



WATERLOO METRO QUARTER OVER STATION DEVELOPMENT

Environmental Impact Statement Appendix W – Transportation Air Quality Management

**SSD-10437 Southern Precinct
SSD-10439 Central Precinct and
SSD-10440 Northern Precinct
SSD-10441 Amending Concept DA**

Detailed State Significant Development
Development Application

Prepared for **Waterloo Developer Pty Ltd**

30 September 2020

Reference	Description
Applicable SSD Applications	SSD-10437 Southern Precinct SSD-10439 Central Precinct SSD-10440 Northern Precinct SSD-10441 Amending Concept DA
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1. Glossary and abbreviations

Reference	Description
ACHAR	Aboriginal Cultural Heritage Assessment Report
ADG	Apartment Design Guide
AHD	Australian height datum
AQIA	Air Quality Impact Assessment
BC Act	Biodiversity Conservation Act 2016
BCA	Building Code of Australia
BC Reg	Biodiversity Conservation Regulation 2017
BDAR	Biodiversity Development Assessment Report
CEEC	critically endangered ecological community
CIV	capital investment value
CMP	Construction Management Plan
CO	Carbon Monoxide
Concept DA	A concept DA is a staged application often referred to as a 'Stage 1' DA. The subject application constitutes a detailed subsequent stage application to an approved concept DA (SSD 9393) lodged under section 4.22 of the EP&A Act.
Council	City of Sydney Council
CPTED	Crime Prevention Through Environmental Design
CSSI approval	critical State significant infrastructure approval
CTMP	Construction Traffic Management Plan
DA	development application
DPIE	NSW Department of Planning, Industry and Environment
DRP	Design Review Panel
EP&A Act	Environmental Planning and Assessment Act 1979
EPA	NSW Environment Protection Authority
EPA Regulation	Environmental Planning and Assessment Regulation 2000
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999

Reference	Description
ESD	ecologically sustainable design
GANSW	NSW Government Architect's Office
GFA	gross floor area
HIA	Heritage Impact Assessment
IAP	Interchange Access Plan
LGA	Local Government Area
NCC	National Construction Code
NO ₂	Nitrogen Dioxide
OSD	over station development
PIR	Preferred Infrastructure Report
PM ₁₀	Inhalable Particulate Matter (< 10 µm in diameter)
POM	Plan of Management
PSI	Preliminary Site Investigation
RMS	Roads and Maritime Services
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SEPP 55	State Environmental Planning Policy No 55—Remediation of Land
SEPP 65	State Environmental Planning Policy No. 65 – Design Quality of Residential Apartment Development
SRD SEPP	State Environmental Planning Policy (State and Regional Development) 2009
SREP Sydney Harbour	State Regional Environmental Plan (Sydney Harbour Catchment) 2005
SSD	State significant development
SSD DA	State significant development application
SLEP	Sydney Local Environmental Plan 2012
Transport for NSW	Transport for New South Wales
TIA	Traffic Impact Assessment

Reference	Description
The proposal	The proposed development which is the subject of the detailed SSD DA
The site	The site which is the subject of the detailed SSD DA
TRAQ	Tool for Roadside Air Quality
VIA	Visual Impact Assessment
WMQ	Waterloo Metro Quarter
WMP	Waste Management Plan
WSUD	water sensitive urban design

2. Executive summary

This planning report has been prepared by RWDI Anemos Ltd. (RWDI) to accompany a detailed State significant development (SSD) development application (DA) for the following Precincts: Southern Precinct Central Precinct and Northern Precinct over station development (OSD) at the Waterloo Metro Quarter site.

This report has been prepared to address the relevant conditions of the concept SSD DA (SSD 9393) and the Secretary's Environmental Assessment Requirements (SEARs) issued for the detailed SSD DA (SSD 10437 SSD 10439 and SSD 10440).

Emissions associated with the Metro exhaust have been considered, however we note that Sydney Metro's Environmental Impact Statement states that concentrations of particulates and other compounds are expected to be minor and that "it is unlikely that the project would have air quality impacts on the surrounding environment, including sensitive receivers". Roadway emissions were assessed and it was found that compliance is achieved at the kerb of Botany Road (the worst-case of the surrounding roadways) for carbon monoxide (CO), nitrogen dioxide (NO₂), and inhalable particulate matter (PM₁₀) under the proposed peak hour traffic volume at mid-block on Botany Road.

This report concludes that transportation-related air quality impacts at the proposed Southern Precinct Central Precinct and Northern Precinct OSD is suitable and warrants approval.

3. Introduction

This report has been prepared to accompany a detailed State significant development (SSD) development application (DA) for the following precincts: Southern Precinct Central Precinct and Northern Precinct over station development (OSD) at the Waterloo Metro Quarter site. The detailed SSD DA is consistent with the concept approval (SSD 9393) granted for the maximum building envelope on the site, as proposed to be modified.

The Minister for Planning, or their delegate, is the consent authority for the SSD DA and this application is lodged with the NSW Department of Planning, Industry and Environment (DPIE) for assessment.

The detailed SSD DA seeks development consent for the design, construction and operation of:

Southern Precinct

- 25-storey residential building (Building 3) comprising student accommodation, to be delivered as a mixture of studio and twin apartments with approximate capacity of 474 students
- 9-storey residential building (Building 4) above the southern station box to accommodate 70 social housing dwellings
- ground level retail tenancies including Makerspace and gymnasium lobby, and loading facilities
- level 1 and level 2 gymnasium and student accommodation communal facilities
- landscaping and private and communal open space at podium and roof top levels to support the residential accommodation
- new public open space including the delivery of the Cope Street Plaza, including vehicle access to the site via a shared way from Cope Street, expanded footpaths on Botany and Wellington streets and public domain upgrades
- signage zone locations
- utilities and service provision
- stratum subdivision (staged).

Central Precinct

- 24–storey residential building (Building 2) comprising approximately 126 market residential and 24 affordable housing apartments, to be delivered as a mixture of one-bedroom, two-bedroom and three-bedroom apartments
- ground level retail tenancies, community hub, precinct retail amenities and basement carpark entry
- level 1 and level 2 community facilities (as defined in the SLEP) intended to be operated as a childcare centre
- landscaping and private and communal open space at roof top levels to support the residential accommodation
- new public open space including the delivery of the Church Square, including vehicle access to the basement car park via a shared way from Cope Street, expanded footpaths and public domain upgrades on Botany Road
- external licensed seating areas
- signage zone locations
- utilities and service provision
- stratum subdivision (staged).

Northern Precinct

- 17-storey commercial building (Building 1) comprising Commercial floor space, with an approximate capacity of 4000 workers
- ground level retail tenancies, loading facilities serving the northern and central precinct including Waterloo metro station
- landscaping and private open space at podium and roof top levels to support the commercial tenants
- new public open space including the delivery of the Raglan Street Plaza, Raglan Walk and expanded footpaths on Raglan Street and Botany Road and public domain upgrades
- external licensed seating areas
- signage zone locations
- utilities and service provision
- stratum subdivision (staged).

This report has been prepared in response to the requirements contained within the Secretary’s Environmental Assessment Requirements (SEARs) dated 8 April 2020, 9 April 2020 and 9 April 2020 and issued for the detailed SSD DA. Specifically, this report has been prepared to respond to the SEARs requirements summarised below.

Item	Description of requirement	Section reference (this report)
Plans and Documents	the EIS must include the following: air quality assessment (where relevant)	7,8,9

Table 1 - SEARs requirements

4. The site

The site is located within the City of Sydney Local Government Area (LGA). The site is situated about 3.3 kilometres south of Sydney CBD and eight kilometres northeast of Sydney International Airport within the suburb of Waterloo.

The Waterloo Metro Quarter site comprises land to the west of Cope Street, east of Botany Road, south of Raglan Street and north of Wellington Street (refer to Figure 1). The heritage-listed Waterloo Congregational Church at 103–105 Botany Road is within this street block but does not form a part of the Waterloo Metro Quarter site boundaries.

The Waterloo Metro Quarter site is a rectangular shaped allotment with an overall site area of approximately 1.287 hectares.

The Waterloo Metro Quarter site comprises the following allotments and legal description at the date of this report. Following consolidation by Sydney Metro (the Principal) the land will be set out in deposited plan DP1257150.

- 1368 Raglan Street (Lot 4 DP 215751)
- 59 Botany Road (Lot 5 DP 215751)
- 65 Botany Road (Lot 1 DP 814205)
- 67 Botany Road (Lot 1 DP 228641)
- 124-128 Cope Street (Lot 2 DP 228641)
- 69-83 Botany Road (Lot 1, DP 1084919)
- 130-134 Cope Street (Lot 12 DP 399757)
- 136-144 Cope Street (Lots A-E DP 108312)
- 85 Botany Road (Lot 1 DP 27454)
- 87 Botany Road (Lot 2 DP 27454)
- 89-91 Botany Road (Lot 1 DP 996765)
- 93-101 Botany Road (Lot 1 DP 433969 and Lot 1 DP 738891)
- 119 Botany Road (Lot 1 DP 205942 and Lot 1 DP 436831)
- 156-160 Cope Street (Lot 31 DP 805384)
- 107-117A Botany Road (Lot 32 DP 805384 and Lot A DP 408116)
- 170-174 Cope Street (Lot 2 DP 205942).

The detailed SSD DA applies to the Southern Precinct Central Precinct Northern Precinct (the site) of the Waterloo Metro Quarter site. The site has an area of approximately 4830sqm 2,460sqm 5,120sqm. The subject site comprises the following allotments and legal description at the date of this report.

Southern Precinct DA

- 130–134 Cope Street (Lot 12 DP 399757) (Part)
- 136–144 Cope Street (Lots A-E DP 108312) (Part)
- 93–101 Botany Road (Lot 1 DP 433969 and Lot 1 DP 738891) (Part)
- 156–160 Cope Street (Lot 31 DP 805384)

- 107–117A Botany Road (Lot 32 DP 805384 and Lot A DP 408116)
- 119 Botany Road (Lot 1 DP 205942 and Lot 1 DP 436831)
- 170–174 Cope Street (Lot 2 DP 205942).

Central Precinct DA

- 130–134 Cope Street (Lot 12 DP 399757) (Part)
- 136–144 Cope Street (Lots A-E DP 108312) (Part)
- 85 Botany Road (Lot 1 DP 27454)
- 87 Botany Road (Lot 2 DP 27454)
- 89–91 Botany Road (Lot 1 DP 996765)
- 93–101 Botany Road (Lot 1 DP 433969 and Lot 1 DP 738891) (Part).

Northern Precinct DA

- 1368 Raglan Street (Lot 4 DP 215751)
- 59 Botany Road (Lot 5 DP 215751)
- 65 Botany Road (Lot 1 DP 814205)
- 67 Botany Road (Lot 1 DP 228641)
- 124–128 Cope Street (Lot 2 DP 228641)
- 69–83 Botany Road (Lot 1, DP 1084919)
- 130–134 Cope Street (Lot 12 DP 399757).

The boundaries of the overall site are identified at Figure 1, and the subject site of the detailed SSD DA is identified at Figures 2 and 3. The site is reasonably flat with a slight fall to the south.

The site previously included three to five storey commercial, light industrial and shop top housing buildings. All previous structures except for an office building at the corner of Botany Road and Wellington Street have been demolished to facilitate construction of the new Sydney Metro Waterloo station. As such the existing site is predominately vacant and being used as a construction site. Construction of the Sydney metro is currently underway on site in accordance with critical State significant infrastructure approval (CSSI 7400).



Figure 1 - Aerial image of the site
Source: Urbis

The area surrounding the site consists of commercial premises to the north, light industrial and mixed-use development to the south, residential development to the east and predominantly commercial and light industry uses to the west.

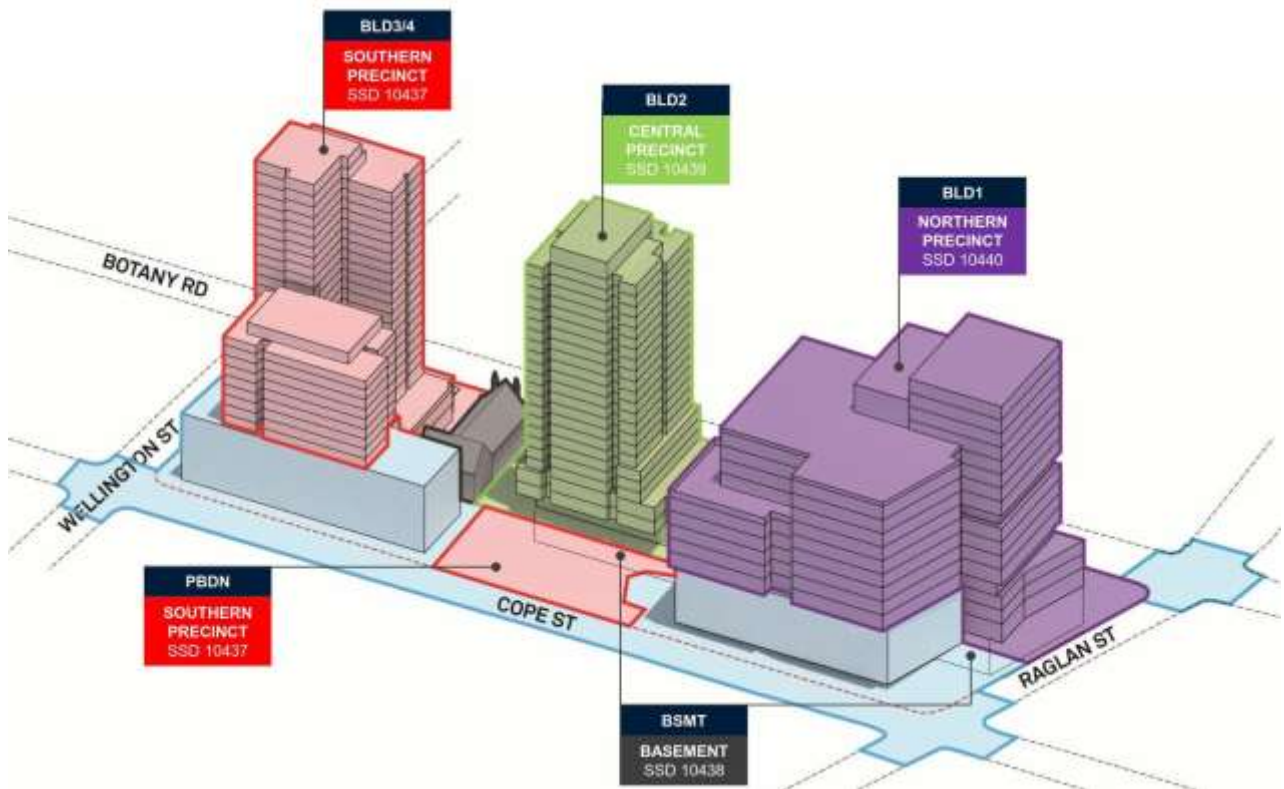


Figure 2 - Waterloo Metro Quarter site, with sub-precincts identified
Source: HASSELL

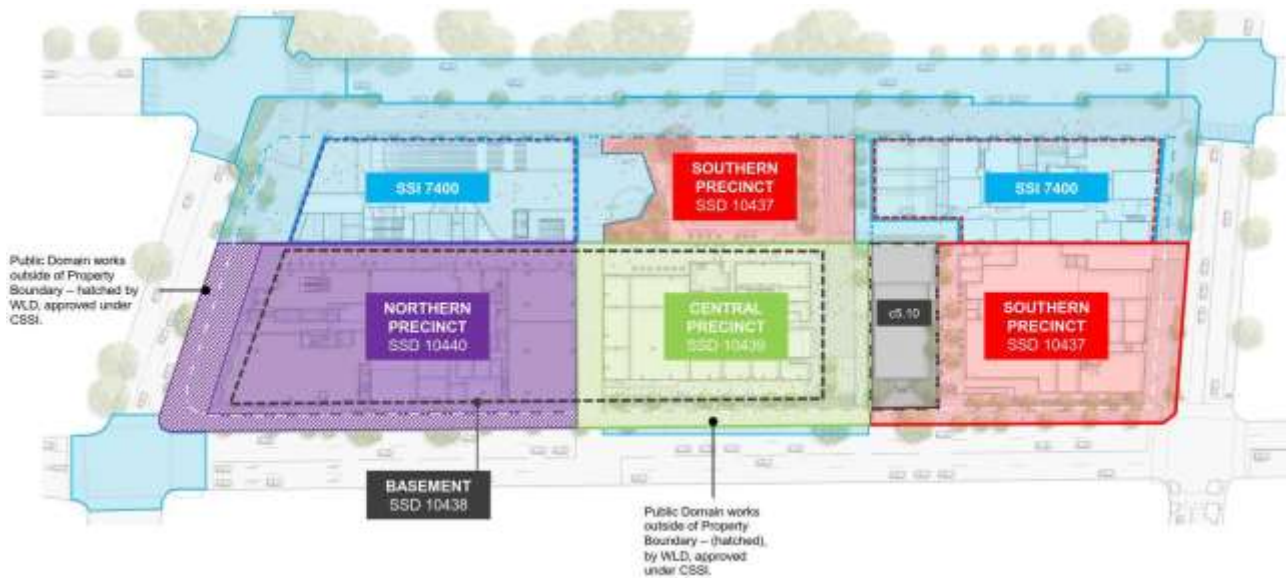


Figure 3 - Waterloo Metro Quarter site, with sub-precincts identified
Source: Waterloo Developer Pty Ltd

5. Background

5.1 About Sydney Metro

Sydney Metro is Australia's biggest public transport project. Services started in May 2019 in the city's North West with a train every four minutes in the peak. A new standalone railway, this 21st century network will revolutionise the way Sydney travels.

There are four core components:

5.1.1 Sydney Metro North West

This project is now complete and passenger services commenced in May 2019 between Rouse Hill and Chatswood, with a metro train every four minutes in the peak. The project was delivered on time and \$1 billion under budget.

5.1.2 Sydney Metro City & Southwest

Sydney Metro City & Southwest project includes a new 30km metro line extending metro rail from the end of Metro Northwest at Chatswood, under Sydney Harbour, through new CBD stations and southwest to Bankstown. It is due to open in 2024 with the ultimate capacity to run a metro train every two minutes each way through the centre of Sydney.

Sydney Metro City & Southwest will deliver new metro stations at Crows Nest, Victoria Cross, Barangaroo, Martin Place, Pitt Street, Waterloo and new underground metro platforms at Central Station. In addition, it will upgrade and convert all 11 stations between Sydenham and Bankstown to metro standards.

5.1.3 Sydney Metro West

Sydney Metro West is a new underground railway connecting Greater Parramatta and the Sydney CBD. This once-in-a-century infrastructure investment will transform Sydney for generations to come, doubling rail capacity between these two areas, linking new communities to rail services and supporting employment growth and housing supply between the two CBDs.

The locations of seven proposed metro stations have been confirmed at Westmead, Parramatta, Sydney Olympic Park, North Strathfield, Burwood North, Five Dock and The Bays.

The NSW Government is assessing an optional station at Pyrmont and further planning is underway to determine the location of a new metro station in the Sydney CBD.

5.1.4 Sydney Metro Greater West

Metro rail will also service Greater Western Sydney and the new Western Sydney International (Nancy Bird Walton) Airport. The new railway line will become the transport spine for the Western Parkland City's growth for generations to come, connecting communities and travellers with the rest of Sydney's public transport system with a fast, safe and easy metro service.

The Australian and NSW governments are equal partners in the delivery of this new railway.

The Sydney Metro project is illustrated below.

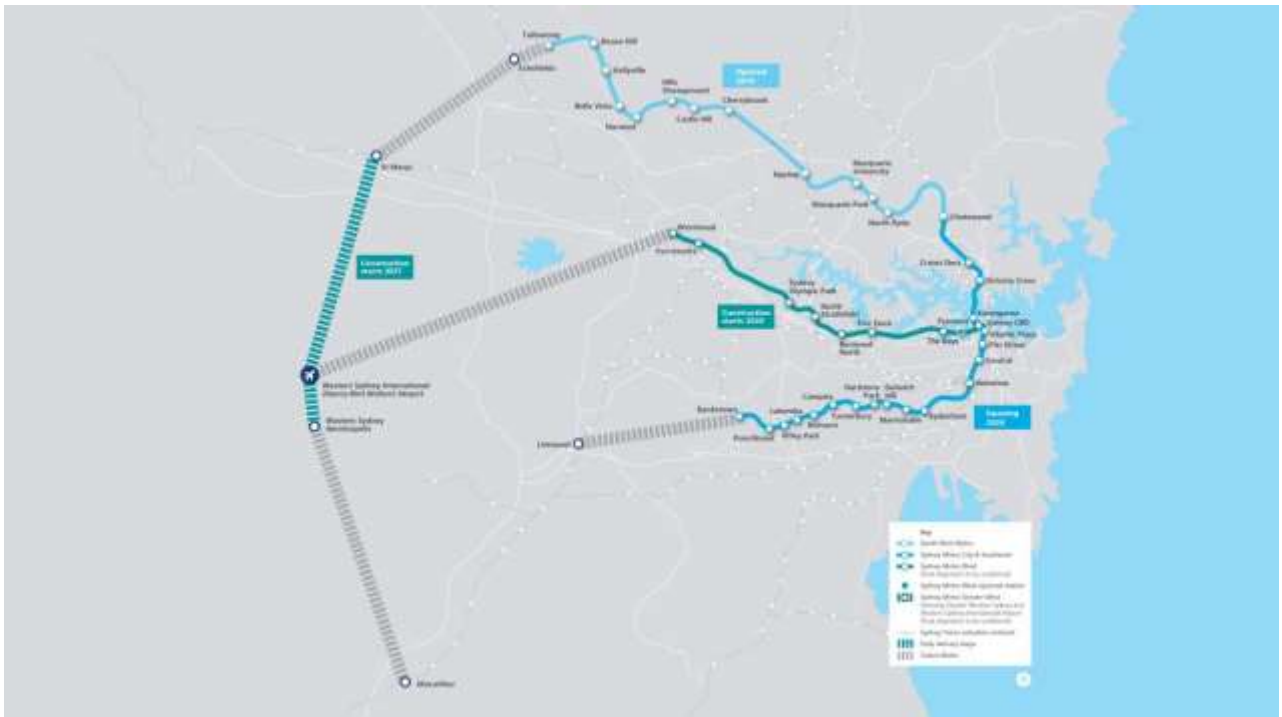


Figure 4 - Sydney Metro alignment map
Source: Sydney Metro

5.2 Sydney Metro CSSI Approval (SSI 7400)

On 9 January 2017, the Minister for Planning approved the Sydney Metro City & Southwest - Chatswood to Sydenham project as a critical State significant infrastructure (CSSI) project (reference SSI 7400) (CSSI approval). The terms of the CSSI approval includes all works required to construct the Sydney Metro Waterloo Station. The CSSI approval also includes the construction of below and above ground works within the metro station structure for appropriate integration with the OSD.

With regards to CSSI related works, any changes to the ‘metro station box’ envelope and public domain will be pursued in satisfaction of the CSSI conditions of approval and do not form part of the scope of the concept SSD DA or detailed SSD DA for the OSD.

Except to the extent described in the EIS or Preferred Infrastructure Report (PIR) submitted with the CSSI application, any OSD buildings and uses do not form part of the CSSI approval and will be subject to the relevant assessment pathway prescribed by the EP&A Act.

The delineation between the approved Sydney Metro works, generally described as within the two ‘metro station boxes’ and surrounding public domain works, and the OSD elements are illustrated in Figure 5.

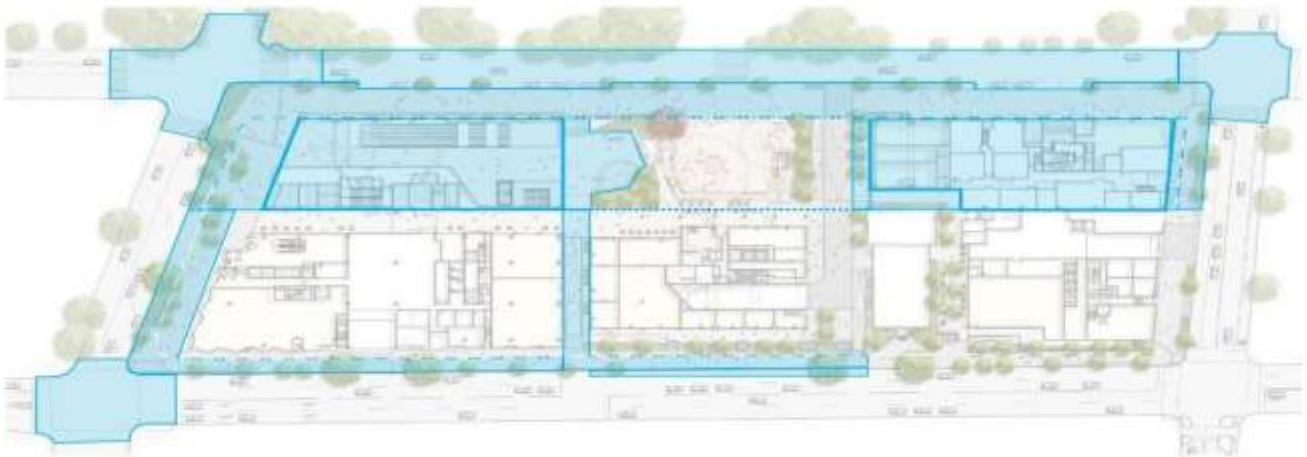


Figure 5 - CSSI Approval scope of works
Source: WL Developer Pty Ltd

5.3 Concept Approval (SSD 9393)

As per the requirements of clause 7.20 of the *Sydney Local Environmental Plan 2012 (SLEP)*, as the OSD exceeds a height of 25 metres above ground level (among other triggers), development consent is first required to be issued in a concept DA (formerly known as Stage 1 DA).

Development consent was granted on 10 December 2019 for the concept SSD DA (SSD 9393) for the Waterloo Metro Quarter OSD including:

- a maximum building envelope for podium, mid-rise and tower buildings
- a maximum gross floor area of 68,750sqm, excluding station floor space
- conceptual land use for non-residential and residential floor space
- minimum 12,000sqm of non-residential gross floor area including a minimum of 2,000sqm of community facilities
- minimum 5% residential gross floor area as affordable housing dwellings
- 70 social housing dwellings
- basement car parking, motorcycle parking, bicycle parking, and service vehicle spaces.

The detailed SSD DA seeks development consent for the OSD located within the Southern Precinct Central Precinct Northern Precinct of the site, consistent with the parameters of this concept approval. Separate SSD DAs have been prepared and will be submitted for the Basement Car Park proposed across the Waterloo Metro Quarter site.

A concurrent amending concept SSD DA has been prepared and submitted to the DPIE which proposed to make modifications to the approved building envelopes at the northern precinct and central building. This amending concept SSD DA does not impact the proposed development within the southern precinct.

6. Proposed development

6.1 Waterloo Metro Quarter Development

The Waterloo Metro Quarter OSD comprises four separate buildings, a basement carpark and public domain works adjacent to the Waterloo Metro station.

Separate SSD DAs will be submitted concurrently for the design, construction and operation of each building in the precinct;

- Southern precinct SSD-10437,
- Basement Car Park SSD-10438,
- Central precinct SSD-10439, and
- Northern precinct-SSD-10440.

An overview of the Development is included below for context. This detailed SSD DA seeks development consent for the design, construction and operation of the Southern Precinct, Central Precinct, and Northern Precinct:

6.1.1 Southern Precinct [Subject DA]

The Southern Precinct comprises:

- 25-storey residential building (Building 3) comprising student accommodation, to be delivered as a mixture of studio and twin apartments with approximate capacity of 474 students
- 9 storey residential building (Building 4) above the southern station box to accommodate 70 social housing dwellings
- ground level retail tenancies including Makerspace and gymnasium lobby, and loading facilities
- level 1 and level 2 gymnasium and student accommodation communal facilities
- landscaping and private and communal open space at podium and roof top levels to support the residential accommodation
- new public open space including the delivery of the Cope Street Plaza, including vehicle access to the site via a shared way from Cope Street, expanded footpaths on Botany and Wellington Streets and public domain upgrades
- signage zone locations
- utilities and service provision
- stratum subdivision (staged).

6.1.2 Basement Car Park

The Basement Car Park comprises:

- 2-storey shared basement car park and associated excavation comprising
- Ground level structure
- Carparking for the Commercial Building 1, Residential Building 2, social housing Building 4, Waterloo Congregational Church and Sydney Metro
- Service vehicle bays

- commercial end of trip and bicycle storage facilities
- Retail end of trip and bicycle storage facilities
- residential storage facilities
- shared plant and services.

6.1.3 Central Precinct [Subject DA]

The Central Precinct comprises:

- 24-storey residential building (Building 2) comprising approximately 126 market residential and 24 affordable housing apartments, to be delivered as a mixture of 1 bedroom, 2 bedroom and 3 bedroom apartments
- Ground level retail tenancies, community hub, precinct retail amenities and basement car park entry
- level 1 and level 2 community facilities (as defined in the SLEP) intended to be operated as a childcare centre
- landscaping and private and communal open space at roof top levels to support the residential accommodation
- new public open space including the delivery of the Church Square, including vehicle access to the basement via a shared way from Cope Street, expanded footpaths and public domain upgrades on Botany Road
- external licensed seating areas
- signage zone locations
- utilities and service provision
- stratum subdivision (staged).

6.1.4 Northern Precinct [Subject DA]

The Northern Precinct comprises:

- 17-storey commercial building (Building 1) comprising Commercial floor space, with an approximate capacity of 4000 workers
- ground level retail tenancies, loading dock facilities serving the northern and central precinct including Waterloo metro station
- landscaping and private open space at podium and roof top levels to support the commercial tenants
- new public open space including the delivery of the Raglan Street Plaza, Raglan Walk and expanded footpaths on Raglan Street and Botany Road and public domain upgrades
- external licensed seating areas
- signage zone locations
- utilities and service provision
- stratum subdivision (staged).

7. Methodology and Approach

An assessment of air quality impacts due to emissions associated with transportation in the vicinity of the proposed development has been performed. Two potential sources of emissions were considered:

- exhaust associated with the Sydney Metro; and
- motor vehicle emissions from major roadways.

Emissions associated with the Metro exhaust have been considered, however we note that Sydney Metro's Environmental Impact Statement (Chapter 22, Air Quality) states that concentrations of particulates and other compounds are expected to be minor and that "it is unlikely that the project would have air quality impacts on the surrounding environment, including sensitive receivers". Therefore, the focus of our study and scope of this report is limited to emissions from roadway sources only, with focus on traffic on Botany Road, to determine the potential for adverse air quality effects at the proposed development.

Screening-level modelling was performed using version 1.3 of the Tool for Roadside Air Quality (TRAQ) developed by the NSW Roads and Maritime Services (release date: June 1, 2017). This is a conservative screening tool for determining whether further assessment is needed. It is used in conjunction with the CALINE4 roadway dispersion model; RWDI used Version 2.1 of CALINE4 for this purpose.

The development site is bounded by Botany Road to the west, Wellington Street to the south, Cope Street to the east and Raglan Street to the North. Of these streets, Botany Road has by far the largest volume of traffic and has been selected as the subject of this screening level modelling. The Transport Impact Assessment report for the development (prepared by ptc, dated 03 July 2020 – Appendix I) provides traffic volumes for existing and future 2036 scenarios (including development and background growth). Botany Road had the highest traffic volume, whereas Wellington Street, Cope Street and Raglan Street all had less than one third of that volume of traffic. The traffic volumes along Botany Road are:

- Existing AM Peak - 801 to 810 northbound / 1237 to 1254 southbound
- Existing PM Peak - 764 to 777 northbound / 1136 to 1142 southbound
- 2036 AM Peak - 834 to 843 northbound / 1287 to 1305 southbound
- 2036 PM Peak - 795 to 809 northbound / 1182 to 1189 southbound

The bi-directional existing peak traffic volume was therefore taken to be 2,064 vehicles (810+1254), and for future 2036 taken to be 2,148 (843+1,305) vehicles at mid-block on Botany Road. RWDI used a nominal peak hour traffic volume of 2,200 which provides a worst-case of existing and future 2036 traffic volumes. For simplicity, and with little impact on the end results, RWDI divided the traffic equally among the four travel lanes on Botany Road.

To help mitigate the possibility that uncertainties in the screening-level simulation would lead to an underestimate of impacts, RWDI used a 2016 horizon year for the simulation, which provides conservatively high results, as average emission factors for motor vehicles declined between 2016 and 2020, and are projected to decline further in future.

We relied on the default settings for the peak-hour traffic speed (35 km/h) and set the roadway length to the approximate length of Botany Road between Wellington Street and Raglan Street (0.25 km).



The results were found to be relatively insensitive to these settings. We also relied on the default vehicle mix and emission factors for an arterial road. Meteorological conditions (wind angle, wind speed, atmospheric stability class) were set to worst-case conditions. The input parameters are summarised in Section 9.

The land use in the study area is mixed use, and was represented in the simulation as “residential” which was the most applicable of the three options (residential, high-rise and rural).

8. Results and Discussion

The screening results are shown below.

Roads and Maritime Services

TRAQ: Emissions and Air Quality Screening Assessment Report (Version 1.3)

Date of report: 09-Jul-2020 10:59
User name: mfl

INPUT DATA

Simulation name	Botany Road TRAQ assessment 1									
Road type	Arterial									
Traffic data	Traffic per hour	Speed (km/h)	Grade (%)	Length (km)						
Lane 1	550	35	0	0.25						
Lane 2	550	35	0	0.25						
Lane 3	550	35	0	0.25						
Lane 4	550	35	0	0.25						
Median strip	none									
Traffic mix (%)	CP	CD	LDCP	LDCD	HDCP	RT	AT	BusD	MC	Default
Lane 1	75.6	2.2	9.6	3.2	0.2	5.3	2.7	0.6	0.6	Default
Lane 2	75.6	2.2	9.6	3.2	0.2	5.3	2.7	0.6	0.6	Default
Lane 3	75.6	2.2	9.6	3.2	0.2	5.3	2.7	0.6	0.6	Default
Lane 4	75.6	2.2	9.6	3.2	0.2	5.3	2.7	0.6	0.6	Default
24-hour average speed	36.3	Default								
Peak hour percentage of daily (%)	10									
Year of assessment	2016									
Local landuse	Residential									
Air quality environment	Sydney East									
Season	Worst-case Default									
Cold start emissions	Included Default									

METEOROLOGICAL CONDITIONS

Wind direction	Worst-case wind angle									
Wind speed	1 m/s									
Atmospheric stability	F class (stable night time conditions)									
Temperature	15 deg C									

EMISSIONS (Air Pollutants)

	g/km/v	g/km/v	g/km/v	kg/h	kg/h	kg/h
	CO	NOx	PM10	CO	NOx	PM10
Lane 1	1.2	0.54	0.06	0.16	0.07	0.01
Lane 2	1.2	0.54	0.06	0.16	0.07	0.01
Lane 3	1.2	0.54	0.06	0.16	0.07	0.01
Lane 4	1.2	0.54	0.06	0.16	0.07	0.01

EMISSIONS (Greenhouse Gases)

	Fuel consumption (L/h)		CO2-e emission factors (kg/L)		CO2-e emissions (t CO2-ef/h)	CO2-e emissions (t CO2-ef/y)
	Petrol	Diesel	Petrol	Diesel		
Lane 1	9.3	5.2	2.38032	2.69814	0.0	132.0
Lane 2	9.3	5.2	2.38032	2.69814	0.0	132.0
Lane 3	9.3	5.2	2.38032	2.69814	0.0	132.0
Lane 4	9.3	5.2	2.38032	2.69814	0.0	132.0
					0.1	528.0

PREDICTED ROADSIDE CONCENTRATIONS AND ASSESSMENT

Maximum 1-hour average CO concentrations (mg/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	0.6	1.3	1.9	30	Compliance
10 m from kerb	0.3	1.3	1.6	30	Compliance
20 m from kerb	0.2	1.3	1.5	30	Compliance
30 m from kerb	0.2	1.3	1.5	30	Compliance
40 m from kerb	0.1	1.3	1.4	30	Compliance
50 m from kerb	0.1	1.3	1.4	30	Compliance
75 m from kerb	0.1	1.3	1.4	30	Compliance
100 m from kerb	0.1	1.3	1.4	30	Compliance
150 m from kerb	0.1	1.3	1.4	30	Compliance
200 m from kerb	0.1	1.3	1.4	30	Compliance
Maximum 8-hour average CO concentrations (mg/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	0.4	1.2	1.6	10	Compliance
10 m from kerb	0.2	1.2	1.4	10	Compliance
20 m from kerb	0.1	1.2	1.3	10	Compliance
30 m from kerb	0.1	1.2	1.3	10	Compliance
40 m from kerb	0.1	1.2	1.3	10	Compliance
50 m from kerb	0.1	1.2	1.3	10	Compliance
75 m from kerb	0.1	1.2	1.3	10	Compliance
100 m from kerb	0.1	1.2	1.3	10	Compliance
150 m from kerb	0	1.2	1.2	10	Compliance
200 m from kerb	0	1.2	1.2	10	Compliance
Maximum 1-hour average NO2 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	26.7	61.1	87.8	246	Compliance
10 m from kerb	18.8	61.1	79.9	246	Compliance
20 m from kerb	18.5	61.1	79.6	246	Compliance
30 m from kerb	15.4	61.1	76.5	246	Compliance
40 m from kerb	13.4	61.1	74.5	246	Compliance
50 m from kerb	11.9	61.1	73.0	246	Compliance
75 m from kerb	9.6	61.1	70.7	246	Compliance
100 m from kerb	8.2	61.1	69.3	246	Compliance
150 m from kerb	6.4	61.1	67.5	246	Compliance
200 m from kerb	5.3	61.1	66.4	246	Compliance
Annual average NO2 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	5.3	20.7	26.0	62	Compliance
10 m from kerb	3.8	20.7	24.5	62	Compliance
20 m from kerb	3.7	20.7	24.4	62	Compliance
30 m from kerb	3.1	20.7	23.8	62	Compliance
40 m from kerb	2.7	20.7	23.4	62	Compliance
50 m from kerb	2.4	20.7	23.1	62	Compliance
75 m from kerb	1.9	20.7	22.6	62	Compliance
100 m from kerb	1.6	20.7	22.3	62	Compliance
150 m from kerb	1.3	20.7	22.0	62	Compliance
200 m from kerb	1.1	20.7	21.8	62	Compliance
Maximum 24-hour average PM10 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	14.9	24.8	39.7	50	Compliance
10 m from kerb	7	24.8	31.8	50	Compliance
20 m from kerb	5.2	24.8	30.0	50	Compliance
30 m from kerb	4.3	24.8	29.1	50	Compliance
40 m from kerb	3.7	24.8	28.5	50	Compliance
50 m from kerb	3.3	24.8	28.1	50	Compliance
75 m from kerb	2.7	24.8	27.5	50	Compliance
100 m from kerb	2.3	24.8	27.1	50	Compliance
150 m from kerb	1.8	24.8	26.6	50	Compliance
200 m from kerb	1.5	24.8	26.3	50	Compliance
Annual average PM10 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	6	16.5	22.5	25	Compliance
10 m from kerb	2.8	16.5	19.3	25	Compliance
20 m from kerb	2.1	16.5	18.6	25	Compliance
30 m from kerb	1.7	16.5	18.2	25	Compliance
40 m from kerb	1.5	16.5	18.0	25	Compliance
50 m from kerb	1.3	16.5	17.8	25	Compliance
75 m from kerb	1.1	16.5	17.6	25	Compliance
100 m from kerb	0.9	16.5	17.4	25	Compliance
150 m from kerb	0.7	16.5	17.2	25	Compliance
200 m from kerb	0.6	16.5	17.1	25	Compliance

END OF REPORT

These results indicate that compliance is easily achieved at the kerb of Botany Road for carbon monoxide (CO), nitrogen dioxide (NO₂), and inhalable particulate matter (PM₁₀). The findings



therefore indicate that vehicle emissions on Botany Road will be compliant with NSW air quality criteria anywhere at the development site for both existing and future 2036 scenarios.



9. Conclusion

Based on the results indicating compliance is achieved at the kerb of Botany Road for carbon monoxide (CO), nitrogen dioxide (NO₂), and inhalable particulate matter (PM₁₀) under the proposed peak hour traffic volume at mid-block on Botany Road, we therefore conclude that no further study of transportation-related air quality is warranted.