise Level (dBA) <sup>1</sup>								
		Piling works (W.0001)	General earthworks (W.0002)	Bridge works (W.0003)	Concrete Works (W.0004)	Roadworks (W.0005)	Installation of environmental controls (W.0006)	Site Operation (W.0007)	General Earthworks (W.0008)	Roadworks (W.0009)
NCA29		40	43	38	33	40	32	<30	41	38
NCA30		43	46	41	36	43	38	<30	<30	<30

Notes:

1. Colouring indicates the range of predicted worst case NML exceedances without any additional mitigation based on nearest receiver (red >20 dBA, orange 11-20 dBA, yellow 1-10 dBA) based on the controlling time period
2. The NML is dependent on the classification of a given sensitive receiver. As the table represents the highest predicted noise level for a particular activity, the most affected "other sensitive" receiver may change between each activity depending on the location of the works. No NMLs can be provided in this table for "other sensitive receivers as result of the various types of "other sensitive" receivers within each NCA which may be affected by different activities

Table 6-19 Overview of NML exceedances

Activity	Weeks <sup>1</sup>	Activity duration within overall project program <sup>2</sup>								Number of receivers		NML exceedance receiver count <sup>3</sup>														
												Total	Highly noise affected <sup>4</sup>	Daytime			Daytime (out of hours)			Evening			Night-time			Sleep disturbance
										1-10 dBA	11-20 dBA			>20 dBA	1-10 dBA	11-20 dBA	>20 dBA	1-10 dBA	11-20 dBA	>20 dBA	1-10 dBA	11-20 dBA	>20 dBA	1-10 dBA	11-20 dBA	>20 dBA
		25	50	75	100																					
Piling (W.0001)	48									5678	4	36	17	-	-	-	-	-	-	-	-	-	-	-	-	
General earthworks (W.0002)	48									5678	13	55	18	-	-	-	-	-	-	-	-	-	-	-	-	
Bridge works (W.0003)	61									5678	-	27	15	-	53	18	-	52	18	-	39 3	30	16	53	18	-
Concrete works (W.0004)	61									5678	-	18	-	-	-	-	-	-	-	-	-	-	-	-	-	
Roadworks (W.0005)	61									5678	-	38	9	-	-	-	-	-	-	-	-	-	-	-	-	
Installation of environmental controls (W.0006)	3									5678	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Site operation (W.0007)	130									5678	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
General earthworks (W.0008)	100									5678	3	46	12	4												
Roadworks (W.0009)	100									5678	1	35	5	2	75	17	2	96	20	1	36 3	66	6	12 0	15	1

Notes

1. Approximate overall duration of the activity in all areas of the site. The duration of these impacts is less than the overall duration, and depends on the rate of progress in the works areas
2. Approximate percentage (to nearest 1/8<sup>th</sup> of full project) of activity duration within overall proposal program. Where percentage is less than 1/8<sup>th</sup> of the overall program, 12.5 per cent is shown for illustrative purposes
3. Based on worst case noise works area (closest to receivers)
4. Based on ICNG definition (i.e. predicted LAeq(15minute) noise at residential receiver is 75 dBA or greater)

In summary, during construction of the proposed modification:

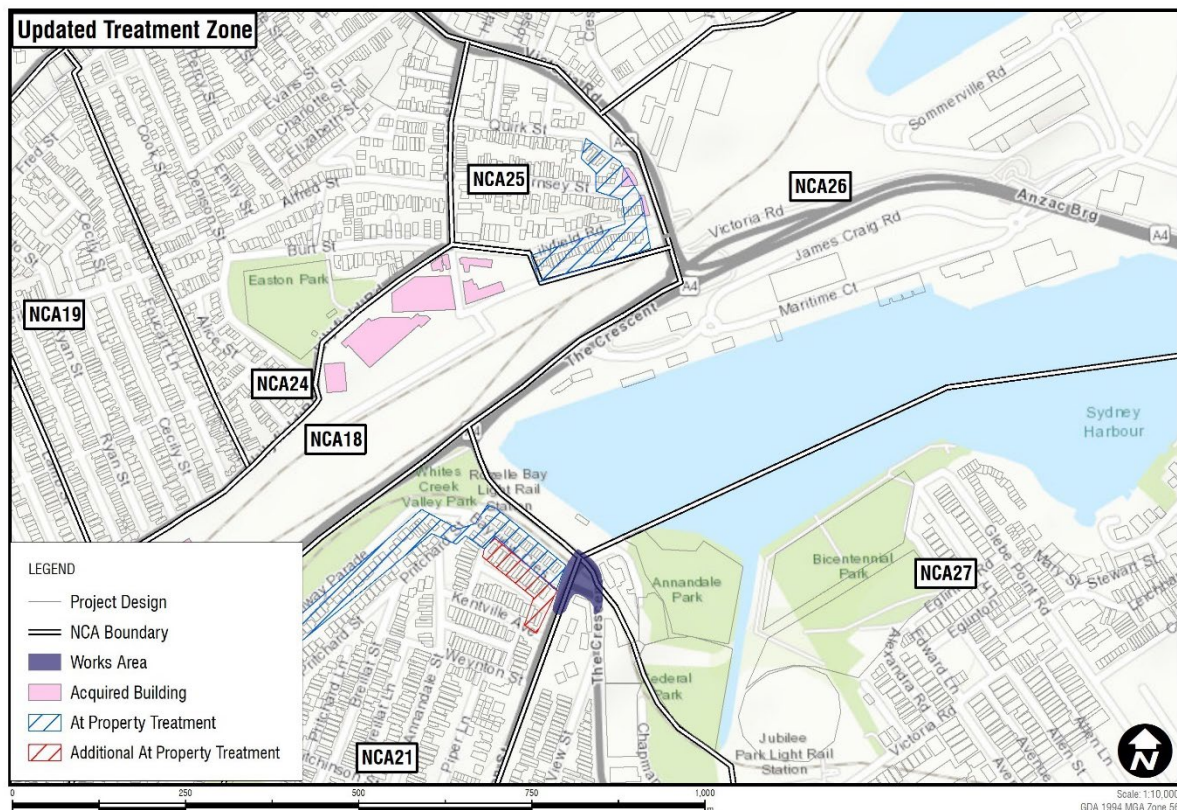
- The predicted daytime impacts for the majority of works are limited to NCA21 and NCA25. The other catchments either have no residential receivers or receivers are sufficiently far from the works to generally be compliant with the daytime NMLs
- Worst-case noise levels at the nearest receivers are around 78 to 80 dBA during works to upgrade the intersection of The Crescent, Johnston Street and Chapman Road. Worst-case noise levels in NCAs where receivers are more distant are typically around 45 to 57 dBA
- The highest impacted residential receivers are in NCA21 (to the west of The Crescent) along Bayview Crescent where the nearest receivers are around 30 m from the works associated with the construction of The Crescent overpass and the intersection of The Crescent, Johnston Street and Chapman Road
- During the daytime, the worst-case impacts are predicted to be 'moderate' to 'high' in NCA21 and 'minor' in NCA27. Worst-case impacts are predicted to be minor in NCA25, with noise levels expected to be compliant in all other catchments. During the night-time, the worst-case impacts are predicted to be 'high' in NCA21, with 'minor' in the surrounding NCAs
- Out of hours works associated with the proposed modification are limited to bridgeworks which require the craning of bridge spans over trafficable lanes along with roadworks where the upgrade ties into trafficable lanes and works to the intersection of The Crescent, Johnston Street and Chapman Road. Noise impacts associated with these scenarios would be due to the use of large cranes and a mix of other plant operating simultaneously. The impacts are more widespread, however generally predicted at 'moderate' or at a relatively minor NML exceedance less than 10 dBA with the exception of NCA21 which are predicted to have 'high' worst-case impacts during the noisiest works. While out of hours works for bridgeworks was included in the EIS, as more bridge components are required as part of the proposed modification, the duration of impact would be increased while the noise level would remain consistent with previously assessed works
- Impacts during works to upgrade the intersection of The Crescent, Johnston Street and Chapman Road are generally limited to NCA21, NCA23 and NCA27. The other catchments either have no residential receivers or receivers are sufficiently far from the works to generally be compliant with the NMLs
- Noise impacts are predicted at the Petersham College, Annandale TAFE during the daytime period.

It is noted that some of the affected receivers are adjacent, or near, to major existing roads and are subject to relatively high existing noise levels. The operational road noise modelling (without the project) indicates that existing noise levels next to major roads are in the region of  $L_{Aeq}$  60 to 65 dB during the daytime and 55 to 60 dB during the night-time. This is comparable to the predicted construction noise levels for many of the assessed work scenarios.

The highest worst-case impacts are predicted at residential buildings situated between Bayview Crescent and Railway Parade within NCA21 and Johnston Street within NCA23. Moderate exceedances are generally limited to the first two rows of receivers which is consistent with the impacts presented in the EIS.

#### *Out of hours works – Mitigation Condition 87*

Condition 87 ensures respite in the form of at-property treatments to sensitive receivers which are likely to experience noise impacts for a prolonged duration. As additional out of hours construction impacts are anticipated as a result of the proposed modification, additional properties would require at-receiver noise mitigation in the form of at-property treatments. It is therefore proposed to amend Appendix D of the CoA to include additional properties predicted to experience out of hours noise impacts resulting in sleep disturbance. A total of 19 receivers are additionally identified as being within the treatment zone and include properties on Kentville Avenue and the northern extent of Johnston Street. The extension to the treatment zone is shown in **Figure 6-4** on the following page.



**Figure 6-4 Updated CoA 87 treatment zone and out of hours works (roadworks) impacts**

### *Sleep disturbance*

A sleep disturbance assessment was undertaken as a part of the noise and vibration assessment prepared for the proposed modification. A summary of the results is provided in **Table 6-19**. This assessment shows that the sleep disturbance screening criterion is likely to be exceeded when night works occur near residential receivers. The receivers potentially affected by sleep disturbance are generally consistent with those receivers where 'high' night-time impacts have been predicted. The roadworks activity around The Crescent, Johnston Street and Chapman Road intersection and the installation of the bridge spans are the construction activities that would occur outside of standard of hours and result in exceedances of the sleep disturbance criterion.

### *Cumulative construction noise impacts*

Cumulative noise impacts warrant assessment where more than one works activity operates at the same time and in the same location such that the same receiver is potentially impacted by noise from more than one works activity. The EIS assessed cumulative impacts for fixed sites such as compounds, spoil handling sites and tunnelling support sites which are restricted to within the same general locality and likely to affect the same nearby receivers. Where works are required outside of these confined localities such as the activities associated with the proposed modification, cumulative impacts would be dependent on timing and location of simultaneous construction activities and would require detailed scheduling information to accurately quantify.

Condition E76 of the CoA for the project requires the contractor to provide the community a 3 month schedule of the likely out of hours works (which is the period where cumulative impacts would be most noticeable), the location, duration and the likely noise levels. Cumulative impacts from multiple works locations would be included in the prediction of these noise levels and would inform the likely mitigation and management of impacts. These predictions would be based on detailed scheduling information and included in site-specific environmental impact's assessments.

Cumulative impacts from the construction activities associated with the Glebe Island concrete batching plant (not associated with the M4-M5 link project) would be included where suitable but noting that this site is located some distance to the east of the proposed modification.

## Construction vibration

Construction works for the proposed modification has been analysed to determine appropriate minimum working distances for the required vibration intensive construction equipment. Construction with large rockbreakers has the potential to generate significant construction vibration impacts due to the vibration intensive characteristics of this plant. A summary of the number of buildings within the minimum working distances is provided in **Table 6-20**.

**Table 6-20 Construction vibration assessment summary**

Works area	Vibration intensive equipment	NCA	Number of buildings within minimum working distance for highest vibration plant item			
			Cosmetic damage			Human response (Group 4)
			Residential and light commercial (Group 1)	Group 2 (typical)	Group 3 (structurally unsound) <sup>1</sup>	
The Crescent overpass, green link and shared path user bridge	<ul style="list-style-type: none"> <li>Jackhammer</li> <li>Rockbreaker<sup>2</sup></li> <li>Vibratory roller</li> <li>Piling Rig</li> </ul>	NCA18	-	-	-	-
		NCA21	19	21	6	53
		NCA23	-	-	1	-
		NCA26	1	1	-	2
		NCA27	-	-	-	-
The Crescent Civil site (C6)	<ul style="list-style-type: none"> <li>Jackhammer</li> <li>Rockbreaker<sup>2</sup></li> <li>Vibratory roller</li> </ul>	NCA18	-	-	-	-
		NCA21	-	-	-	-
		NCA23	-	-	-	-
		NCA26	1	1	-	2
		NCA27	-	-	-	-
The Crescent, Johnston Street and Chapman Road intersection works	<ul style="list-style-type: none"> <li>Jackhammer</li> <li>Rockbreaker<sup>2</sup></li> <li>Vibratory roller</li> </ul>	NCA18	-	-	-	-
		NCA21	8	12	2	39
		NCA23	1	2	2	3
		NCA26	-	-	-	-
		NCA27	1	1	1	1

Note

1. This group identifies heritage items only and represents a screening test applicable where a historic item is deemed to be sensitive to damage from vibration (following inspection) to be confirmed during detailed design.
2. Proposed highest vibration plant item for these works.

The assessment presented in **Table 6-20** indicates that during works, the following buildings may be within the minimum working distances should a large rockbreaker be used at the outer extents of the work sites:

- Up to 22 buildings for The Crescent overpass, green link and shared path user bridge works
- One building for The Crescent civil site (C6) works
- Up to 15 buildings for The Crescent, Johnston Street and Chapman Road intersection works.

In addition, works using a large rockbreaker may result in impacts to the following buildings within the nominated minimum working distance for human comfort vibration:

- Up to 55 buildings for The Crescent overpass, green link and shared path user bridge works
- Two buildings for The Crescent Civil site (C6) works
- Up to 43 buildings for The Crescent, Chapman Road and Johnston Street intersection works.

Receivers adjacent to the construction areas have been identified as likely to perceive vibration impacts at times during construction works. This is expected to be primarily due to works associated with rockbreakers and other vibration intensive plant items. In practice vibration impacts from most construction activities would be intermittent and not require the use of a rockbreaker in all areas. Therefore, the vibration impacts in this assessment are considered worst-case.

## Operational noise

Operational road traffic noise impacts ‘without mitigation’ have been predicted for all sensitive receivers in the assessment area for the project prior to mitigation being applied.

The **Do Nothing** (i.e. without the project or other approved WestConnex stages) scenario represents the existing road network in the study area in the absence of the project. The traffic data for this scenario does not include any stages of WestConnex or the interfacing projects.

Two traffic scenarios have been investigated, these are:

- **No Build Vs Do Something (2023 and 2033)** (i.e. with the project): The traffic data includes the M4-M5 Link and the approved WestConnex stages and is assessed against a no build scenario, i.e. the wider WestConnex programme including M4 East and New M5 did not go ahead
- **No Build Vs Do Something Plus 2023** (i.e. with the project and other projects that interface, overlap or have potentially concurrent impacts). The traffic data includes the M4-M5 Link and the approved WestConnex stages, together with the proposed Western Harbour Tunnel project and Sydney Gateway and is assessed against a no build scenario, i.e. the wider WestConnex programme including M4 East and New M5 did not go ahead. The **2033** assessment scenario includes the operation of Beaches Link and F6 Extensions.

The predicted operational road noise levels at residential receivers and other sensitive receivers are presented in sections 6.2.1, 6.2.2 and 6.2.3 of the Noise and Vibration assessment (**Appendix C**) for the 2023 at-opening and 2033 future design scenarios for each traffic scenario. The tables show the worst-case impacts in each NCA.

The results in those tables show:

- Many residential receivers in the study area are subject to relatively high existing road traffic noise impacts which already exceed the Noise Criteria Guideline in many cases
- The proposed modification would result in increases in road traffic noise levels (i.e. greater than 2.0 dBA) being predicted in certain areas, including:
  - For the ‘Do Something’ scenario:
    - NCA21 and NCA 23 – Due to the widening and additional roads within the City West Link/The Crescent road corridor as part of the approved project. The proposed modification also results in altered traffic volumes for Johnston Street and The Crescent
    - NCA25, NCA33 and NCA36 – Where large increases in noise (up to +15 dBA) are identified in NCA33 and NCA36 (on the southern side of Victoria Road at Iron Cove in the proposed Iron Cove Link tunnel portals) and NCA25 (near the new Victoria Road bridge), where the approved project results in traffic lanes being closer to receivers, in combination with removing existing screening due to property acquisitions. These predicted increases are generally limited to the receivers which have partial or direct line of sight to Victoria Road once the acquired buildings are demolished. This modification does not alter the physical works in this area and the increases are generally consistent with the EIS. This location would be assessed further during development of the detailed design to identify appropriate noise mitigation measures to address these large predicted increases
  - For the ‘Do Something Plus’ scenario:
    - NCA21 and NCA 23 – Which is due to the widening and additional roads within the City West Link road corridor as part of the approved project. The proposed modification also results in altered traffic volumes on Johnston Street and The Crescent. The increase in noise on Johnston Street is however slightly lower than for the Do Something scenario which is due to



slightly fewer heavy vehicles using this route in the Do Something Plus scenario

- NCA25, NCA33 and NCA36 – As for the 'Do Something' scenario, these increases are generally consistent with the EIS and this location would be assessed further in detailed design.

The key difference between the two traffic scenarios is the increase in triggered receivers along Johnston Street in the Do Something scenario. Whilst the Do Something Plus scenario has a higher volume of light vehicles on Johnston Street, the Do Something scenario has more heavy vehicles which results in noise levels being around 0.2 dB higher than for the 'Do Something Plus' scenario. Most sensitive receivers on Johnston Street are marginally compliant with relevant NMLs in the 'Do Something Plus' scenario and only marginally in exceedance of NMLs in the 'Do Something' scenario. This marginal level of compliance in the 'Do Something Plus' scenario is generally consistent with the EIS assessment.

Whilst the inclusion of The Crescent overpass results in changes to the wider traffic network, the elevated structure does not significantly change the number of exceedances near the overpass. This is due to road traffic noise levels at nearby receivers generally being influenced by the high volume of traffic on the City West Link and The Crescent, as opposed to overpass which has lower relative volumes. The changes in noise levels because of the proposed modification when compared with the comparable EIS traffic scenario are:

- Changes in noise levels as a result of the proposed modification are generally between -0.5 and +0.5 dBA for the majority of receivers in the operational study area, which is considered a marginal change in noise. The increases are generally higher in the 'Do Something' scenario due to traffic redistribution effects, particularly on Johnston Street
- The inclusion of The Crescent overpass increases noise levels at receivers near to Bayview Crescent, with the increase generally being between +0.5 dBA and +1.5 dBA
- The difference between the EIS 'Do Something' and the Modification 'Do Something' traffic scenario results in the greatest change in noise levels at receivers, with a general change of around +0.5 dBA apparent across the study area
- Increases of between +0.5 dBA and +1.0 dBA are predicted along Johnston Street in the 'Do Something' scenario which is due to increased heavy vehicles on this route. The increase on this route in the 'Do Something Plus' scenario is marginally lower due to less heavy vehicles.

A comparison of the differences in the number of triggered receivers between the EIS and proposed modification is provided in **Table 6-21**.

**Table 6-21 Comparison of EIS triggers with the proposed modification**

NCA	Receiver type	EIS Triggered receivers (Floors)		Modification Triggered receivers (Floors)		Difference	
		Do Something	Do Something Plus (cumulative scenario)	Do Something	Do Something Plus	Do Something	Do Something plus
NCA15	Residential	7	4	5	3	-2	-1
	Other	-	-	-	-	-	-
NCA16	Residential	-	-	-	-	-	-
	Other	-	-	-	-	-	-
NCA17	Residential	-	-	-	-	-	-
	Other	-	-	-	-	-	-
NCA18	Residential	-	-	-	-	-	-
	Other	-	-	-	-	-	-
NCA19	Residential	13	11	11	7	-2	-4
	Other	-	-	-	-	-	-

NCA	Receiver type	EIS Triggered receivers (Floors)		Modification Triggered receivers (Floors)		Difference	
		Do Something	Do Something Plus (cumulative scenario)	Do Something	Do Something Plus	Do Something	Do Something plus
NCA20	Residential	-	-	-	-	-	-
	Other	-	-	-	-	-	-
NCA21	Residential	17	23	83	35	66	12
	Other	1	1	1	1	-	-
NCA22	Residential	-	-	-	-	-	-
	Other	-	-	-	-	-	-
NCA23	Residential	1	-	97		96	
	Other	-	-	9	7		
NCA24	Residential	-	-	-	-	-	-
	Other	1	1	2	2	1	1
NCA25	Residential	151	127	141	129	-10	2
	Other	6	6	6	6	-	-
NCA26	Residential	-	-	-	-	-	-
	Other	-	-	-	-	-	-
NCA27	Residential	-	-	-	-	-	-
	Other	15	15	16	14	1	-1
NCA28	Residential	-	-	-	-	-	-
	Other	-	-	-	-	-	-
NCA29	Residential	-	-	-	-	-	-
	Other	3	2	3	2	-	-
NCA30	Residential	-	-	-	-	-	-
	Other	-	-	-	-	-	-
NCA31	Residential	-	-	-	-	-	-
	Other	8	8	8	8	-	-
NCA32	Residential	3	4	4	4	1	-
	Other	-	-	-	-	-	-
NCA33	Residential	23	23	23	23	-	-
	Other	-	-	-	-	-	-
NCA34	Residential	8	8	9	8	1	-
	Other	-	-	-	-	-	-
NCA35	Residential	127	127	127	127	-	-
	Other	1	1	-	*		-
NCA36	Residential	33	33	30	31	-3	-2
	Other	1	1	1	1	-	-
NCA37	Residential	-	-	-	-	-	-
	Other	12	14	14	14	2	-
NCA38	Residential	-	-			-	-
	Other	-	-			-	-
NCA39	Residential	-	-			-	-
	Other	-	-			-	-
NCA40	Residential	-	-			-	-
	Other	-	-			-	-
ALL	Residential	383	360	530	367	147	7
	Other	48	49	59	54	11	5
	TOTAL	431	409	589	421	158	12

The above results show the following:

- The greatest change in triggered receivers are in NCA21 and NCA23 in the Do Something scenario. The increased heavy vehicle movements on Johnston Street in this scenario results in an additional 142 triggered floors at residential receivers within these two NCAs when compared to the EIS assessment
- In the 'Do Something Plus' scenario the heavy vehicle volumes on Johnson Street are slightly reduced from the 'Do Something' scenario and the total number of triggered receivers is approximately consistent with the findings of the EIS.

#### 6.4.4 Management measures and conditions of approval

Based on the assessment of potential noise and vibration impacts associated with the proposed modification, no further environmental management measures are deemed necessary beyond those summarised in Part E of the SPIR.

Certain receivers close to The Crescent, Johnston Street and Chapman Road modification works are predicted to require noise mitigation in the form of at-property treatment to address noise impacts associated with out of hours construction work. On this basis the Condition 87 'treatment zone' shown in Appendix D of the CoA would be extended to include the receivers adjacent to the proposed modification works in this area. This extension is shown in **Figure 6-4**.

### 6.5 Air quality

#### 6.5.1 Assessment methodology

An assessment of potential construction and operation air quality impacts was prepared and is included as **Appendix D** (Air Quality assessment). This section summarises that assessment.

The following assumptions were made in the assessment:

- The assumptions in the WestConnex Road Traffic Model – the strategic traffic model used by Roads and Maritime to forecast traffic demands for future scenarios – were retained
- All vehicle emissions assumptions for 2033 used in the EIS were retained
- Emissions from ventilation outlets that were used in the EIS remained the same
- Meteorological modelling data used for the EIS was retained.

The EIS provided an assessment of risk of impacts due to construction dust and recommended a number of mitigation measures to address that risk. Given the minor change in construction work proposed. Construction air quality impacts were therefore not quantitatively assessed for the proposed modification.

The operational impacts of the proposed modification were assessed using the existing GRAL<sup>1</sup> dispersion model. The GRAL model was previously used to assess operational impacts for the Rozelle Interchange in the EIS. Predicted impacts were assessed at 386 residential, workplace and recreational receptors (RWR<sup>2</sup>) receptors surrounding the Rozelle Interchange.

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<sup>1</sup> The Graz Lagrangian Model air quality dispersion modelling package used in the EIS and for this assessment

<sup>2</sup> Residential, workplace and recreational receptors. This term refers to all discrete receptor locations along the project corridor, and mainly covers residential and commercial land uses

Four future year project scenarios were modelled in the EIS and these are listed to follow:

- **Do Something – 2023 (DS-2023):** With the M4 Widening, M4 East, New M5 and the King Georges Road Interchange Upgrade projects completed and the M4-M5 Link complete and open to traffic
- **Do Something Cumulative – 2023 (DSC-2023):** As for DS-2023, the M4-M5 Link complete and open to traffic, and in addition, the proposed Sydney Gateway and the proposed Western Harbour Tunnel project complete and operational
- **Do Something – 2033 (DS-2033):** With the M4 Widening, M4 East, New M5 and the King Georges Road Interchange Upgrade projects completed and the M4-M5 Link complete and open to traffic; and
- **Do Something Cumulative – 2033 (DSC-2033):** As for DS-2033, the M4-M5 Link complete and open to traffic, and in addition, the proposed Sydney Gateway, Western Harbour Tunnel project and F6 Extension complete and operational.

The DSC-2033 scenario is the focus of this assessment as this was the worst-case scenario for operational impacts in the EIS. This scenario has been remodelled using the updated traffic inputs from the Traffic and Transport assessment (**Appendix B**) following changes to the road network resulting from the proposed modification.

Further information about the assessment process is provided in Appendix D (Air Quality assessment).

## 6.5.2 Existing environment

Existing air quality information for the wider WestConnex program of works (and therefore the modification area) is provided in section 9.5 of the EIS. This section is a summary of the information in the EIS.

Topography influences the dispersion of air pollutants. The terrain within the WestConnex study area is predominantly flat but increases in elevation to the north of the Five Dock Bay area towards the Hills District and south towards the Sutherland Shire. Elevation varies from 10 metres Australian Height Datum (AHD) to around 14 metres AHD at the Rozelle Interchange. The uniformity of the terrain and lack of major geographical obstacles to wind flow, should support good dispersion and airflow throughout the study area.

Climate and meteorological factors also influence air quality and the dispersion of air pollutants. The annual average daily maximum and minimum temperatures are 23.0°C and 12.3°C, respectively. On average, January is the hottest month with an average daily maximum temperature of 27.6°C. July is the coldest month, with average daily minimum temperature of 5.8°C. The wettest month is April, with 111 millimetres falling over eight rain days. The average annual rainfall is 971 millimetres over an average of 85 rain days per year. At Canterbury Racecourse (reference point chosen for meteorological conditions in the EIS) the wind speed and wind direction patterns over the seven-year period between 2009 and 2015 were quite consistent; the annual average wind speed ranged from 3.2 metres per second to 3.3 metres per second, and the annual percentage of calms (wind speeds <0.5 metres per second) ranged from 8.0 to 9.4 per cent (between 8.6 and 8.8 per cent in the three most recent three years).

Exhaust emissions of some pollutants from road transport have decreased as the vehicle emission legislation has tightened and are predicted to decrease further in the future (Bureau of Infrastructure, WestConnex M4-M5 Link 9-35 Roads and Maritime Services Environmental Impact Statement Transport and Regional Economics (BITRE) 2010). Road transport was the single largest sectoral contributor to emissions of carbon monoxide (CO) (44 per cent) and nitrogen oxides (NOx) (57 per cent) in Sydney during 2011. It was also responsible for a proportion of emissions of volatile organic compounds (VOCs) (17 per cent), PM<sub>10</sub> (10 per cent) and PM<sub>2.5</sub> (12 per cent). The main contributors to VOCs were domestic-commercial activity and biogenic sources.

Road transport contributed only two per cent of total sulfur dioxide (SO<sub>2</sub>) emissions in Sydney, reflecting the removal of sulfur from road transport fuels in recent years. SO<sub>2</sub> emissions in Sydney were dominated by the off-road mobile sector and industry.

Exhaust emissions from petrol passenger vehicles were responsible for 62 per cent of CO from road transport in Sydney in 2011, 45 per cent of NO<sub>x</sub>, and 76 per cent of SO<sub>2</sub>. They were a minor source of PM<sub>10</sub> (four per cent) and PM<sub>2.5</sub> (nine per cent). Non-exhaust particulates, e.g. particles from brake lining wear and tyre wear were the largest source of road transport PM<sub>10</sub> (60 per cent) and PM<sub>2.5</sub> (46 per cent).

Existing assumed background concentrations of air pollutants are presented below in **Table 6-22**.

**Table 6-22 Characteristics of assumed background concentrations (2015)**

Pollutant / metric	Averaging period	Form	Units	Statistical descriptors		
				Mean	Max	98 <sup>th</sup> %ile
CO	1 hour	Synthetic profile	mg/m <sup>3</sup>	0.48	3.37	1.41
	8 hours (rolling)	Synthetic profile	mg/m <sup>3</sup>	0.46	2.27	1.21
NO <sub>x</sub>	Annual	Map	µg/m <sup>3</sup>	Spatially varying	-	-
	1 hour	Synthetic profile	µg/m <sup>3</sup>	65.9	769.6	301.4
PM <sub>10</sub>	Annual	Map	µg/m <sup>3</sup>	Spatially varying	-	-
	24 hours	Synthetic profile	µg/m <sup>3</sup>	20.0	46.2	35.8
PM <sub>2.5</sub>	Annual	Single value	µg/m <sup>3</sup>	8.0	-	-
	24 hours	Synthetic profile	µg/m <sup>3</sup>	9.5	25.1	19.9

### 6.5.3 Assessment of potential impacts

#### Construction

A detailed assessment of potential construction impacts for the project was carried out in the EIS. This was a qualitative risk assessment based on a precinct wide approach, with the precinct including a number of construction sites including the Rozelle civil and tunnel site (C5), The Crescent civil site (C6) and The Victoria Road civil site (C7).

The EIS assessment identified areas at risk of potential impacts based on their proximity to works and sensitivity to dust and the potential magnitude of dust generating construction activities proposed at these sites. Due to the high dust generating potential of the construction activities which included building demolition, significant earthworks, tunnelling and civil works, risks were categorized in the EIS as medium to high within the Rozelle precinct.

The key elements of the proposed modification includes the construction of a new overpass, realignment of active transport links, upgrade of The Crescent/Johnston Street intersection and use of a minor construction ancillary facility, established in accordance with Condition C24, as a construction ancillary facility. The proposed construction ancillary facility (C6a) would support the approved construction activities at The Crescent civil site (C6).

As the proposed modification is generally within the same footprint as the approved project, with minor extensions of footprint limited to areas within existing road reservations on The Crescent and Johnston Street, it is not anticipated that the construction dust risk profile would be different to that assessed in the EIS. Activities occurring in the limited extended footprint areas would include things such as re-sheeting, kerb adjustments and line marking, which are not significant generators of dust. As such it is recommended that, the mitigation measures proposed in the EIS would remain unchanged for the proposed modification.

## Operation

### Traffic Emissions

The total traffic emissions for selected roads in the EIS and the modification modelling scenarios are presented in **Table 6-23**. The absolute changes in emissions between scenarios for the selected roads are shown in **Table 6-24**.

When compared to the Do Something Cumulative scenario in the EIS, there is 18.4 tonnes per year increase in NO<sub>x</sub> and a one tonne per year increase in PM<sub>2.5</sub> for the proposed modification (refer to **Table 6-24**). This is largely a result of the gradient from the overpass which increases emissions. When compared to the Do Minimum scenario, both the EIS and Modification DSC scenarios show a reduction in emissions for both NO<sub>x</sub> and PM<sub>2.5</sub>.

**Table 6-23 Total traffic emissions near the proposed modification**

Scenario code	Scenario description	Total emissions (tonnes/year)	
		NO <sub>x</sub>	PM <sub>2.5</sub>
2033-DM EIS	2033 – Do Minimum (no M4-M5 Link)	76.5	4.0
2033 - DSC EIS	2033 – Do Something Cumulative (with M4-M5 Link and all other projects)	36.0	2.4
2033 - DSC MOD	2033 – Do Something Cumulative (with M4-M5 Link MOD and all other projects)	54.5	3.4

**Table 6-24 Absolute changes in total traffic emissions near the proposed modification**

Scenario comparison	Change in total emissions (tonnes/year)	
	NO <sub>x</sub>	PM <sub>2.5</sub>
<b>Changes due to the proposed modification</b>		
2033-DSC MOD vs 2033-DSC EIS	+18.4	+1.0
<b>Changes due to the project in a given time</b>		
2033-DSC EIS vs 2033-DM	-40.47	-1.62
2033-DSC MOD vs 2033-DM	-22.04	-0.63

### Operational assessment

There are differences in the operational air quality impacts between the EIS and proposed modification. Differences can be attributed, in part, to the changes in the position of the traffic along The Crescent as it approaches the overpass from the southeast. The lanes are slightly closer to the light-rail line and Bayview Crescent for the proposed modification. Also the gradient (around 6%) increases emissions at that location due to northbound traffic using the overpass.

No major changes can be identified between the EIS and the proposed modification for maximum 24-hour average PM<sub>2.5</sub>, annual average PM<sub>2.5</sub> and predicted maximum 1-hour average NO<sub>x</sub> concentrations. There were however some minor observations relation to the predicted changes in maximum 24-hour average PM<sub>2.5</sub>, between the proposed modification and the EIS. There are slightly more receptors that experience increases for the proposed modification, however, the maximum increases are still low. The maximum predicted change for these receptors in the EIS was 2.1 µg/m<sup>3</sup>, compared to 2.9 µg/m<sup>3</sup> for the proposed modification.

The EIS included several plots which showed the changes in concentration due to the project. The most relevant metric when predicting changes in air pollutant concentrations and their significance for health impacts, is annual mean PM<sub>2.5</sub>. The differences are most noticeable along Johnson Street and



The Crescent where the main changes are for the proposed modification. Even though there is a larger area of increased annual mean PM<sub>2.5</sub> when compared to the EIS, these increases are well below the critical criterion of 1.8 µg/m<sup>3</sup>.

Specifically, results for the predicted annual mean PM<sub>2.5</sub> concentrations, show a maximum increase of 0.21 µg/m<sup>3</sup> for the EIS and 0.32 µg/m<sup>3</sup> for the proposed modification. There are more receptors which are predicted to experience an increase, but again, these increases are small and well below 1.8 µg/m<sup>3</sup>.

With regards to changes in maximum 1-hour NO<sub>2</sub> concentrations for the EIS and proposed modification, there are more receptors showing a predicted increase for the proposed modification, but the increases are small.

#### 6.5.4 Management measures and conditions of approval

Based on the assessment of potential air quality impacts associated with the proposed modification, no further environmental management measures are deemed necessary beyond those summarised in Part E of the SPIR.

The proposed modification would not require any change to the conditions of approval for air quality impacts arising from the proposed modification. Air quality impacts will be managed through the implementation of the Air Quality sub-plan to the CEMP as required by Condition C4(d) and ambient air quality monitoring as required by Condition E24.

### 6.6 Urban design and access

#### 6.6.1 Assessment methodology

The assessment of potential urban design and access impacts related to the proposed modification was primarily informed by a review of the modified design in line with the relevant parts of the EIS for the project, specifically: Chapter 13 (Urban design and visual amenity), Appendix L (Urban Design) and Appendix N (Active transport strategy).

This urban design and access assessment has reviewed the consistency of the proposed modification with the relevant conditions of approval including the requirements of the Urban Design and Landscape Plan (UDLP) (E133 – E137) and green link (E120 and E121).

#### 6.6.2 Existing environment

The existing urban design and access environment of the Rozelle Interchange site is dominated by the major road connections between the Anzac Bridge, City West Link and Victoria Road. The dominance of arterial and state roads in the landscape has an existing impact on the amenity and urban design of the local area. Existing pedestrian and cycle paths include the foreshore walk and cycle path around Glebe foreshore and connections from Victoria Road and the Rozelle Bay light rail stop. Pedestrian and cycling routes and the foreshore walk from Annandale, Glebe and Rozelle Bay end at the intersection of either The Crescent and City West Link or The Crescent and Victoria Road.

The historical use of the Rozelle Interchange site as an industrial precinct is evident through former and current industrial uses including White Bay Power Station, the Glebe Island silos, Harold Park Tram-sheds and the railway viaduct (now the light rail corridor). The northern foreshore of Rozelle Bay consists of port and maritime uses.

The Rozelle Rail Yards separate the residential suburbs of Rozelle and Annandale. Beyond the Rozelle Rail Yards, the neighbouring suburbs of Rozelle and Lilyfield to the north are characterised by one and two storey houses in a dense street pattern of small local streets and interlinked laneways. The suburb of Annandale to the west of the modification area has a mixed character created by the range of architectural styles and building heights. The housing style is predominantly low scale Victorian workers' cottages, mixed with single storey Californian bungalows, weatherboard cottages and fibro cottages. Around the harbour area, major physical elements include the industrial and maritime buildings, the light rail corridor and the road network including the elevated Victoria Road/The Crescent/Anzac Bridge junction.

Regarding active transport networks, the areas of influence for the Rozelle Interchange include the suburbs of Rozelle, Annandale, Lilyfield, Glebe, Balmain and Forest Lodge. These areas contain mostly residential land uses. Public open space in this area includes Callan Park, the Bay Run, Bicentennial Park, Easton Park, Buruwan Park, the Glebe Foreshore Parks and Whites Valley Creek parklands. Active transport links include the Bay Run, Glebe Foreshores, Anzac Bridge cycleway and the northern part of the green link. Presently, there is poor connectivity between these links, particularly across the Rozelle Rail Yards, which is a significant barrier between Annandale and Rozelle/Lilyfield.

### 6.6.3 Urban design and access assessment

Much of the built form of the Rozelle Interchange will remain consistent with the works approved as part of the project. As approved the project will integrate the necessary motorway infrastructure with a parkland setting and improve connectivity in the area.

Access arrangements would be maintained throughout construction of the proposed modification in accordance with Conditions E43 to E47 of the conditions of approval. This would ensure ongoing connectivity to the Rozelle Bay light rail stop, Bicentennial Park and the suburb of Annandale.

The upgrades to the intersection of The Crescent/Johnston Street/Chapman Road and the inclusion of The Crescent overpass and associated traffic lane amendments would help support strategies five (place sensitive design) and seven (revitalisation, opportunity and economics) of the Rozelle Rail Yards Strategies outlined in Appendix L of the EIS. These components of the proposed modification would facilitate more efficient traffic movements through these intersections, with the aim of reducing overall traffic congestion and the related adverse amenity impacts.

The reduction of traffic congestion in the local area would also benefit broader urban design objectives by promoting a more pedestrian centric revitalisation of public places. The proposed modification continues to support the strategy of revitalising streets for equality of mobility by including new, and retaining existing, active transport links alongside new road infrastructure.

The introduction of The Crescent overpass has meant that the approved green link between the Rozelle Rail Yards to the park adjacent Chapman Road (Bicentennial Park) needs to be realigned. This change has resulted in two structures being proposed to meet intent of Conditions E120 and E121. These structures are:

- A new elevated shared user path bridge over the City West Link approximately 120 metres east of the intersection of The Crescent and City West Link, linking the Rozelle Rail Yards to the park adjacent Chapman Road (Bicentennial Park)
- A green link connecting the Rozelle Rail Yards to the Rozelle Bay light rail stop and The Crescent.

These bridges over City West Link form connections between communities, open parkland spaces and foreshores and link to shared use path and footpath connections in the local area. The shared user path bridge and realigned green link would connect existing and proposed active transport networks and would significantly improve pedestrian and cyclist connectivity between surrounding suburbs and recreational spaces compared to the existing conditions.

The green link planting is generally consistent with that of the EIS and in line with the requirements of the CoA. The bridge would include a variety of plantings and small trees across the link to the Rozelle Bay light rail stop.

Under the proposed modification the green link would create a direct connection between the Rozelle Rail Yards and the Rozelle Bay light rail stop. This new connection facilitates access to this mode of public transport from the Rozelle/Lilyfield suburbs. Connections between Rozelle Rail Yards and Bicentennial Park would still be provided via a shared user path bridge in a horseshoe shape spanning City West Link. This shared user path bridge would also allow elevated views to Rozelle Bay and the Sydney CBD.

The green link would span from the roof of the Rozelle ventilation facility, over multiple traffic lanes on City West Link and The Crescent before landing at the platform of the Rozelle Bay light rail station. The bridge must provide at least a 5.5m vertical clearance when crossing traffic lanes before dropping around 2 metres to meet the level of the light rail platform. The bridge is being designed with a cross section consistent with Figure 5.8 of Appendix L of the EIS, therefore the bridge deck and girders need to be significant structures to support the weight of the bridge, soil and vegetation.

When investigating design options for the green link, the option of including soil depth and plantings for the full length of the bridge was investigated. To provide the required vertical clearance over City West Link and The Crescent, the deck of this bridge would be approximately 2 metres higher than the light rail platform. There is minimal space available to provide the required pedestrian and cyclist connectivity via a switch back ramp perpendicular to the green link, to enable access for pedestrians, cyclists and disabled persons.

During design investigations it was identified that this option was not ideal in respect to connectivity, and an alternative design option was developed. This alternative design, which forms part of the proposed modification, utilises bridge girders which taper down as the bridge approaches the light rail platform, providing a continuous path for pedestrians, cyclists and disabled persons and a direct connection to the level of the light rail platform which is DDA compliant. This design avoids the need for a switch back ramp. However, the thinner, tapered bridge girders are not able to support the weight of soil shown in Figure 5.8 of Appendix L of the EIS. Therefore, vegetation is not able to be provided at this end of the green link over a distance of around 30 metres.

As the green link design and the UDLP develop, the contractor and Roads and Maritime will continue to investigate ways to integrate the soft landscape and hard surface public realm treatments particularly in the section of the bridge adjacent to the light rail platform. This may include the option of raised planter boxes to accommodate vegetation plantings in this area.

The overall urban design approach for the project is to ensure that all elements form a larger unified composition of elements that are recessive in the landscape. The minimalist design is sculptural, highly experiential and materially integrated. The major elements, including the green link and shared user path bridge, form an integrated suite of architectural elements that will remain timeless, contemporary and visually appealing in the landscape.

The green link structure is simple, refined and elegant with minimal piers and abutments to maximise usability, permeability and visual transparency. It features:

- A significant place making structure as an integrated landscape design element with a strong public realm quality
- A horizontal and vertical alignment designed to assist with suitable sightlines and legibility consistent with the Crime Prevention Through Environmental Design (CPTED) principles
- A transition to the Rozelle Bay light rail platform which has been designed to 'feather' into the level of the platform and to accommodate a DDA compliant 1:14 ramp and landing configuration
- Vertical and horizontal alignments which will enliven the journey and provide enhanced pedestrian connections between surrounding streets and other public spaces
- Careful integration of the soft landscape and hard surface public realm treatments
- Bridge piers that are shaped to be elegant and form part of a family of structures with other shared user path bridges that form part of the project.

In developing the design for the green link and shared user path bridge the CPTED principles have been considered as detailed below:

- The green link and shared user path bridge were designed to provide maximum opportunity for passive surveillance from the Rozelle Rail Yards, the Rozelle Bay light rail stop and the Rozelle Bay foreshore

- The pedestrian and cyclist paths, including the green link and shared user path bridges, were designed with legibility for the user in mind, allowing people to easily know where they are and how to get where they are going. This will be further developed in the Rozelle Rail Yard Lighting and Wayfinding Strategy which will be developed as part of the Urban Design and Landscape Plan as required by Condition of Approval E134(q)
- A feeling of ownership will be encouraged through delivering a design which is timeless, contemporary and visually appealing in the landscape. This will be further promoted through the consultation process for the UDLP.

The design objectives of the green link and the shared user path bridge would be reviewed by the Design Review Panel in line with Conditions E125 to E132. The design and integration of these two structures within the surrounding urban context would be informed by the UDLP in line with Conditions E133 to E137. The urban design for The Crescent overpass would also be informed by the UDLP and relevant road standards.

The inclusion of these structures has required an amendment to Condition E134. This change is presented in **section 6.7.4**. None of the other conditions would require amendment as part of this modification application.

Whilst the detailed design for each of the three elevated structures has not been finalised, the CoA relating to the Design Review Panel and the UDLP, in addition to the Roads and Maritime urban design approach, would assist in the new structures being complementary with each other and the urban context around the Rozelle Rail Yards and The Crescent/City West Link intersection.

#### 6.6.4 Management measures and conditions of approval

Potential urban design and access impacts associated with the proposed modification would generally be managed through the implementation of the approved environmental management measures for the project as summarised in Part E of the SPIR.

The proposed modification would require changes to Conditions E120, E121 and E134 as presented in **Chapter 7**.

### 6.7 Landscape and visual amenity

#### 6.7.1 Assessment methodology

An assessment of the potential visual and landscape character impacts resulting from the proposed modification was undertaken. The following key tasks were completed:

- Review of the landscape and visual context as described in Chapter 13 (Urban design and visual amenity) of the EIS for the approved project
- Site visit to Annandale and Rozelle to confirm the landscape context and identify representative views from potential receptors to the proposed modification
- Assessment of potential additional landscape character and visual impacts of the proposed modification in accordance with the Roads and Maritime *Guideline for landscape character and visual impact assessment – Environmental impact assessment practice note EIA-N04* (Roads and Maritime, 2018) including:
  - Identification of representative sensitive receiver locations and sensitivity of each receiver location to change
  - Analysis of existing landscape character and its sensitivity
  - Determination of the magnitude of potential landscape character and visual impacts at each receiver location and landscape zone
  - Assessment of landscape character and visual impact based on a composite of the sensitivity of the view and magnitude of potential impact
  - Identification of reasonable and feasible mitigation measures

- Comparison of predicted visual impacts of the proposed modification against those assessed in the EIS and determination of an overall impact assessment rating from the cumulative impacts of the project and the proposed modification.

## 6.7.2 Existing environment

### Landscape character

The existing landscape character and setting around the Rozelle Interchange is centred on the Rozelle Rail Yards. The Rozelle Rail Yards consisted of disused and largely vacant land which is mainly flat with some gentle gradients. Prior to the commencement of the project, Roads and Maritime undertook a program of site management works which largely cleared vegetation from the surface of the Rozelle Rail Yards, with remaining vegetation largely limited to the external boundaries of the site, particularly along the City West Link.

The existing landscape character and setting surrounding the future Rozelle Interchange is characterised by:

- Primarily one to two storey residential buildings and neighbourhood centres in the suburbs of Lilyfield, Rozelle and Annandale
- Commercial land uses (low rise factories and warehouses) on Lilyfield Road and Halloran Street
- Rozelle Bay and the Rozelle Bay wharves and associated maritime land uses
- High volume transport infrastructure including City West Link, Victoria Road and the Inner West light rail line
- Areas of open space including Easton Park, Whites Creek Valley Park and the adjoining Federal Park, Jubilee Park and Bicentennial Park which form the Glebe foreshore parklands
- The decommissioned White Bay Power Station.

The area to the south of the proposed modification within the suburb of Annandale contains a varied built form consisting of single storey Federation dwellings, grander scaled Victorian-style buildings and post war civic and commercial buildings. The elevated nature of the northern section of Annandale provides many dwellings with views towards the Sydney Harbour Bridge, Anzac Bridge and Sydney CBD. The steep slopes around Bayview Crescent expose attractive sandstone outcrops. The slopes also allow for significant views overlooking Rozelle Bay to the north east and the City to east.

The Rozelle Rail Yards, adjacent to the modification area, have been identified as a 'destination' within The Bays Precinct Transformation Plan (UrbanGrowth NSW, 2015), which has the potential to alter the landscape character of the wider area. Following development of the Rozelle Interchange, the Rozelle Rail Yards would be largely used for public open space (as detailed within the EIS and CoA).

### Visual amenity

The area around the proposed modification, adjacent to Rozelle Bay and within the large cleared area associated with the Rozelle Rail Yards is located upon a low-lying terrain. The surrounding suburbs of Rozelle and Annandale are elevated above the rail yards, The Crescent and City West Link, and contain receivers which have potential to have ongoing views of the various components of the proposed modification.

Views of the proposed modified design would consist of transient views from nearby roads and bridges (e.g. The Crescent, City West Link and Victoria Road), permanent views from houses and business in the surrounding area and views from commuters and recreational users of Bicentennial Park, Easton Park and the Rozelle Bay light rail stop. Residents on and, to a lesser extent, workers close to Lilyfield Road and in Annandale are likely to be particularly sensitive to visual changes of the proposed modification due to their proximity and elevated position.

Given the anticipated views of the proposed modified design from the surrounding area, the following representative receptors could potentially be affected by the proposed changes in visual amenity (refer to **Figure 6-5**):

- Residential properties on Bayview Crescent, Annandale (**Plate 6-9**)
- Residential properties at 300 Johnston Street, Annandale (**Plate 6-5**)
- Residential properties in Rozelle
- Motorists and public transport users on The Crescent, City West Link and Victoria Road (**Plate 6-4**, **Plate 6-7** and **Plate 6-8**)
- Recreational users of Bicentennial Park
- Light rail users using the Rozelle Bay light rail stop (**Plate 6-5** and **Plate 6-6**).

A description of the sensitivity of views from these five receptor groups is provided in **Table 6-25**. The sensitivity of existing views for the assessed receptors is dependent on:

- Location and context of the receptor location
- Expectations and activity of the receptor
- Type and number of receptors
- Quality of the existing view
- Importance of the view
- Temporal duration of the view.

**Table 6-25 Sensitivity of views**

View location	Description of view	Sensitivity of view
Residential (Annandale - Bayview Crescent)	Residential properties along Bayview Crescent have an elevated view across Rozelle Bay towards Anzac Bridge and the city. A row of street trees along the northern side of Bayview Crescent and the residential apartments at 300 Johnston Street provide some intermittent obstruction of certain views.	High
Residential (300 Johnston Street)	Apartments at 300 Johnston Street generally have unobstructed views across to Rozelle Bay with the view partially obstructed by use of the light rail corridor. Views from these residences are predominantly towards the northeast. Views of the existing The Crescent and City West Link intersection are not possible from these apartments. Existing architectural treatments on these properties (e.g. louvers) have the ability to block or obscure certain views.	High
Residential (Rozelle)	Residential properties on Denison Street have an obstructed view across Easton Park over the Rozelle Rail Yards towards Anzac Bridge and the city. Established vegetation within Easton Park and proposed vegetation in the Rozelle Rail Yards along with approved ventilation outlets would provide significant screening towards the components of the proposed modification.	Moderate
Motorists	Motorists passing by in cars would have an unobstructed view of the proposed modified design. The view would be short in duration and of infrastructure compatible with the existing road network and visual context of the area.	Low



View location	Description of view	Sensitivity of view
Recreational	Recreational users of Bicentennial Park have a view across Rozelle Bay towards the modification area. Mature trees are located between the C6 civil site and Chapman Road and provide solid vegetation screening. Several of these trees would not require removal for the construction of the modified design. Other street trees within the C6 civil site currently provide intermittent screening, however these would be removed. In addition, existing recreational infrastructure in the park (benches, picnic facilities, etc) are oriented away from the proposed modified design and therefore do not encourage views towards the modification area.	Moderate
Light rail users	Light rail users have a similar elevated view over across Rozelle Bay towards Anzac Bridge and the city as residences on Bayview Street. Significant screening is currently present from mature trees in Buruwan Park, however these are to be removed as part of approved construction work resulting in unobstructed views towards the proposed modified design of The Crescent and realigned green link.	Low



**Plate 6-3** View south from the Rozelle Bay light rail stop



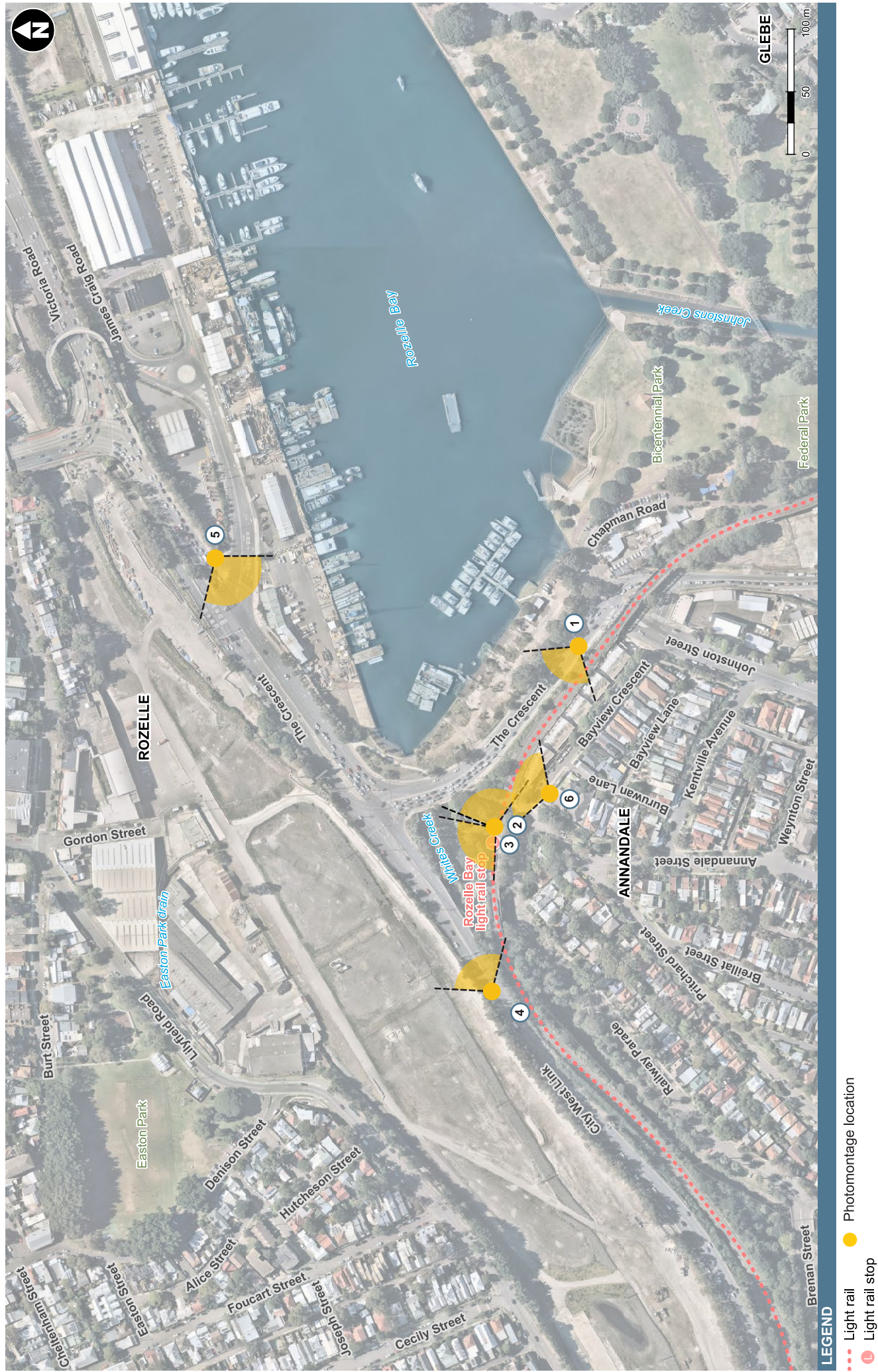


Figure 6-5 Representative view locations

### 6.7.3 Assessment of potential impacts

#### Landscape character

The sensitivity to change of the general landscape character of the area surrounding the proposed modified design is considered to be low. For the surrounding landscape character zones as assessed in the EIS, overall rating of landscape character impacts ranged from negligible to moderate. Given the low sensitivity to landscape character change resulting from the proposed modification, the overall landscape character impact rating would not change from previously assessed in the EIS. Surrounding relevant landscape character zones assessed in the EIS and the impact on landscape character resulting from the approved project is included in **Table 6-26**.

**Table 6-26 Landscape character impact summary**

Landscape character zone	Sensitivity to change EIS	Magnitude of change EIS	Overall rating EIS	Overall rating proposed modification
LCZ 4 – Glebe Foreshore Parklands	Moderate	Moderate	Moderate	Moderate (no change)
LCZ 5 – Johnston Street Precinct	High	Negligible	Negligible	Negligible (no change)
LCZ 6 – Annandale Street and Young Street precinct	Moderate	Low	Moderate-Low	Moderate-Low (no change)
LCZ 17 – City West Link precinct	Low	Moderate	Moderate-Low	Moderate-Low (no change)
LCZ 18 – Rozelle light rail corridor and Whites Creek canal precinct	Moderate	Moderate	Moderate	Moderate (no change)
LCZ 19 – Rozelle Rail Yards.	Low	Moderate	Moderate-Low	Moderate-Low (no change)

The proposed modification would not result in a material change to the setting or use of the area for transport infrastructure and would be compatible with existing road networks and active transport infrastructure. No additional landscape character impacts are anticipated over those previously assessed in the EIS.

#### Visual amenity

##### Construction

Through the construction of additional elevated structures and relocation of previously approved structures, the proposed modified design would result in a changed visual environment at surrounding viewpoints during both construction and operation.

The construction of the proposed modification would result in additional construction works in and around the C6 civil site resulting in the potential for an increased magnitude of temporary visual impacts. Some trees and vegetation adjacent to the south of the C6 civil site and Chapman Street are outside the project area and would not be removed. These trees would provide some visual screening for the users of Bicentennial Park. A summary of potential visual amenity impact on the identified sensitive viewpoints resulting from construction of the proposed modification is provided in **Table 6-27**. A comparison to the equivalent construction receiver assessed in the EIS is also provided.

The overall visual impact during construction of the proposed modification would continue to be high as was assessed in the EIS. Impact for motorists traveling on The Crescent during construction is expected to increase slightly from moderate-low to moderate while all other viewpoints would experience a similar visual impact during construction as assessed in the EIS.

## **Operation**

During operation of the project, the addition of an elevated shared user path and The Crescent overpass alongside the realigned green link would increase the magnitude of the visual impacts of the Rozelle Interchange. In addition, intersection improvement upgrades including additional lanes at The Crescent/Johnston Street/Chapman Road intersection would result in a wider and more visually prevalent roadway. As the proposed modification would not significantly change the project footprint or extent of project components, no change to the extent of vegetation to be provided as part of the approved project is deemed to be required as a result of this proposed modification. A summary of the potential visual impact on the identified sensitive viewpoints resulting from the operation of the proposed modified project is provided in **Table 6-28**. A comparison to the equivalent operational impacts within the viewpoints assessed in the EIS is also provided.

Generally, the visual impact from the design proposed as part of the modification would be consistent with the EIS with the exception for residents located in the northern part of the apartments at 300 Johnston Street and Bayview Crescent. These residents would experience views from the addition of the new infrastructure as part of the modification and hence their visual impact would increase from High-Moderate to High.



**Table 6-27 Summary of potential impacts on visual amenity during construction**

<b>Viewpoint</b>	<b>Sensitivity to impact</b>	<b>Visible element</b>	<b>Magnitude of impact</b>	<b>Summary</b>	<b>Impact rating (proposed modification)</b>	<b>Impact rating (EIS)</b>	<b>Overall impact rating (EIS and proposed modification)</b>
Residential (Annandale - Bayview Crescent)	High	Works to construct the green link, shared user path and The Crescent overpass including plant and equipment.	Moderate	Much of the works would occur below the level of the light rail tracks and would therefore remain out of view. Street trees and other properties would provide some screening for certain receptors during construction, particularly residences on the southern side of Bayview Crescent. However, given the high sensitivity of receptors, the likely impacts would result in an elevated overall impact rating.	<b>High-Moderate</b>	C6-1 (Bayview Crescent and Johnston Street): <b>High</b>	<b>High</b> – Given that views towards the approved Rozelle civil and tunnel site (C5) and The Crescent civil site (C6) would remain prevalent, the overall impact rating at this location would remain High.
Residential (300 Johnston Street)	High	Works to construct the green link, shared user path and The Crescent overpass including plant and equipment.	High	Residences in the northern units at 300 Johnston Street would have generally unobstructed views of elevated works. This would include construction activities associated with the construction of The Crescent overpass which would be visible for an extended duration for some receptors at 300 Johnston Street.	<b>High</b>	C6-1 (Bayview Crescent and Johnston Street): <b>High</b>	<b>High</b> – View at this location would continue to be impacted by construction works at The Crescent civil site (C6). The proposed modification would result in additional works being visible from this viewpoint. The overall impact rating would remain High.

Viewpoint	Sensitivity to impact	Visible element	Magnitude of impact	Summary	Impact rating (proposed modification)	Impact rating (EIS)	Overall impact rating (EIS and proposed modification)
Residential (Rozelle)	Moderate	Potential views of construction works of elevated components including cranes and long arm concrete pumps.	Low	Construction works associated with the proposed modification would be visible for extended durations but would only include works to construct elevated components as well as cranes and concrete pumps. While buildings and vegetation which currently provide visual screening would be removed during construction, receptors are located around 250 metres from the elevated components of the proposed modification. Therefore, construction would result in only a low magnitude of impact within the wider visual context.	<b>Moderate-Low</b>	C5-3 (Lilyfield Road near Denison Street): <b>High</b>	<b>High</b> – Residences in Rozelle would continue to experience views of construction activities associated with the Rozelle civil and tunnel site. Works associated with the proposed modification would impact on only a minor component of the overall viewshed at this location. The overall impact rating would remain High.
Motorists	Low	Passing views of all construction components including hoardings, plant and equipment, materials, etc.	High	Motorists would be exposed to views of the majority of construction activities related to the proposed modification. As lane reconfigurations occur, hoardings would be used to minimise visibility as far as possible resulting in only transient views where possible.	<b>Moderate</b>	C5-1 (City West Link): <b>Moderate</b> C6-2 (The Crescent): <b>Moderate-Low</b>	<b>Moderate</b> – Motorists would continue to experience views of construction activities associated with construction of the project. The proposed modification would not change the overall impact rating which would remain Moderate.



Viewpoint	Sensitivity to impact	Visible element	Magnitude of impact	Summary	Impact rating (proposed modification)	Impact rating (EIS)	Overall impact rating (EIS and proposed modification)
Recreational	Moderate	Elevated structures including the green link, The Crescent overpass and shared user path bridge.	Moderate	While some construction works would be visible for recreational users within Bicentennial Park, established trees between the C6 civil site and Chapman Road would provide some screening during construction works. In addition, receivers in Bicentennial Park generally do not experience views towards the proposed modification with the majority of recreational infrastructure oriented towards Rozelle Bay to the east.	<b>Moderate</b>	C6-4 (Glebe Foreshore Parklands): <b>High-Moderate</b>	<b>High-Moderate</b> – Recreational receivers in Bicentennial Park would experience views of approved project components including The Crescent civil site (C6). The proposed modification would not change the overall impact rating at this location which would remain High-Moderate.
Light rail users	Low	Construction of the green link, The Crescent overpass and surface works	High	Construction works associated with the green link would be in immediate proximity to the Rozelle Bay light rail stop. Existing screening vegetation associated with Buruwan Park would be removed early in construction resulting in significant views of the proposed modification and related surface works.	<b>Moderate</b>	N/A	<b>Moderate</b> – No assessment for construction activities of light rail users was undertaken in the EIS. The proposed modification would not change the overall impact rating at this location.

**Table 6-28**      **Summary of potential impacts on visual amenity during operation**

<b>Viewpoint</b>	<b>Sensitivity to impact</b>	<b>Visible element</b>	<b>Magnitude of impact</b>	<b>Summary</b>	<b>Impact rating (proposed modification)</b>	<b>Impact rating (EIS)</b>	<b>Overall impact rating (EIS and proposed modification)</b>
Residential (Annandale - Bayview Crescent)	High	Elevated components including the green link, shared user path and The Crescent overpass.	Moderate	Operation of The Crescent overpass would result in traffic utilising the overpass potentially being visible for some residences along Bayview Crescent, however existing features including street trees, topography and other buildings would generally provide visual shielding for these receivers.	<b>High-Moderate</b>	View looking north from Rozelle Bay light rail stop to the Rozelle Rail Yards (R7 residents) <b>High-Moderate</b>	<b>High</b> – The change in view for residents of Bayview Crescent would continue to be primarily affected by approved project works including the clearing of vegetation in Buruwan Park. With the addition of the overpass and bridge structures in the proposed modification the overall impact rating for this location would change to High.

Viewpoint	Sensitivity to impact	Visible element	Magnitude of impact	Summary	Impact rating (proposed modification)	Impact rating (EIS)	Overall impact rating (EIS and proposed modification)
Residential (300 Johnston Street)	High	Elevated components including the shared user path and The Crescent overpass.	Moderate	Receivers at 300 Johnston Street would have generally unobstructed views of the operation of The Crescent overpass. Impacts would be greater for apartments at the northern end of the building compared to the southern end as The Crescent overpass rises, partially blocking views and introducing traffic as well as lighting at night.	<b>High-Moderate</b>	View looking north from Rozelle Bay light rail stop to the Rozelle Rail Yards (R7 residents) <b>High-Moderate</b>	<b>High</b> – The change in view for residents of 300 Johnston Street would be affected by approved project works including the clearing of vegetation in Buruwan Park. With the addition of the overpass and bridge structures in the proposed modification the overall impact rating for this location would change to High.

Viewpoint	Sensitivity to impact	Visible element	Magnitude of impact	Summary	Impact rating (proposed modification)	Impact rating (EIS)	Overall impact rating (EIS and proposed modification)
Residential (Rozelle)	Moderate	The crest of The Crescent overpass and parts of the green link and shared user path bridge.	Low	While small components of the proposed modified design may be visible for residents in Rozelle, existing vegetation in Easton Park, proposed vegetation in Rozelle rail yards and the approved ventilation facility in Rozelle Rail Yards would provide screening for the majority of the proposed modified design components.	<b>Moderate-Low</b>	View looking south from Easton Park to the Rozelle Rail Yards (R5 residents) <b>High</b>	<b>High</b> – Operational project views for residents in Rozelle would continue to be dominated by approved project components including ventilation outlets and the Rozelle Rail Yards. The proposed modification would not change the overall impact rating at this location which would remain High.
Motorists	Low	All components of the proposed modification including lane configurations, green link, The Crescent overpass and shared user path bridge.	Moderate	The proposed modified design involves components that are compatible with the general visual character associated with traveling on major arterial roads. Magnitude of impact is therefore not considered significant.	<b>Moderate-Low</b>	View looking west along City West Link to The Crescent (R3 motorists) <b>Moderate-Low</b>	<b>Moderate-Low</b> - Motorists would experience views of both approved project components and components associated with the proposed modification. The proposed modification would not change the overall impact rating at this location which would remain Moderate-Low.

Viewpoint	Sensitivity to impact	Visible element	Magnitude of impact	Summary	Impact rating (proposed modification)	Impact rating (EIS)	Overall impact rating (EIS and proposed modification)
Recreational	Moderate	All elevated components including the green link, The Crescent overpass and the shared user path bridge.	Low	Recreational users of Bicentennial Park would have visibility of the shared user path bridge and The Crescent overpass. Established vegetation adjacent to Chapman Road that would be maintained as part of the project would continue to provide significant screening of the proposed modification area for users of Bicentennial Park.	<b>Moderate-Low</b>	View looking north from Glebe Foreshore Parklands to the Rozelle Rail Yards (R6 passive recreation) <b>High-Moderate</b>	<b>High-Moderate</b> – Recreational users of Bicentennial Park would continue to have visibility of approved project components including ventilation outlets in the Rozelle Rail Yards. The proposed modification components would not change the overall impact rating which would remain High-Moderate.

Viewpoint	Sensitivity to impact	Visible element	Magnitude of impact	Summary	Impact rating (proposed modification)	Impact rating (EIS)	Overall impact rating (EIS and proposed modification)
Light rail users	Low	Elevated structures including the green link and The Crescent overpass.	Moderate	Light rail users at the Rozelle Bay light rail stop would have direct visibility of The Crescent overpass and associated operational traffic. The green link would also be a prominent structure, however as it would contain vegetation, it is considered that this would result in a positive contribution to visual character. The removal of established vegetation in the former Buruwan Park location would result in increased views of The Crescent/City West Link.	<b>Moderate-Low</b>	View looking north from Rozelle Bay light rail stop to the Rozelle Rail Yards (R7 light rail users) <b>High-Moderate</b>	<b>High-Moderate</b> – Light rail users would continue to experience views of approved project components including ventilation outlets and expanded roadways. The proposed modification would not change the overall impact rating which would remain High-Moderate.





**Plate 6-4** Photomontage 1: Indicative view north-west from the corner of The Crescent and Johnston Street (without project)



**Plate 6-4** Photomontage 1: Indicative view north-west from the corner of The Crescent and Johnston Street (with project)



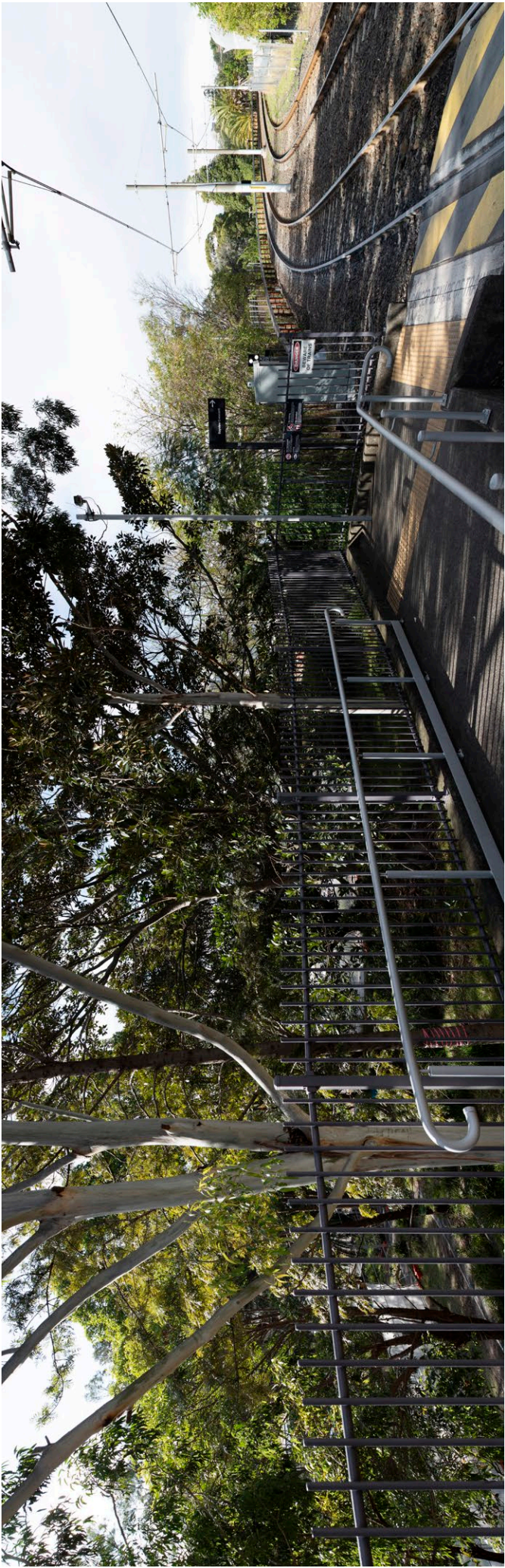


Plate 6-5 Photomontage 2: Indicative view east from Rozelle Bay light rail stop (without project)



Plate 6-5 Photomontage 2: Indicative view east from Rozelle Bay light rail stop (with project)





Plate 6-6 Photomontage 3: Indicative view north from Rozelle Bay light rail stop (without project)

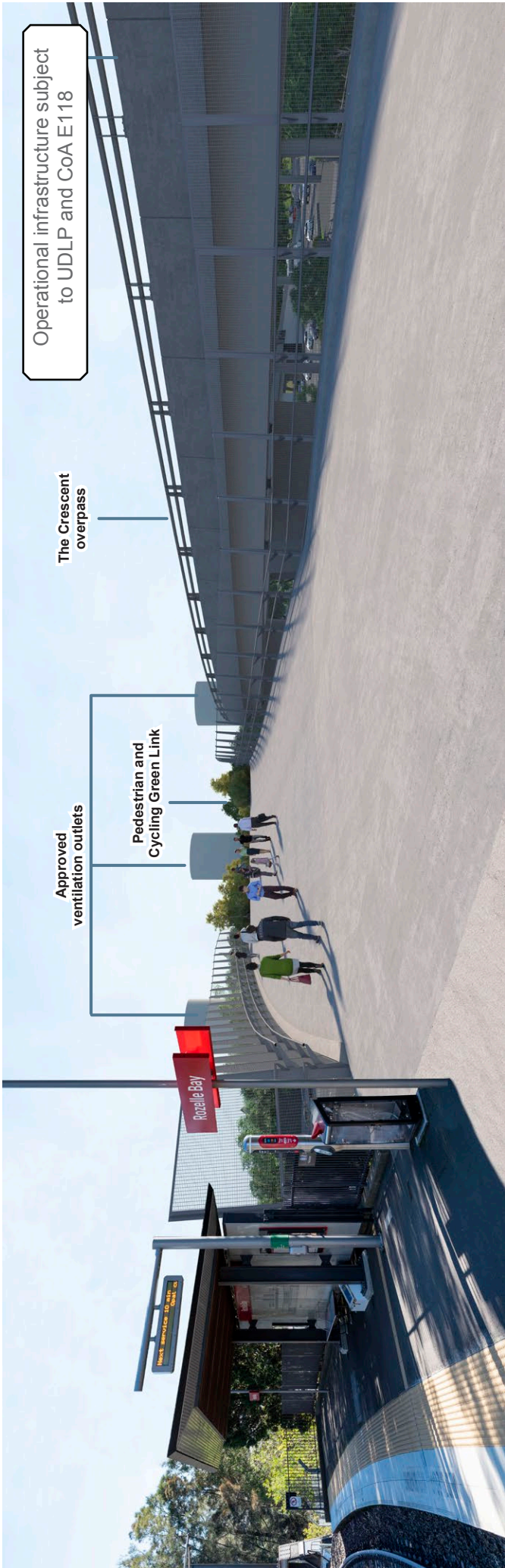


Plate 6-6 Photomontage 3: Indicative view north from Rozelle Bay light rail stop (with project)





**Plate 6-7** Photomontage 4: Indicative view east from City West Link (without project)



**Plate 6-7** Photomontage 4: Indicative view east from City West Link (with project)



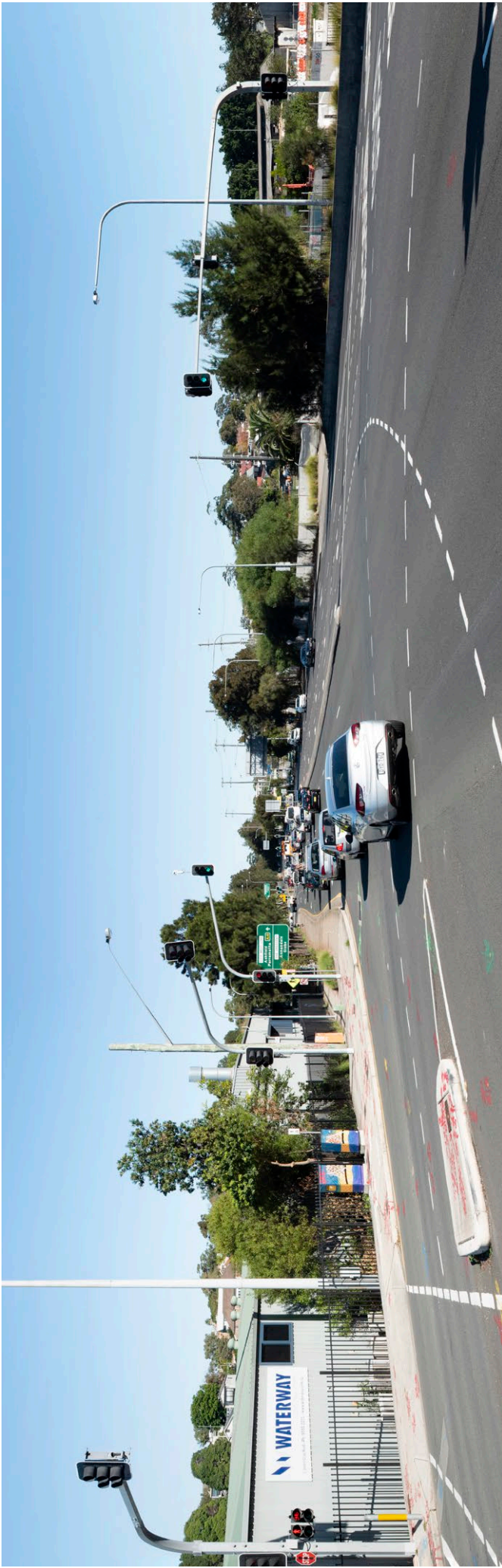
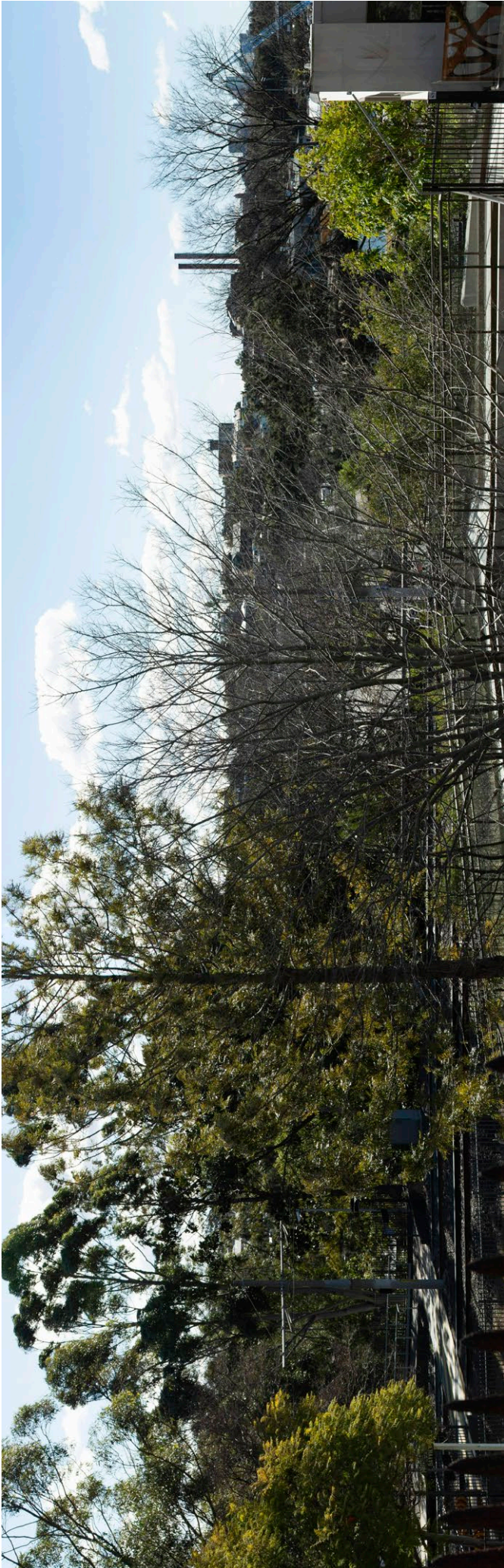


Plate 6-8 Photomontage 5: Indicative view west from the corner of The Crescent and James Craig Road (without project)

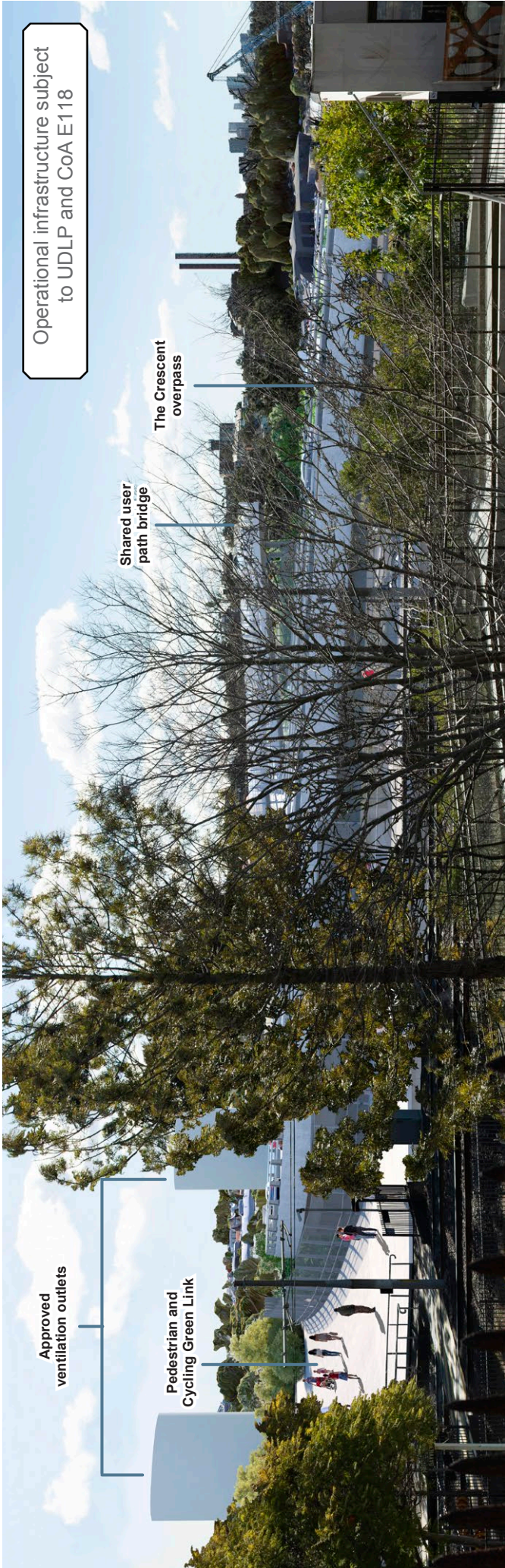


Plate 6-8 Photomontage 5: Indicative view west from the corner of The Crescent and James Craig Road (with project)





**Plate 6-9** Photomontage 6: Indicative view north-east from Bayview Crescent and Pritchard Street (without project)



**Plate 6-9** Photomontage 6: Indicative view north-east from Bayview Crescent and Pritchard Street (with project)



## 6.7.4 Management measures and conditions of approval

Potential landscape character and visual impacts associated with the proposed modified design would generally be managed through the implementation of the approved environmental management measures for the project as summarised in Part E of the SPIR as well as compliance with the CoA. As noted in **section 6.6.3**, Conditions E133 to E137 require UDLP(s) to be produced for the project. Planting around the proposed works will be confirmed within these plans.

In order to minimise visual impact for recreational users of Bicentennial Park, established trees and shrubs would be retained in accordance with environmental management measure B8 from the SPIR. No amended or additional environmental management measures are proposed.

The proposed modification would require changes to Condition E134 as presented in **Chapter 7**.

## 6.8 Non-Aboriginal heritage

### 6.8.1 Assessment methodology

The non-Aboriginal heritage assessment for the proposed modification was primarily informed by a review of the EIS Appendix U – Technical working paper: Non-Aboriginal heritage. This technical working paper included the following sources:

- State Heritage Register (SHR)
- RailCorp Section 170 Heritage and Conservation Register
- Sydney Water Section 170 Heritage and Conservation Register
- Leichhardt Local Environmental Plan 2013 heritage mapping
- Sydney Local Environmental Plan 2012 heritage mapping
- Sydney Regional Environmental Plan No 26 – City West.

In addition, due to the proximity of the identified potential heritage item, The Crescent Mural, which was not identified in the EIS, a review of *The Crescent Mural Annandale – Local History Project 2010* (Heritage Solutions, 2010) was undertaken to understand the significance of this item and to assess potential impacts.

### 6.8.2 Existing environment

The proposed modification is located within the area identified as Area 3 within the EIS. The Area 3 study area, including the Rozelle Rail Yards, The Crescent, Rozelle Bay and Victoria Road is located around four kilometres west of Sydney's CBD and contains a number of linking roadways which connect the suburbs of Rozelle, Pyrmont, Annandale and Lilyfield.

The area is characterised by light industrial development interspersed with parkland constructed above areas of nineteenth century reclamation and bisected by the network of modern roadways. The residential areas within and adjacent to the study area are dominated by late nineteenth century developments.

Heritage items identified for Area 3 and within the project footprint having the potential to be affected by the proposed modification are listed in **Table 6-29** below and in **Figure 6-6**.



**Table 6-29 Identified heritage items relevant to the proposed modification**

Item name	Address	Suburb	Significance	Listing	Impact type
Annandale (Johnston Street) Underbridge	Johnston Street	Annandale	Local	Sydney Regional Environmental Plan – City West REP No. 26 – Sch. 4, Part 3 (#9) RailCorp S170 (4803229)	Setting, vibration
White Creek Stormwater Channel No 95	Railway Parade to Parramatta Road	Annandale	Local	Sydney Water S170 (#4570343)	Setting, vibration,
Annandale (Railway Parade) Railway Bridge	Railway Parade	Annandale	Local	Sydney Regional Environmental Plan – City West REP No. 26 – Sch. 4, Part 3 (#7) RailCorp S170 (4803231)	Setting, vibration
Street trees – row of Palms	Railway Parade	Annandale	Local	Leichhardt LEP 2013 (Item no. I78)	Setting
Avenue of <i>Phoenix canariensis</i>	Railway Parade	Annandale	Local	Leichhardt LEP 2013 (Item no. I79)	Setting

In addition, the following items of non-aboriginal heritage were identified in the EIS but were not considered further as they were located outside of the project footprint. These items now have the potential to be impacted as a result of the proposed modification:

- Glebe Railway Viaduct (SHR 01034)
- Street trees, row of Brush Box (Leichhardt LEP I10)
- Annandale Heritage Conservation Area (Leichhardt LEP C1)
- Iron/sandstone palisade fence (Leichhardt LEP I11)
- Sandstone retaining wall (Leichhardt LEP I83).

The Mural along the western side of The Crescent (refer to **Plate 6-11**) has also been identified as a potential heritage item for addition to the local environmental plan heritage register<sup>3</sup>. This mural was created in 1980 and coordinated by artist Rodney Monk after being commissioned by the then-Leichhardt Council as an employment scheme for unemployed artists. The mural was refurbished by Monk and Leichhardt Council in 2003/2004. In 2005, Leichhardt Council undertook a heritage assessment of the mural which recommended that The Crescent Mural become a heritage item of state significance. However, as of 2019 the Mural has not yet been heritage listed.

*The Crescent Mural Annandale – Local History Project 2010* (Heritage Solutions, 2010) summarised that The Crescent Mural remains as the best and most comprehensive example of the mural art of this time in Leichhardt and is reflective of the changes occurring in this part of Sydney at the time. It is a record of community aspirations and concerns during the 1980 period of social, political, economic and land-use change, in the public domain, in Leichhardt, and the inner city. It also represents a point

<sup>3</sup> <https://www.innerwest.nsw.gov.au/about/news/media-releases/2018-media-releases/iconic-mural-headed-for-heritage-listing>

in the history of the City in terms of de-industrialisation of the waterfront and renewal of the public foreshore and residential uses.



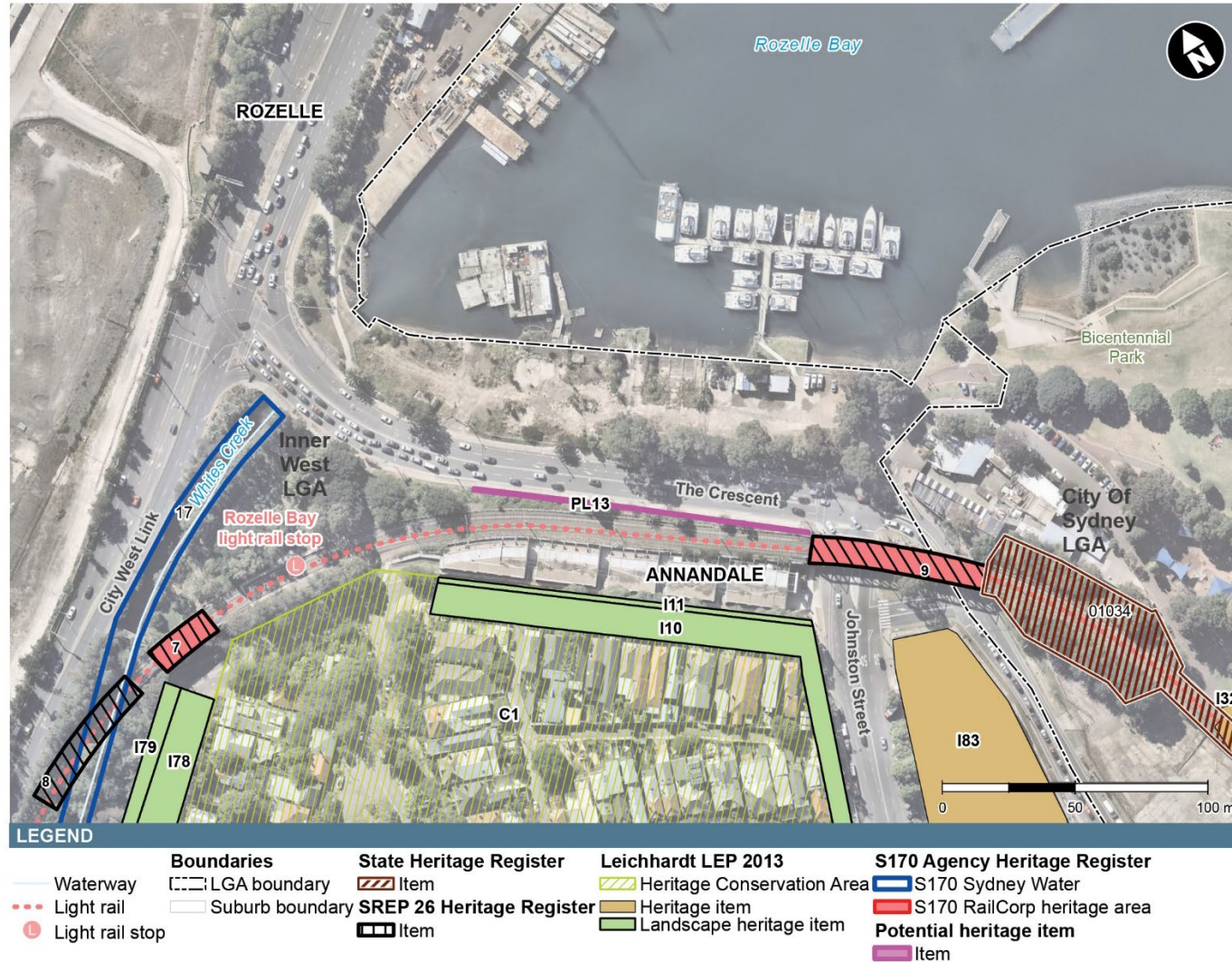
**Plate 6-10**      **Annandale (Johnston Street) Underbridge**





**Plate 6-11      The Crescent Mural**





**Figure 6-6 Non-Aboriginal heritage items**

### 6.8.3 Assessment of potential impacts

Of the identified heritage items having potential to be adversely affected by the proposed modification, the following items were considered unlikely to experience impact greater than previously assessed in the EIS. Potential direct and indirect impacts are generally consistent or less than previously assessed due to the distance and location of these items from proposed modification works resulting in no change to the setting or potential damage to the structure or character of the items. Heritage items discounted include:

- Street trees – row of Palms
- Avenue of Phoenix *canariensis*
- Street trees, row of Brush Box
- Annandale (Railway Parade) Railway Bridge
- Iron/sandstone palisade fence.

Items assessed for potential non-Aboriginal heritage impacts are included below.

#### **Whites Creek Stormwater Channel No 95**

The proposed modification would not include any change to the alignment of the at grade components of the intersection of The Crescent and City West Link as approved. It would continue to include the requirement for encroachment into Buruwan Park, removal of plantings and a new/extended bridge over the White Creek Stormwater Channel No 95. The channel under the bridge (and its operation) would not be physically impacted by the proposed modification.

The inclusion of the realigned green link and The Crescent overpass has the potential to alter the setting of the heritage item at this location further than what was previously assessed. However, the construction of these two structures would not have a direct impact on the channel and would not significantly change the setting of the channel when compared to the approved project. Works would be undertaken in accordance with Condition E161 of the CoA which requires that any works to the Whites Creek Stormwater Channel No. 95 must be undertaken in consultation with Sydney Water and a suitably qualified and experienced heritage consultant.

#### **Annandale (Johnston Street) Underbridge**

The proposed modification to the intersection of The Crescent, Johnston Street and Chapman Road, necessitate the widening of the road under the underbridge, adjacent to the bridge piers. This would result in the grassed verge being reduced, the footpath, kerb and guttering being closer and the associated signage/traffic lights being located closer to the bridge piers. There is sufficient room to accommodate the road widening without physical impact to the bridge piers. While the setting of this small area would change, it would not be dissimilar to the current context (**Plate 6-10**).

Therefore, the works would not directly impact on either the underbridge, which would be retained and continue to function during construction (for the Inner West light rail), or the retaining wall along The Crescent. Vibration impacts would be assessed and managed in accordance with the Construction Noise and Vibration Management Plan required by Condition C4 (b) as well as the requirements of Conditions E84 and E85 which require vibration testing to protect heritage items.

#### **Glebe Railway Viaduct and Sandstone retaining wall**

The proposed intersection upgrade of The Crescent, Chapman Road and Johnston Street would result in an expanded project footprint that would result in works occurring adjacent to the State heritage listed Glebe Railway Viaduct and locally listed Sandstone retaining wall. Works in these areas would generally include milling and resheeting of the roadway and line marking adjustment. As a result, no direct or indirect impacts to these items are expected. As per Condition E154, the works would not destroy, modify or otherwise physically affect this heritage item, which falls outside of the CSSI boundary.

## Annandale Heritage Conservation Area

The proposed modification would result in elevated structures that have the potential to result in a change in the visual character of the Annandale Heritage Conservation Area. This heritage area is located on an elevated area above The Crescent with views at present across the light rail line, above The Crescent and onto Rozelle Bay. The inclusion of the Rozelle Interchange overpass and realigned green link could detract from these views. This item is located outside of the project footprint and would therefore not be subject to direct impacts to the value or character of the Heritage Conservation Area.

### The Crescent Mural (potential heritage item)

The realigned green link would involve the construction of a pedestrian ramp in very close proximity to the inner west light rail retaining wall and its mural. The ramp would provide pedestrian access from the Rozelle Bay light rail stop to an at grade footpath on the west side of The Crescent. The green link and pedestrian ramp would not result in direct impacts to the mural and would have physical separation between the retaining wall and the proposed ramp. The extent of this separation will be determined during further detailed design and would help to ensure that potential damage to the mural from public use, including graffiti would be minimised as far as practicable.

Indirect impacts to the mural would occur as a result of the proposed green link ramp and The Crescent overpass partially blocking views from The Crescent to the mural. This would result in portions of the mural being blocked from a number of viewpoints for the life of the project. In addition, wider views of the whole mural along The Crescent or from Rozelle Bay would not be possible. This is considered a significant negative impact to the potential heritage value of the mural.

## 6.8.4 Management measures and conditions of approval

Potential non-Aboriginal heritage impacts associated with the proposed modification would generally be managed through the implementation of the approved environmental management measures for the project as summarised in Part E of the SPIR. In order to manage potential impacts to The Crescent Mural, an amended management measure (NAH03) would be required. This proposed change is outlined in **Chapter 8**.

The proposed modification would also require a change to the Condition E163 to include a requirement for archival recording of The Crescent Mural.

As required by Condition E167 and environmental management measure NAH02, a Heritage Interpretation Plan would be prepared to document the key heritage values and stories of impacted heritage items, including The Crescent Mural. The Heritage Interpretation Plan would identify initiatives to mitigate impacts to impacted items. No change is proposed to this CoA.

## 6.9 Surface water, flooding and drainage

### 6.9.1 Assessment methodology

The assessment of potential flooding and drainage impacts of the proposed modification was primarily informed by a review of the EIS Appendix Q – Technical working paper: Surface water and flooding. This review also included an assessment of whether surface water impacts associated with the proposed modification can be adequately managed by the environmental management measures stipulated within the EIS and the SPIR and the relevant CoA.

### 6.9.2 Existing environment

The area around the proposed modification drains into Rozelle Bay either directly or via Whites Creek or Johnstons Creek. Whites Creek is a brick and concrete lined channel discharging near the intersection of City West Link and The Crescent. Whites Creek is a first order stream with a heavily urbanised catchment comprising an area of around 262 hectares. Works included in the EIS at the lower reach of Whites Creek included the redevelopment of City West Link and The Crescent intersection, raising the level of sections of these roads, the construction of new culverts into Rozelle Bay and the upgrade and widening of the existing bridge structure that crosses Whites Creek at The

Crescent. The Crescent civil site (C6) is located to the south of the confluence between Whites Creek and Rozelle Bay.

The Johnstons Creek catchment is heavily urbanised being situated within the suburbs of Glebe, Annandale, Petersham and Newtown, immediately west of the Sydney CBD. It comprises a total area of around 460 hectares. The channel consists of a wide-open concrete section at the Rozelle Bay end and brick walls further upstream. While no specific works were identified in the EIS of having the potential to impact the confluence of Johnstons Creek and Rozelle Bay, the proposed Mainline Tunnels alignment traversed beneath the upper reaches of Johnstons Creek. A constructed wetland of potential ecological significance is located on Johnstons Creek within Bicentennial Park.

Overall the Rozelle Bay catchment is highly urbanised and comprises a total area of around 857 hectares. Rozelle Bay is located between the suburbs of Glebe, Annandale, Lilyfield and Rozelle with flow inputs from Whites Creek, Johnstons Creek and Easton Park drain. The foreshore is actively used for recreational fishing and the bay houses private recreation craft, NSW patrol vessels and maritime industries including the Sydney Heritage Fleet located on the western shore of Rozelle Bay. Rozelle Bay is classified as W1 Maritime Waters in the Sydney Regional Environmental Plan (Sydney Harbour Catchment) (NSW Government 2005). Rozelle Bay is mapped as Key Fish Habitat and is an estuarine environment.

The existing flooding character of the proposed modification footprint during a 100-year Annual Recurrence Interval (ARI) is generally localised and minor. The majority of flood waters would be contained within the Rozelle Rail Yards, with only small-scale flooding, typically less than 0.1 m, experienced along the existing alignment of The Crescent. The area associated with Buruwan Park where the proposed future alignment of the intersection of The Crescent (northbound) with City West Link (westbound) crosses Whites Creek is more susceptible to flooding with flood depth of up to 1 m during a 100-year ARI flood event.

### 6.9.3 Assessment of potential impacts

#### **Flooding**

The proposed modification would not impact on or alter the flooding characteristics of the study area by comparison to the EIS, up to and including a 100-year ARI flood event. The approved project includes the raising of a section of The Crescent between the upgraded City West Link/The Crescent intersection and James Craig Road by about 0.2 metres to provide clearance over a new drainage channel that would direct stormwater from the Rozelle Rail Yards to Rozelle Bay. The proposed modification would be consistent with the approved project in this respect.

In accordance with Condition E195 the proponent must undertake further hydrological and hydraulic modelling based on the detailed design to determine the ability of the receiving drainage systems to effectively convey pavement drainage from the project. This modelling is to be undertaken in consultation with the relevant council(s) and Sydney Water and the outcomes are to be documented in the Stormwater Drainage Report required under Condition E196.

The Crescent overpass, green link and shared user path bridge structures including the bridge piers and embankment structures proposed for the overpass, are all elevated above The Crescent and City West Link and above the 100-year ARI flood level. As both The Crescent and City West Link currently have 100-year ARI flood immunity from creek flooding, the proposed modification is not anticipated to alter the flood characteristics of the intersection or result in an increased flood risk or impact on adjacent properties in events up to and including the 100-year ARI.

As the proposed modification would not raise road levels above what the approved project proposed, there would also be no change in flood behaviour, or increased flood risk or impact on adjacent properties in a PMF compared to the approved project. Adjustments to the local drainage design would mitigate any minor changes to overland flow paths caused by bridge piers or the embankment new structures for the overpass.



If during detailed design changes to the overtopping levels of The Crescent and City West Link or other changes to flowpaths are proposed, then further flood assessments would be required. In the event adverse flood impacts for existing properties and potential future development are identified during ongoing design development and modelling, mitigation measures would need to be incorporated in the design to minimise these impacts in accordance with Conditions E151 to E153.

The design of the proposed bridges would consider water forces resulting from a major flooding event up to and including a 100-year ARI event and account for scour, buoyancy and tiedown requirements.

### **Localised drainage**

All construction works would have the potential to impact local overland flow paths and existing minor drainage paths. Disruption of existing flow mechanisms, both of constructed drainage systems or those of overland flow paths, could occur as a consequence of the various construction activities and facilities.

These are typical impacts faced on most construction projects and would be addressed by adopting industry standard mitigation measures. Consideration of these impacts would be included during future detailed design and construction planning phases.

The proposed modification would largely be located within the approved project footprint and as a result would not result in a material increase in impermeable surface from that previously assessed. As such, no material increase in runoff volume and flow rates are likely to be generated. The proposed upgrade works at The Crescent/Johnston Street/Chapman Road intersection are located outside of the approved project footprint however these works would occur within existing road reservations and as a result no material increase in impermeable surface is expected.

While the proposed modification would require pavement drainage to be adjusted, the same strategy as for the approved project would apply. The surface runoff would mainly discharge to drainage systems along City West Link and The Crescent and then directly to Rozelle Bay. Some runoff may also be discharged to Whites Creek and the drainage channels within the Rozelle Rail Yards, which would be consistent with the approved project.

Where new connections to existing drainage infrastructure are proposed flow rates would be matched to existing flow rates where possible, so as not to overload the existing drainage system or cause adverse flood impacts on adjoining properties. Modelling would be undertaken to determine the ability of the receiving drainage systems to effectively convey drainage discharges from the project in accordance with Condition E195. Where modelling indicates that an adverse impact on the receiving drainage systems will occur, feasible and reasonable mitigation measures will be implemented.

### **Water quality and geomorphology**

Water quality of surrounding waterways including Whites Creek, Johnstons Creek and Rozelle Bay are not anticipated to be notably affected by the proposed modification. The implementation of standard erosion and sediment controls as required by the environmental management measures presented in the SPIR, the CoA and the Environment Protection Licence would ensure that potential impacts to water quality are managed effectively.

## **6.9.4 Management measures and conditions of approval**

Based on the assessment of potential surface water, flooding and drainage impacts associated with the proposed modification, no further environmental management measures are deemed necessary beyond those summarised in Part E of the SPIR.

The proposed modification would not require any change to the CoA for the project related to surface water, flooding and drainage.

## 6.10 Contamination and groundwater

### 6.10.1 Assessment methodology

The assessment of potential contamination and groundwater impacts of the proposed modification was informed by a review of the EIS Appendix Q – Technical working paper: Surface water and flooding and Appendix R: Contamination. These technical papers included information from a variety of sources including:

- AECOM, 2016b. WestConnex M4-M5 Link Rozelle Interchange Phase 1 Environmental Site Assessment
- AECOM, 2016c WestConnex M4-M5 Link Factual Contamination Report
- Jacobs (2015b) Lots 21/22, DP1151746 Rozelle Bay – NSW Roads & Maritime Services, Site Access and Management Procedures. Final, ExeC1a4/0341
- Assessment of water quality and treatment options in Johnstons Creek, Whites Creek, Hawthorne Canal and Balmain catchments. (Beck 2010)
- Pollution in Sydney Harbour: sewage, toxic chemicals and microplastics. Briefing Paper No 03/2015 (Montoya, 2015)
- Metals, nutrients and total suspended solids discharged during different flow conditions in highly urbanised catchments (Beck and Birch, 2010).

This review also included an assessment of whether surface water can be adequately managed by the environmental management measures stipulated within the EIS and the SPIR.

### 6.10.2 Existing environment

#### Hydrogeology

Groundwater at the modification area is shallow and tidally influenced in a northerly (towards Whites Creek) and easterly (towards Rozelle Bay) direction. Groundwater levels are typically shallow with levels in the sandstone being less than one metre below ground level. As at Rozelle, the groundwater standing water levels within the alluvium are lower by up to a metre indicating there is likely to be upward pressure from the groundwater within the sandstone.

#### Acid sulfate soils

The Crescent civil site at Annandale (C6) and surrounding areas are predominantly mapped with Class 1 acid sulfate risk potential which means any works that disturb more than one tonne of soil, or lower the water table would trigger the requirement for assessment and may require management.

#### Soils

An assessment of analytical soil results for the C6 civil site was undertaken within the technical working paper against the commercial/industrial (road and open space) site suitability screening criteria. This assessment indicated:

- Selected soil samples exceeded the human health USEPA (2018) residential regional screening levels. These criteria were selected as part of the soil human health assessment criteria for proposed recreational open space in the absence of criteria for particular analytes specific to exposure scenarios during proposed recreational open space land use and are therefore considered to be conservative for the proposed land uses (commercial/industrial – road and open space)
- Selected soil samples exceeded the NEPC (2013) NEPM ecological screening level for urban residential and public open space for benzo(a)pyrene toxic equivalence quotient.

### 6.10.3 Assessment of potential impacts

The proposed modification would generally result in potential contamination and groundwater impacts that are similar to those previously assessed in the EIS and SPIR. Construction of The Crescent overpass and shared user path bridge in the proposed location were not assessed in the EIS and may result in small increases in spoil related to foundations and piling. Potential impacts associated with the potential small increases in soil are considered to be readily manageable with the implementation of standard and approved management and mitigation measures including erosion and sediment controls in accordance with the Soil and Surface Water CEMP Sub-plan for the project required under Condition C4(e).

While it is not anticipated groundwater would be encountered during the construction of the proposed modification, should groundwater be encountered in excavations it would be managed in accordance with the requirements outlined in the Groundwater Management Plan for the project as required under Condition C4(f). The Groundwater CEMP Sub-plan would include the provisions outlined in Conditions E190 to E194, including the requirement for monitoring and modelling of groundwater levels throughout construction.

### 6.10.4 Management measures and conditions of approval

Based on the assessment of potential contamination and groundwater impacts associated with the proposed modification, no further environmental management measures are deemed necessary beyond those summarised in Part E of the SPIR.

The proposed modification would not require any change to the CoA for the project related to contamination and groundwater impacts.

## 6.11 Social and economic

### 6.11.1 Existing environment

Open space facilities in the vicinity of the proposed modification include Federal Park and Bicentennial Park located adjacent to Rozelle Bay. There is some carparking associated with this open space area which is accessed from Chapman Road. Buruwan Park is located adjacent to Whites Creek and the Inner West light rail corridor. This park is located within the approved project footprint and has already been acquired to allow for realignment of the City West Link/The Crescent intersection as detailed in the EIS.

There are only a small number of business and educational uses located in the vicinity of the proposed modification. The most relevant include:

- The Multi-hull Central Marina located on Rozelle Bay adjacent to Chapman Road
- The maritime maintenance facility located on the south side of The Crescent, west of James Craig Road and fronting Rozelle Bay on land owned by Roads and Maritime
- The Crescent Timber and Hardware located adjacent to Chapman Road
- The TAFE College located on Johnston Street close to the intersection with The Crescent
- The Annandale North Public School located on Johnston Street to some distance the south of the intersection.

The EIS did not identify any other social or community infrastructure facilities located in proximity to the proposed modification.

There are a number of existing pedestrian and cycle paths which run along Victoria Road and The Crescent to connect with Anzac Bridge to the east and with Federal Park and Bicentennial Park to the south. There is also a pedestrian and cycle path which connects from The Crescent through Buruwan Park and under the light rail bridge to Railway Parade, Annandale. North/south pedestrian and cycling connectivity between the suburbs of Rozelle/Lilyfield and Annandale/Glebe is constrained by the significant barrier created by Rozelle Rail Yards and City West Link and the Inner West light rail corridor.

The intersection of The Crescent/Johnston Street and Chapman Road contains two signalised pedestrian crossings allowing the crossing of The Crescent west of the intersection and the crossing of Johnston Street to the south of the intersection. In addition, a zebra crossing is located across the slip road between Johnston Street and The Crescent and to the north of the TAFE. Other pedestrian crossings within the modification footprint include a signalised crossing of The Crescent south of the intersection with City West Link and a signalised crossing of James Craig Road.

The nearest residents to the proposed modification are located in the suburb of Annandale to the south and west. Other residential suburbs including Rozelle and Lilyfield are located across City West Link and the Rozelle Rail Yards and a significant distance from the proposed modification. Parking for residents and visitors is generally available as on street parking on local roads. Chapman Road also contains a number of restricted parking spaces available for visitors to Bicentennial Park and its associated active and passive recreational infrastructure.

Public transport infrastructure in the surrounding area consists of the Rozelle Bay light rail stop accessed from either Buruwan Park or Bayview Crescent which provides connections to the CBD in the east via Pyrmont, or to Dulwich Hill in the west. Two bus stops are located on either side of The Crescent and provide connections to Balmain and Central Station via Glebe.

There are a number of heritage listed items located in the vicinity of the proposed modification. This includes a potential heritage item, The Crescent Mural, which is located along the western side of The Crescent abutting part of the light rail corridor. This mural has been identified for addition to the local environment plan heritage register.

## 6.11.2 Assessment of potential impacts

### Construction

#### *Businesses*

A number of business and educational uses would potentially be temporarily impacted during construction by noise and vibration, dust, construction traffic, visual impact and changes to parking and access arrangements. Most of these land uses would already have been impacted by the works proposed as part of the approved project with the exception of the TAFE College on Johnston Street which is more directly impacted by the proposed upgrade works at The Crescent/Johnston Street/Chapman Road intersection.

There would be a temporary loss of four carparking spaces located on the north side of Chapman Road during construction. This is likely to have a temporary impact on users of open space and businesses (the marina and Timber and Hardware store) located in the vicinity. On completion of construction these spaces would be reinstated in the vicinity of their current location.

#### *Connectivity and access*

Existing driveway access to a multi-unit residential property at 300 Johnston Street would be impacted by proposed upgrade works at The Crescent/Johnston Street/Chapman Road intersection. Access to this property would be maintained during construction in consultation with the landowner or occupier and in accordance with the requirements of Condition E46. Any temporary changes to the driveway access during construction of the intersection upgrade works would be coordinated with the landowners and/or occupiers. The indicative construction program shows that works at this intersection are likely to occur over a period of around 12 months. If property access is physically affected by the project, it would be reinstated to at least an equivalent standard in accordance with the requirements of Condition E47.

Potential impacts to connectivity and access during construction are outlined further in **section 6.3.3**. Impacts to parking and access during construction would be managed in accordance with Condition E54 which requires preparation of a Construction Parking and Access Strategy.

#### *Amenity*

The construction of the proposed modification would generally be in similar locations to what was assessed for the approved project, meaning the noise impacts during construction are generally

expected to be consistent with the EIS. The works around The Crescent, Chapman Road and Johnston Street may however impact a relatively small number of additional receivers given the need to complete construction work for the proposed modification further to the south and east than was assessed for the approved project.

The proposed modification does not significantly alter the scope and nature of construction works proposed in the vicinity of City West Link, The Crescent and Johnston Street as outlined in the EIS. As a result, the comprehensive mitigation measures relating to air quality identified in the SPIR and CoA such as the Air Quality CEMP Sub-plan and Dust Deposition Monitoring Program are considered appropriate to manage construction impacts.

The works associated with the proposed modification would be undertaken within the construction timeframe proposed in the EIS for construction of Stage 2 of the project (the Rozelle Interchange and Iron Cove Link). The modification aims to reduce construction fatigue experienced by the community by future proofing the intersection and reducing the need for further construction activities to accommodate future infrastructure projects in the locality including the proposed Western Harbour Tunnel project, should that project proceed in the future. This would minimise the duration of construction impacts on nearby residents resulting in a positive outcome for the local community.

## **Operation**

### *Businesses*

The proposed modification would result in the permanent loss of two parking spaces located on the north side of Johnston Street as a result of the proposed relocation of traffic lights at this intersection. This loss of parking is likely to have a minor impact on local residents, users of the TAFE College and users of nearby open space areas adjacent to Rozelle Bay.

Right turn movements from The Crescent overpass into James Craig Road (eastbound) and from Johnston Street into The Crescent (southbound) are not permitted as a result of the modification. These changes may result in inconvenience and longer trips for some motorists and potentially impact upon maritime related businesses located along James Craig Road. However, in both cases the number of turning movements potentially impacted is limited and alternative traffic routes are available.

### *Connectivity and access*

The proposed modification is predominantly located within the approved project footprint. The upgrade works proposed at the intersection of The Crescent/Johnston Street/Chapman Road would extend the project footprint slightly further to the south by comparison to the EIS. However, these works would occur within the existing road reservations and no additional property acquisition is required as part of the proposed modification.

The works proposed in the modification are of a similar nature and within a similar footprint to works already approved in this area as part of the EIS. A robust set of environmental management measures have been identified in Part E of the SPIR and in the Conditions of Approval to manage the potential impacts that are likely to arise in association with the proposed modification.

Existing driveway access to a multi-unit residential property at 300 Johnston Street would be impacted by proposed upgrade works at The Crescent/Johnston Street/Chapman Road intersection and in particular by the relocation of traffic signals a short distance along Johnston Street. Access to this driveway is via left in/left out movements to Johnston Street. The movement of vehicles into and out of the property is unlikely to affect the intersection performance and is an operational matter that would be addressed during the detailed design.

The EIS proposed to significantly improve pedestrian and cycling connectivity by providing a green link across City West Link to connect the Rozelle Rail Yards with the east side of The Crescent, Chapman Road and through to Bicentennial Park. A new elevated shared user path bridge was proposed from the green link across The Crescent to connect with the Rozelle Bay light rail stop.

The proposed modification would maintain the connectivity proposed in the EIS but with some realignment required as a result of the introduction of The Crescent overpass. The green link would

be realigned to the west of The Crescent providing a connection between the Rozelle Rail Yards and Rozelle Bay light rail stop. The new shared user path bridge would span across The Crescent to the east of The Crescent/City West Link intersection providing a connection between the Rozelle Rail Yards and the east side of The Crescent and Chapman Road adjacent to Rozelle Bay. The existing bus stop on The Crescent (northbound) would be relocated slightly to the south to facilitate The Crescent overpass. The relocation is not anticipated to result in any notable impact for users of the bus stop.

The proposed upgrade works at The Crescent/Johnston Street/Chapman Road intersection would result in the removal of the existing at grade and signalised pedestrian connection across The Crescent between Johnston Street and Chapman Road. This would result in a longer pedestrian movement an increase in the number of signalised pedestrian crossings to reach the open space at Bicentennial Park.

The proposed pedestrian and cycling path connection from The Crescent under the light rail bridge to Railway Parade and Bayview Crescent as detailed in the EIS would not be affected by the proposed modification.

### *Amenity*

Operational road traffic noise levels are expected to generally be comparable to the approved project for the majority of receivers in the study area. There is a relatively small increase in noise from traffic which is sufficient to result in additional exceedances on Johnston Street.

The Crescent overpass is predicted to increase noise levels at a small number of receivers near to Bayview Crescent. Noise levels in this area are however influenced by higher volumes of traffic on City West Link and The Crescent, in comparison to the relatively lower traffic volumes on the overpass. At property treatments for the triggered receivers are considered to be the preferred noise mitigation measure.

The operational air quality assessment shows that some receptors are predicted to experience increases in emissions by comparison to the EIS. However, the predicted increases are small and do not change the outcomes of the EIS assessment. As a result, no additional mitigation is considered necessary.

No additional landscaping or open space is to be removed as a result of the proposed modification. Potential noise and visual amenity impacts to surrounding residents including those at 300 Johnston Street are discussed in **section 6.4.3** and **section 6.7.3** respectively.

The visual setting of The Crescent Mural is likely to be affected by The Crescent overpass and footpath ramp which connects the Rozelle Bay light rail stop to The Crescent. Views to some sections of the mural are likely to be partly obscured by these proposed structures, however a large amount of The Crescent Mural would remain visible, particularly at the southern end (refer to **section 6.8.3**). Changes to an existing environmental management measure and condition of approval is proposed to mitigate this impact.

### 6.11.3 Management measures and conditions of approval

Potential social and economic impacts associated with the proposed modification would generally be managed through the implementation of the approved environmental management measures for the project as summarised in Part E of the SPIR including:

- SE1 requiring preparation of a Business Management Plan and
- OSE8 requiring preparation of a Social Infrastructure Plan.

Potential impacts to carparking and access during construction would be managed in accordance with Condition E54 which requires preparation of a Construction Parking and Access Strategy.

To manage potential impacts to The Crescent Mural revisions to an existing environmental management measure (NAH03) and Condition E163 are proposed to require archival recording of this potential heritage item.

## 6.12 Utilities

The contractor is currently undertaking utility investigations to confirm the location of existing utilities in this area of the project. Based on these investigations, currently the proposed modification does not propose any changes to the utility works described in the EIS. As utility investigations continue, if the need for additional utility relocations are identified then this would be managed in accordance with the CEMP and relevant sub-plans. Therefore, no further environmental management measures are considered necessary beyond those summarised in in Part E of the SPIR.

No changes to the EMMs and CoA are proposed to address utilities as a result of the proposed modification.

## 6.13 Cumulative impacts

### 6.13.1 Assessment methodology

The assessment of cumulative impacts of the proposed modification was informed by a review of the EIS Chapter 26 (Cumulative impacts) along with the NSW Department of Planning, Industry and Environment Major Projects website<sup>4</sup>. This assessment considered major developments that are proposed, have been approved (but not yet constructed), and/or would be constructed or operated at the same time as the planning, construction or operation of the project including near the Rozelle Interchange.

Cumulative impacts are considered important to assess because in isolation, a particular impact from one project may be considered minor, but when the impacts of multiple projects are considered, the impacts may be more substantial.

The assessment of cumulative impacts associated with the proposed modification considers the conclusions from the EIS along with available new information associated with identified projects having the potential to result in cumulative impacts with the proposed modification including:

- Proposed Western Harbour Tunnel project
- Beaches Link and Gore Hill Freeway Connection
- Other WestConnex projects including the M4 Widening, M4 East, New M5, M4-M5 Link and King Georges Road Interchange Upgrade
- Sydney Gateway
- F6 Extension Stage 1
- Glebe Island Concrete Batching Plant
- Glebe Island Multi-User Facility.

### 6.13.2 Existing environment

As outlined in Chapter 1 (Introduction) the modification area is also subject to construction works and operational changes associated with the proposed Western Harbour Tunnel project if it receives planning approval. Specifically, the proposed Western Harbour Tunnel project component includes tunnels connecting to the M4-M5 Link at the Rozelle Interchange with portals to the north of The Crescent and City West Link intersection, crossing underneath Sydney Harbour between the Birchgrove and Waverton areas, and connecting with the Warringah Freeway at North Sydney.

Details regarding the construction of the proposed Western Harbour Tunnel project were not available during the drafting of the EIS and it was assumed that there would be a period of close to four years where the construction works of the two projects would overlap. The EIS conservatively assumed that

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<sup>4</sup> <https://www.planningportal.nsw.gov.au/major-projects>

construction works for the two projects are occurring concurrently within the Rozelle Rail Yards and assessed the potential impacts on this basis. It is now likely that there would be a shorter duration of overlap between the construction works of the two projects.

Cumulative construction traffic volumes noted in the M4-M5 Link SPIR (in addition to the construction traffic volumes being generated by the project) included the proposed Western Harbour Tunnel project construction site at Rozelle and the Multi-User Facility and Concrete Batching Plant planned at Glebe Island. However, the cumulative traffic operation assessment did not include traffic from the proposed Western Harbour Tunnel surface ramps at Rozelle as these were to be assessed in the proposed Western Harbour Tunnel project EIS.

The residential areas likely to be most impacted by construction fatigue associated with these projects are those along and to the north of Lilyfield Road and users of Easton Park. The residential areas of Annandale and Lilyfield to the south of City West Link are also likely to be impacted. Potential impacts include construction traffic, construction noise and vibration, dust and visual impacts associated with building demolition, vegetation removal and construction activity at these sites.

### 6.13.3 Assessment of potential impacts

Potential beneficial or adverse cumulative impacts associated with the proposed modification are generally associated with potential changes to traffic and noise generation during construction and operation, along with construction fatigue at surrounding residences.

Cumulative operational noise impacts and air quality impacts were considered in the relevant cumulative scenarios assessed for the proposed modification (refer to **section 6.4** and **section 6.5**). These cumulative scenarios considered forecast traffic generation from a range of approved and proposed motorway projects. Further specific cumulative impacts are included below.

#### Traffic

Potential cumulative impacts relate to vehicles from multiple projects utilising the same roads during both construction and operation. The proposed Glebe Island Concrete Batching Plant (SSD 8554) and Glebe Island Multi-User Facility would both require the use of James Craig Road for access. The proposed modification would result in a minor change to access arrangements by restricting access for vehicles utilising The Crescent overpass. As the majority of vehicles accessing these facilities would likely be approaching from either City West Link or the Western Distributor, it is considered unlikely that cumulative impacts would occur.

The use of the C6a civil site has the potential to result in additional construction impacts as a result of vehicles entering and exiting the site from The Crescent (westbound). Based on forecast traffic numbers, traffic from these facilities is likely to have a negligible impact on the surrounding road network including The Crescent (westbound) and City West Link.

Two future year cumulative scenarios were modelled to assess the operational traffic impacts of the proposed modification in comparison to the approved project:

- **Operation ‘cumulative’ (2023):** With the 2023 ‘do minimum’ projects completed, the M4-M5 Link complete and open to traffic, and in addition, the proposed Sydney Gateway and the Western Harbour Tunnel component of the proposed Western Harbour Tunnel project complete and operational
- **Operation ‘cumulative’ (2033):** With the 2023 ‘do minimum’ projects completed, the M4-M5 Link complete and open to traffic, and in addition, the proposed Sydney Gateway, Western Harbour Tunnel project and F6 Extension complete and operational.

The cumulative operational traffic assessment concluded:

- During the AM and PM peak hours, the overall modelled network performance metrics are comparable or indicate an improvement to those presented in the EIS
- Intersection performances are forecast to be comparable or better when compared with the EIS results



- Travel time analysis forecasts that City West Link to Anzac Bridge are forecast to improve due to the proposed changes at the City West Link/The Crescent intersection, however, the increased traffic volume able to enter the network still impacts parts of the network already forecast to be congested, such as Victoria Road northbound, causing longer travel times.
- Public transport travel time impacts reflect those of general traffic, except for citybound in the AM peak from Victoria Road, due to the bus lane on Victoria Road in the citybound direction.

## Noise

Concurrent noise impacts can occur where more than one works activity occurs at the same time and in the same location such that an individual receiver is potentially impacted by noise from more than one element of works and from multiple projects.

Additional cumulative construction and operational noise impacts are considered unlikely to occur given the following:

- The noise impacts at each project would be localised to receivers in close proximity to each individual project
- The separation distances and noise attenuation between the various construction sites and projects
- The presence of heavily trafficked major roads such as City West Link, The Crescent, the Western Distributor and Victoria Road which dominate the ambient noise environment
- The conditions of approval for the project which require each construction ancillary facility to operate within applicable noise management levels particularly during the more sensitive out of hours periods.

## Construction fatigue

Construction fatigue relates to receivers that experience construction impacts from a variety of projects over an extended period with few or no breaks between construction periods. Construction fatigue typically relates to traffic and access disruptions, noise and vibration, air quality and visual amenity and social impacts from projects that have overlapping construction phases or are back to back. Construction fatigue is known to result in negative effects on mental health through stress and anxiety.

The proposed modification aims to reduce construction fatigue experienced by residents in Annandale, particularly along Bayview Crescent which will experience most of the noise and visual impacts associated with the project and proposed Western Harbour Tunnel project. The proposed modification would reduce construction fatigue experienced by the community by improving construction efficiencies and consolidating construction activities from both the Rozelle Interchange and the proposed Western Harbour Tunnel project. The proposed modification would help deliver the road infrastructure as efficiently as possible and avoid abortive works by allowing the infrastructure required for both current and proposed projects to be designed and delivered in an integrated and efficient manner. This would be a positive and beneficial outcome for the community and potential construction fatigue receptors.

### 6.13.4 Management measures and conditions of approval

Based on the assessment of potential cumulative impacts associated with the proposed modification, no further environmental management measures are deemed necessary beyond those summarised in Part E of the SPIR.

No specific conditions of approval relate specifically to the management of cumulative impact of the project and other proposed and/or approved projects.

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