APPENDIX C

Road Traffic Noise Monitoring Results

Noise Monitoring Location	V.01
Noise Monitoring Address	**1/7 Alexandra Ave, Westmead**

Logger Device Type: Svantek 957, Logger Serial No: 21425

Sound Level Meter Device Type: Brüel and Kjær 2260, Sound Level Meter Serial No: 2414604

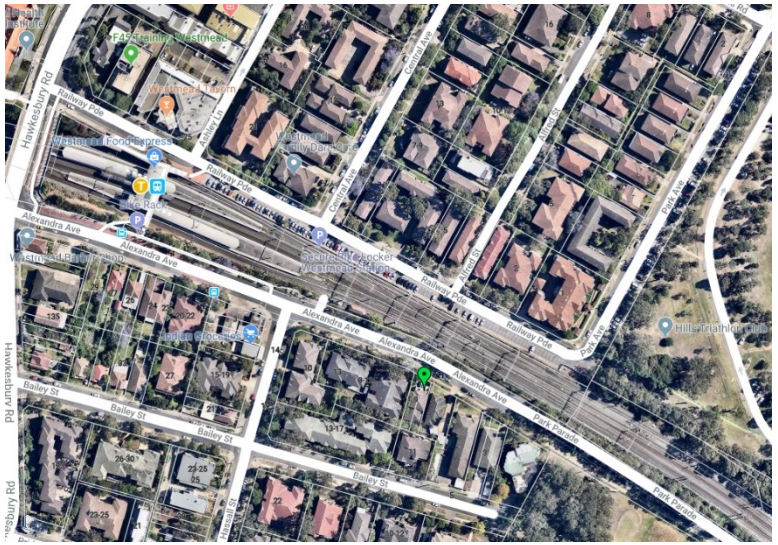
Ambient noise logger located at the front balcony of a level 1 apartment 1/7 Alexandra Avenue, Westmead. Logger located with view of Alexandra Avenue and the Western Rail Line to the north.

Attended noise measurements indicate the ambient noise environment at this location is dominated by road traffic noise from Alexandra Avenue as well as other nearby roads. Train passby noise also heard regularly at this location.

Measured noise levels: (L_{Amax}):

25/07/2019: Light-vehicle traffic Alexandra Avenue: 60-70 dBA, Heavy-vehicle traffic Alexandra Avenue: 66-74 dBA, Train passby: 60-75 dBA, Aircraft: 50-64 dBA, Birds 47-78 dBA

Map of Noise Monitoring Location



Ambient Noise Logging Results – ICNG Defined Time Periods

Monitoring Period (25/07/2019 – 08/08/2019)	Noise Level (dBA)			
	RBL	LAeq	L10	L1
Daytime	49	66	70	76
Evening	47	66	68	75
Night-time	38	61	63	72

Ambient Noise Logging Results – RNP Defined Time Periods

Monitoring Period (25/07/2019 – 08/08/2019)	Noise Level (dBA)	
	LAeq(period)	LAeq(1hour)
Daytime (7am-10pm)	66	69
Night-time (10pm-7am)	61	63

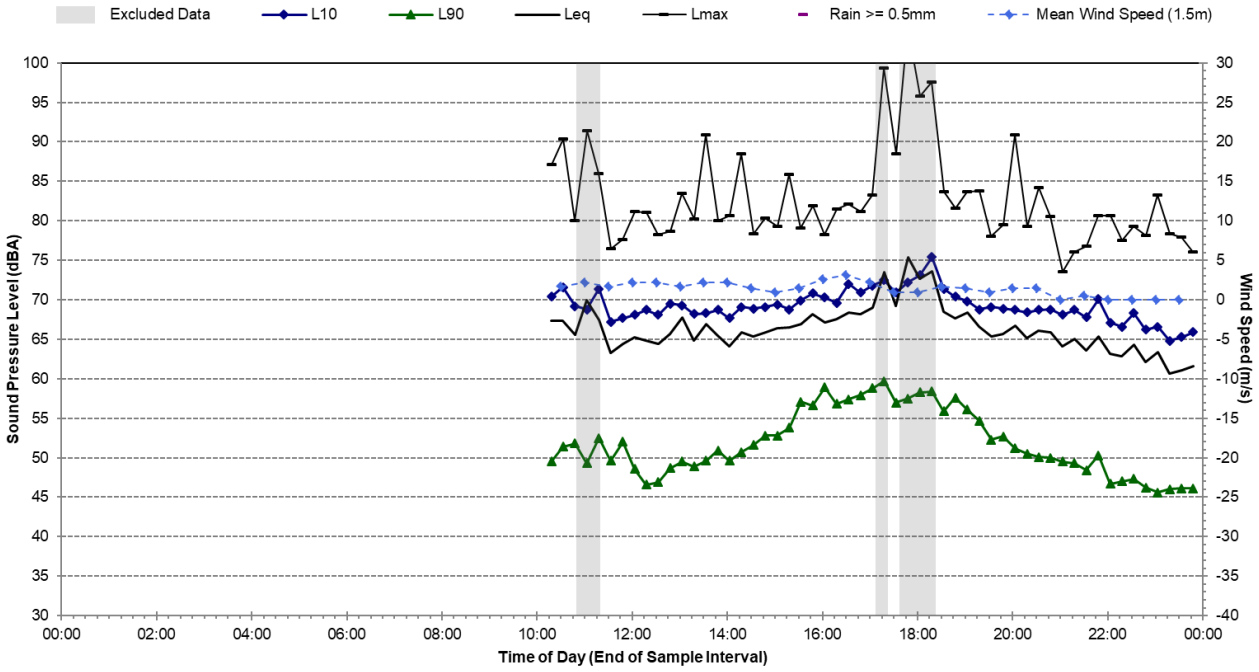
Attended Noise Measurement Results

Date	Start Time	Measured Noise Level (dBA)		
		LA90	LAeq	LAmax
25/07/2019	09:54	50	66	78

Photo of Noise Monitoring Location

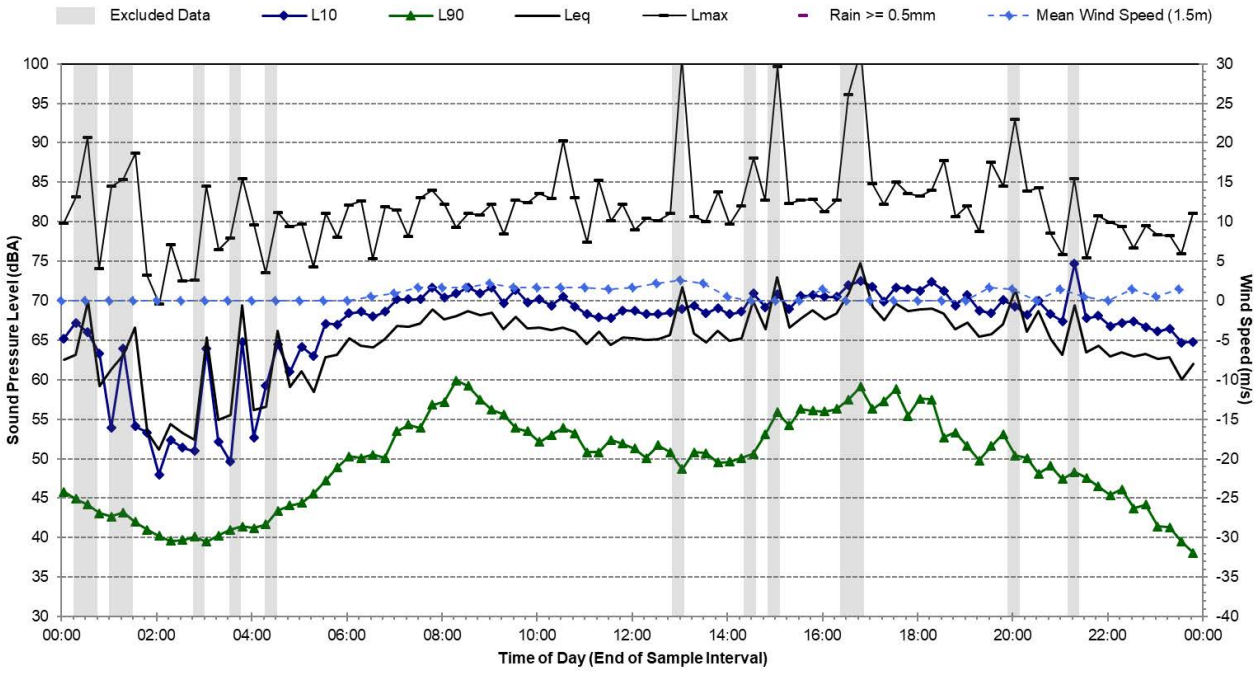
Statistical Ambient Noise Levels

1/7 Alexandra Ave, Westmead NSW - Thursday, 25 July 2019



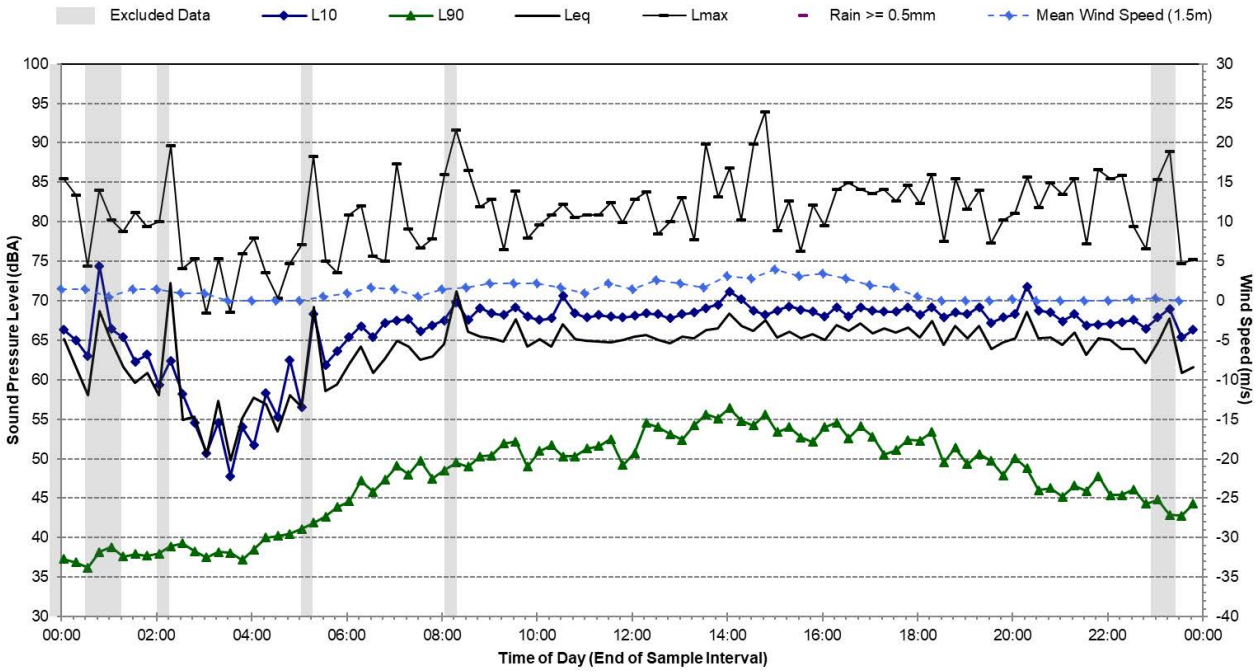
Statistical Ambient Noise Levels

1/7 Alexandra Ave, Westmead NSW - Friday, 26 July 2019



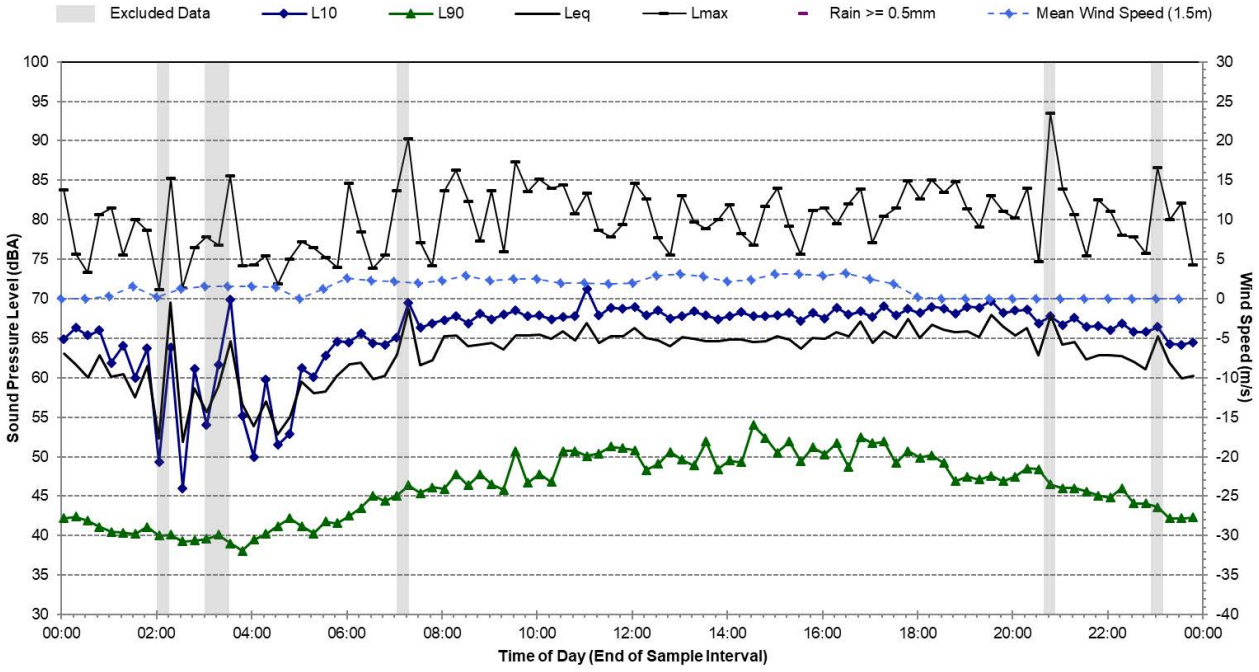
Statistical Ambient Noise Levels

1/7 Alexandra Ave, Westmead NSW - Saturday, 27 July 2019



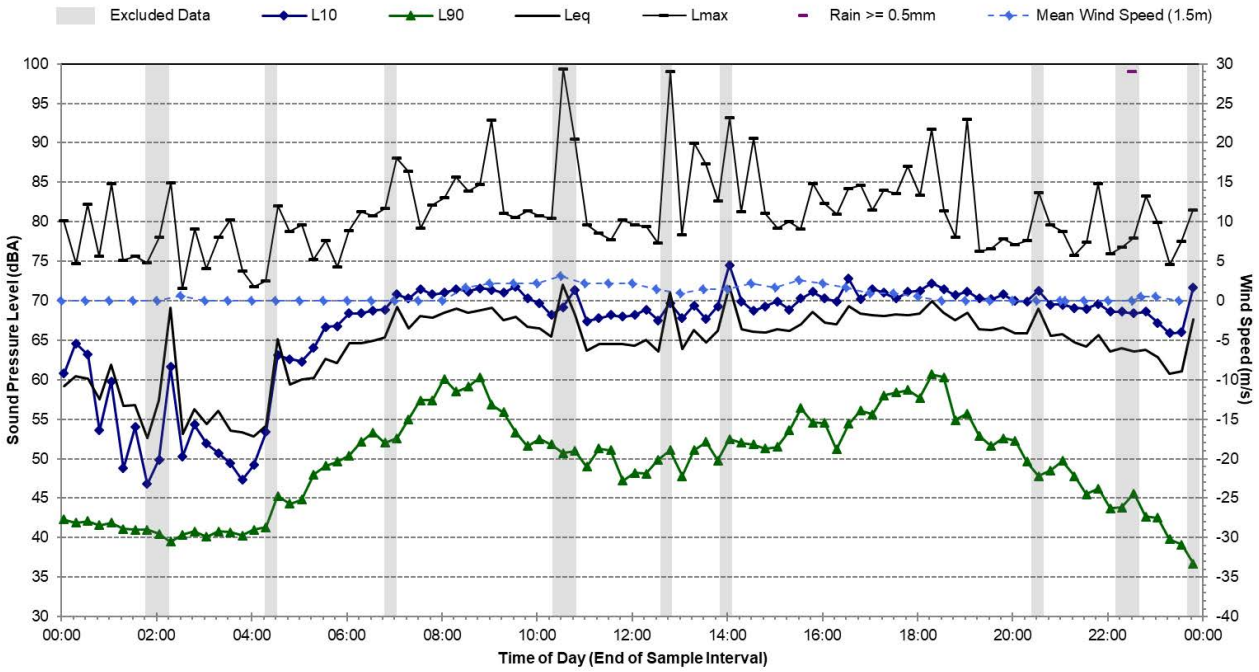
Statistical Ambient Noise Levels

1/7 Alexandra Ave, Westmead NSW - Sunday, 28 July 2019



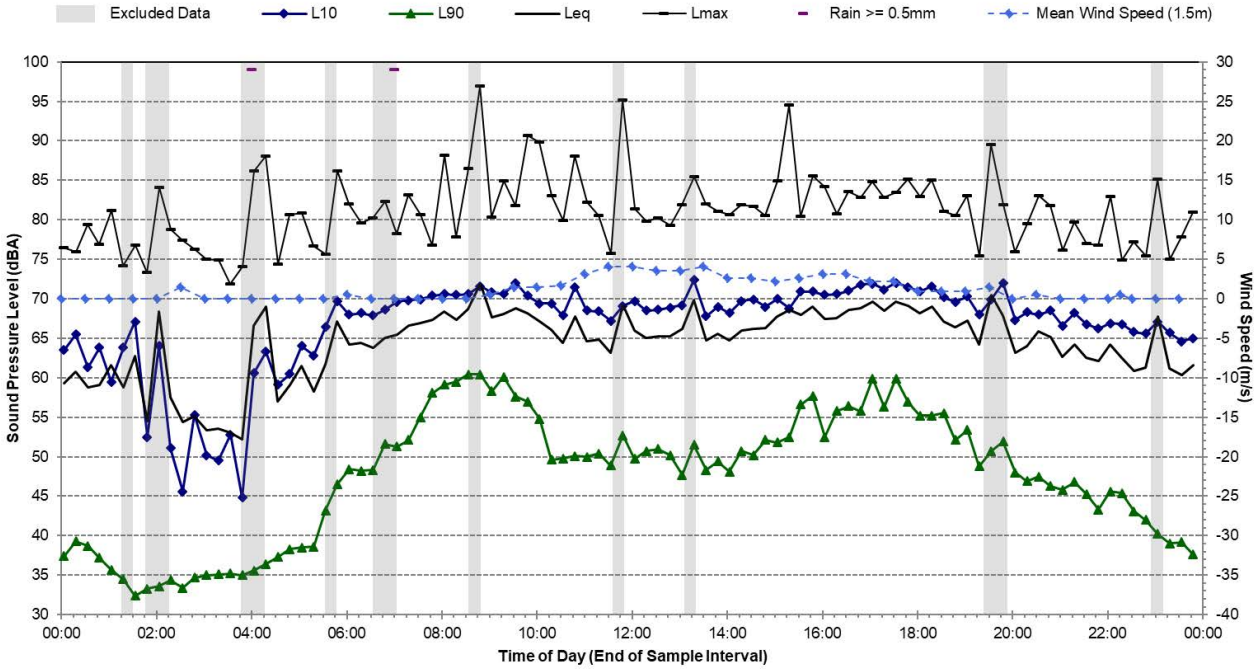
Statistical Ambient Noise Levels

1/7 Alexandra Ave, Westmead NSW - Monday, 29 July 2019



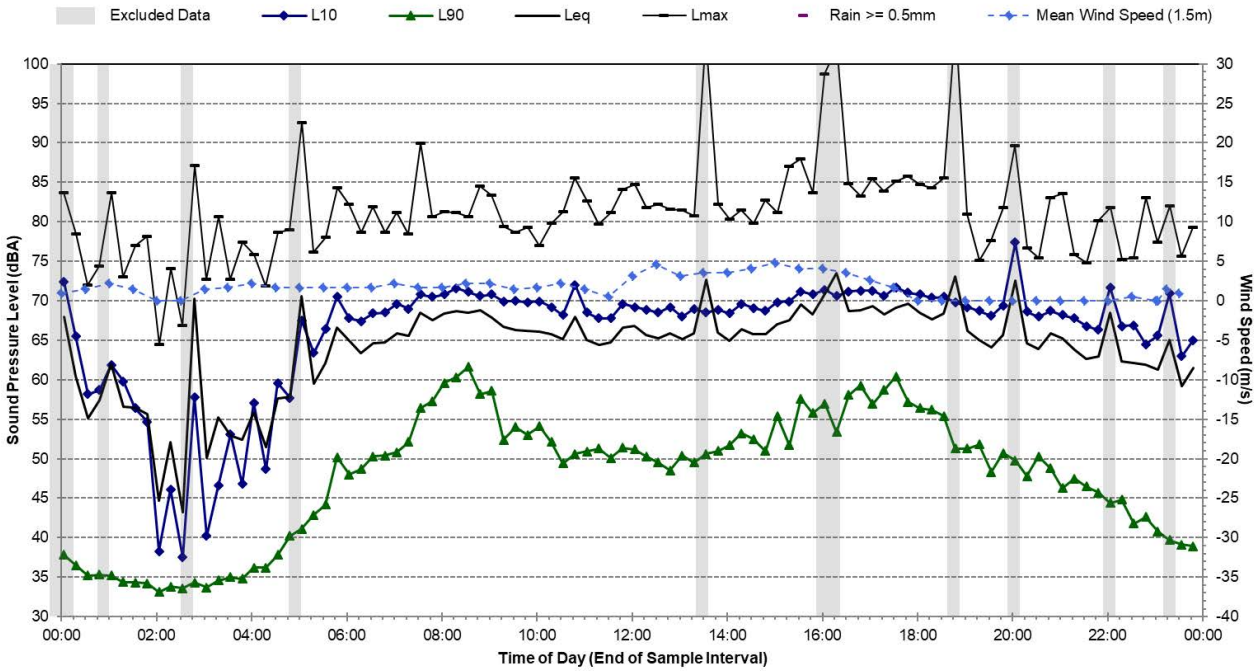
Statistical Ambient Noise Levels

1/7 Alexandra Ave, Westmead NSW - Tuesday, 30 July 2019



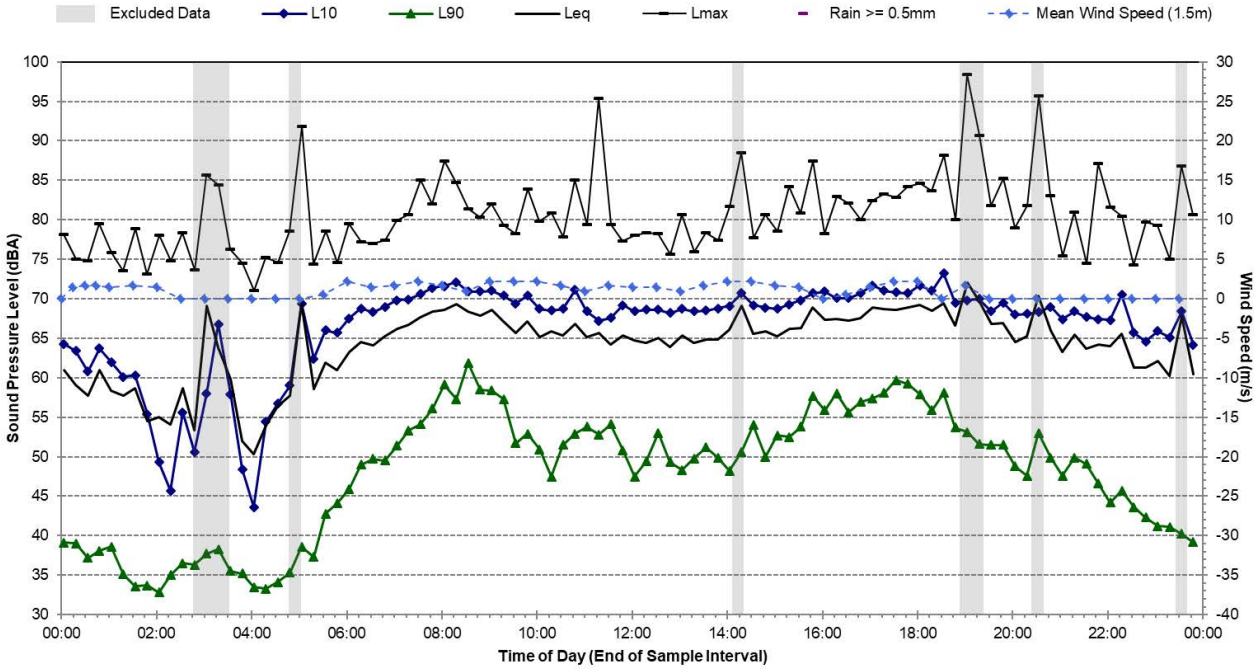
Statistical Ambient Noise Levels

1/7 Alexandra Ave, Westmead NSW - Wednesday, 31 July 2019



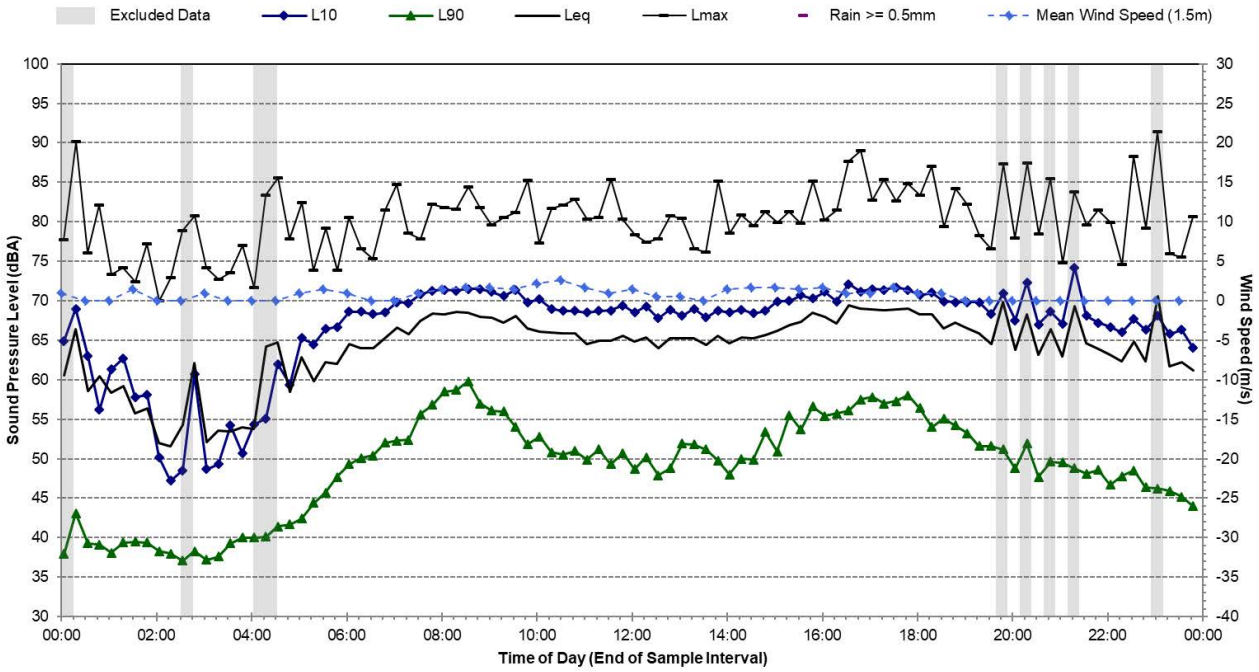
Statistical Ambient Noise Levels

1/7 Alexandra Ave, Westmead NSW - Thursday, 1 August 2019



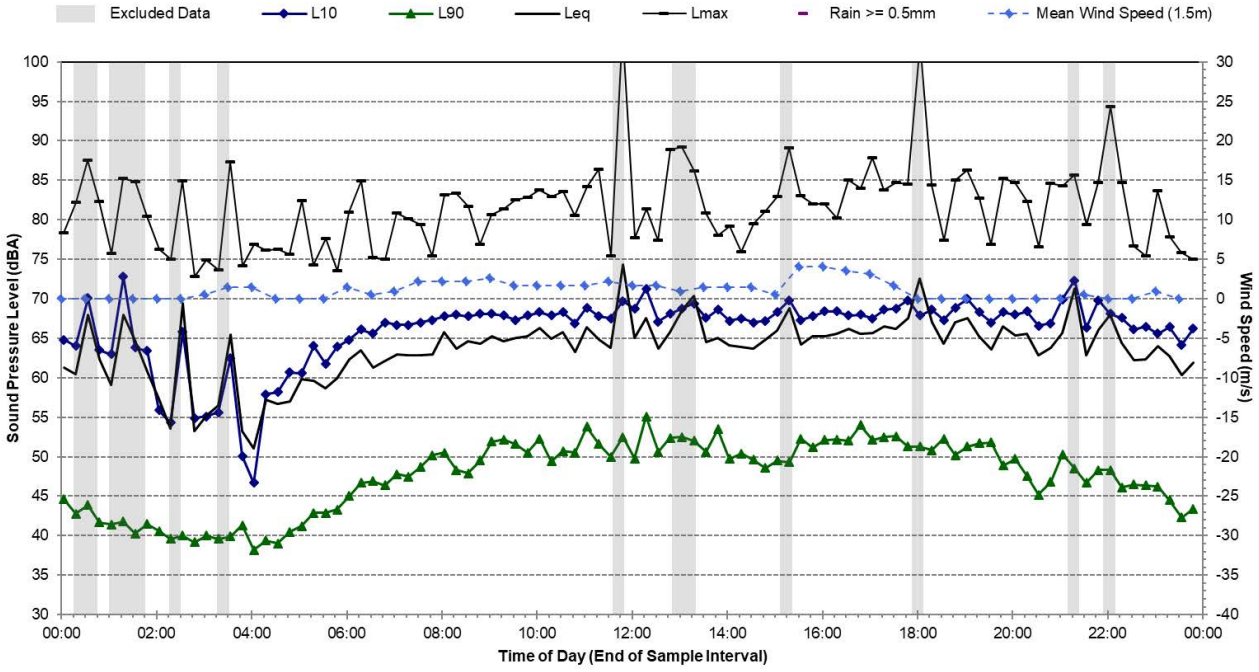
Statistical Ambient Noise Levels

1/7 Alexandra Ave, Westmead NSW - Friday, 2 August 2019



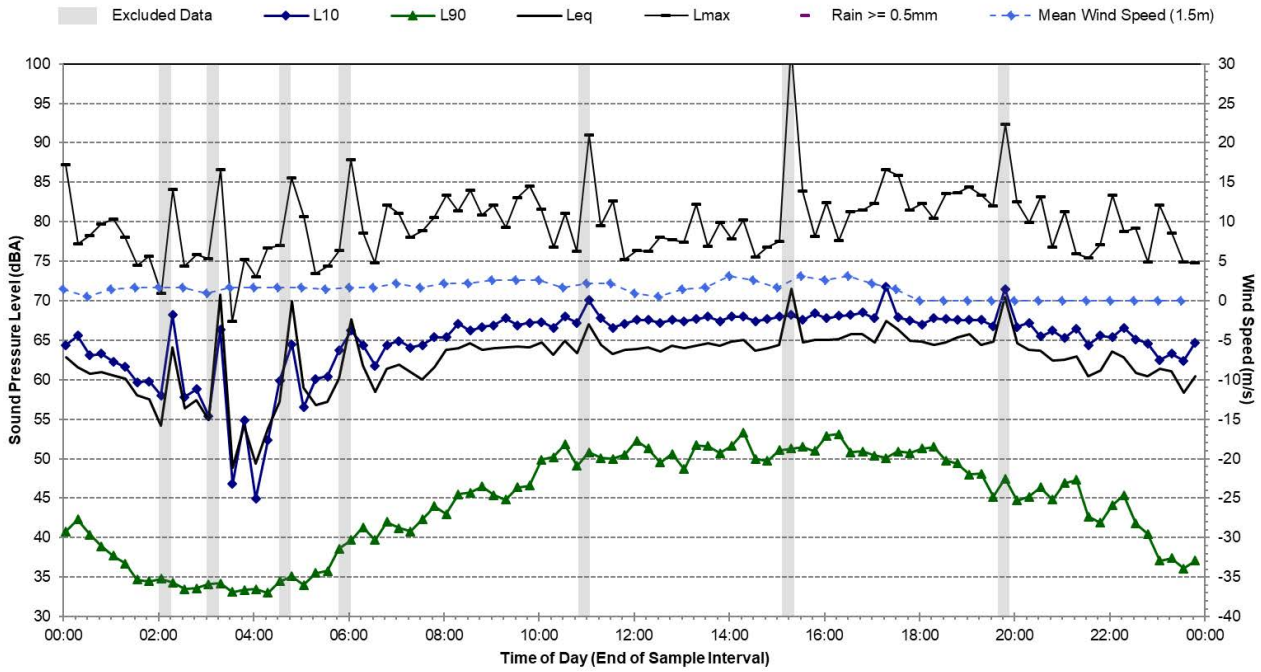
Statistical Ambient Noise Levels

1/7 Alexandra Ave, Westmead NSW - Saturday, 3 August 2019



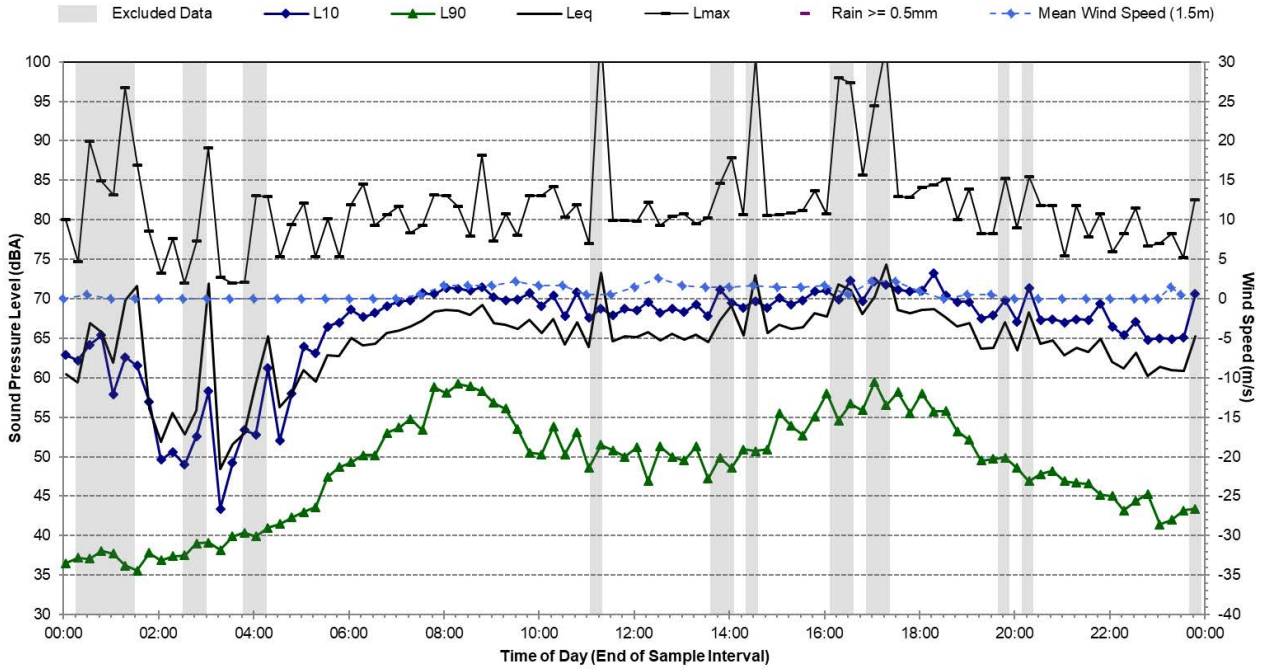
Statistical Ambient Noise Levels

1/7 Alexandra Ave, Westmead NSW - Sunday, 4 August 2019



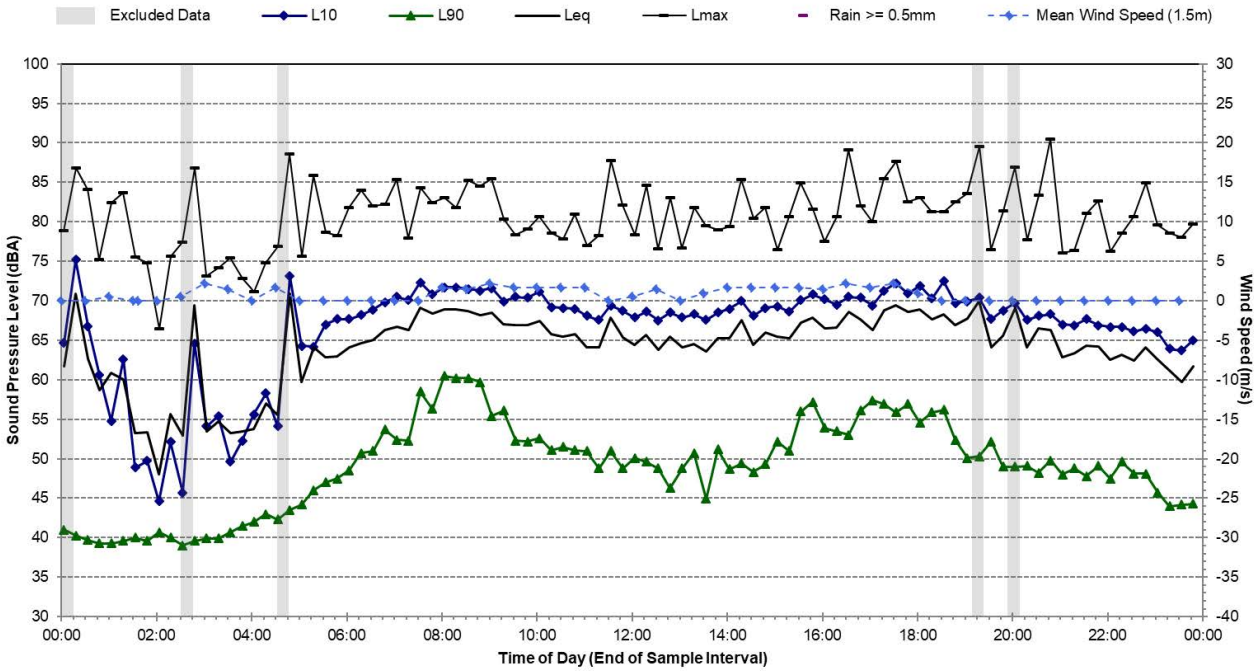
Statistical Ambient Noise Levels

1/7 Alexandra Ave, Westmead NSW - Monday, 5 August 2019



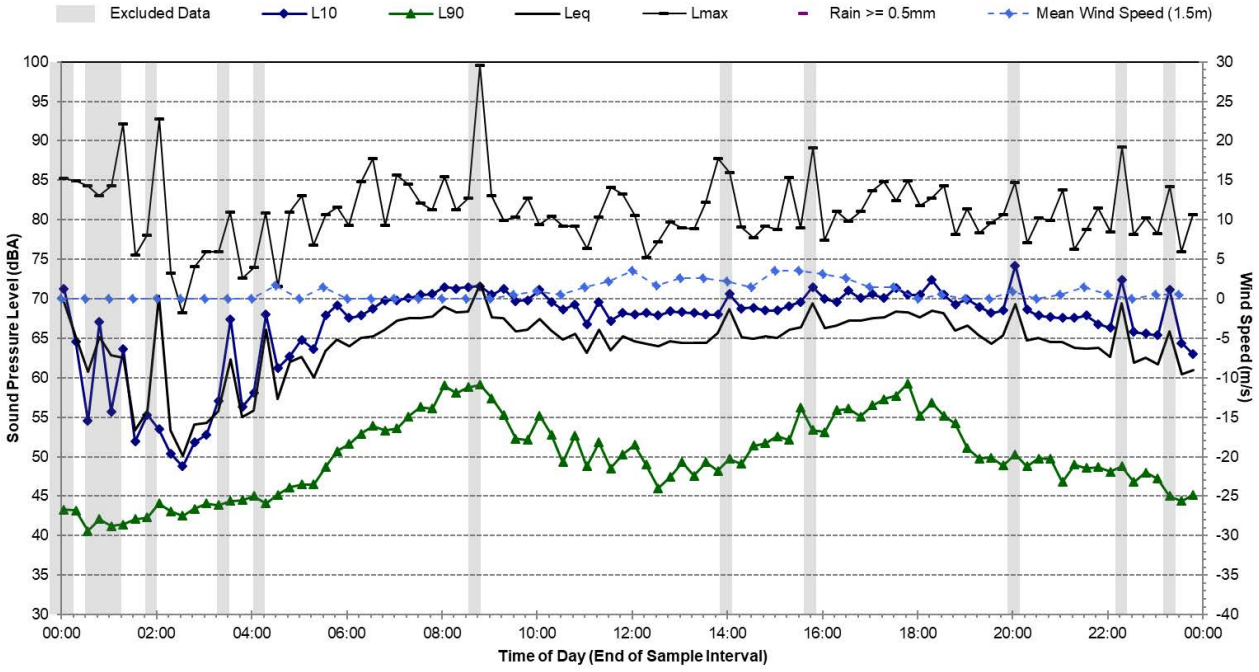
Statistical Ambient Noise Levels

1/7 Alexandra Ave, Westmead NSW - Tuesday, 6 August 2019



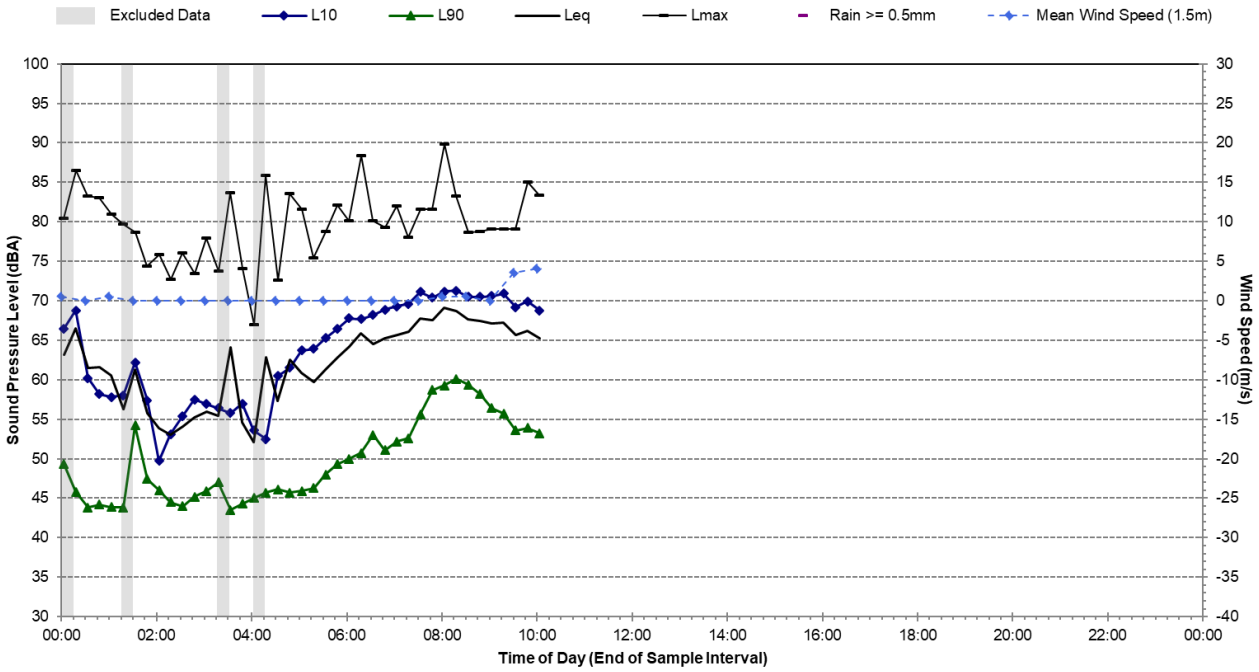
Statistical Ambient Noise Levels

1/7 Alexandra Ave, Westmead NSW - Wednesday, 7 August 2019



Statistical Ambient Noise Levels

1/7 Alexandra Ave, Westmead NSW - Thursday, 8 August 2019



Noise Monitoring Location	V.02
Noise Monitoring Address	**57 Alexandra Ave, Westmead**

Logger Device Type: Svantek 957, Logger Serial No: 20675

Sound Level Meter Device Type: Brüel and Kjær 2260, Sound Level Meter Serial No: 2414604

Ambient noise logger located at 57 Alexandra Avenue, Westmead. Logger located with view of Alexandra Avenue and the Western Rail Line to the north.

Attended noise measurements indicate the ambient noise environment at this location is dominated by road traffic noise from Alexandra Avenue as well as other nearby roads. Train passby noise also heard regularly at this location.

Measured noise levels: (L_{Amax}):

22/07/2019: Light-vehicle traffic Alexandra Avenue: 54-65 dBA, Heavy-vehicle traffic Alexandra Avenue: 62-76 dBA, Train passby: 59-79 dBA, Distant intermittent construction: 44-52 dBA

Map of Noise Monitoring Location

Ambient Noise Logging Results – ICNG Defined Time Periods

Monitoring Period (22/07/2019 – 08/08/2019)	Noise Level (dBA)			
	RBL	LAeq	L_{10}	L_1
Daytime	44	61	62	74
Evening	46	61	61	74
Night-time	39	57	55	70

Ambient Noise Logging Results – RNP Defined Time Periods

Monitoring Period (22/07/2019 – 08/08/2019)	Noise Level (dBA)	
	LAeq(period)	LAeq(1hour)
Daytime (7am-10pm)	61	62
Night-time (10pm-7am)	58	60

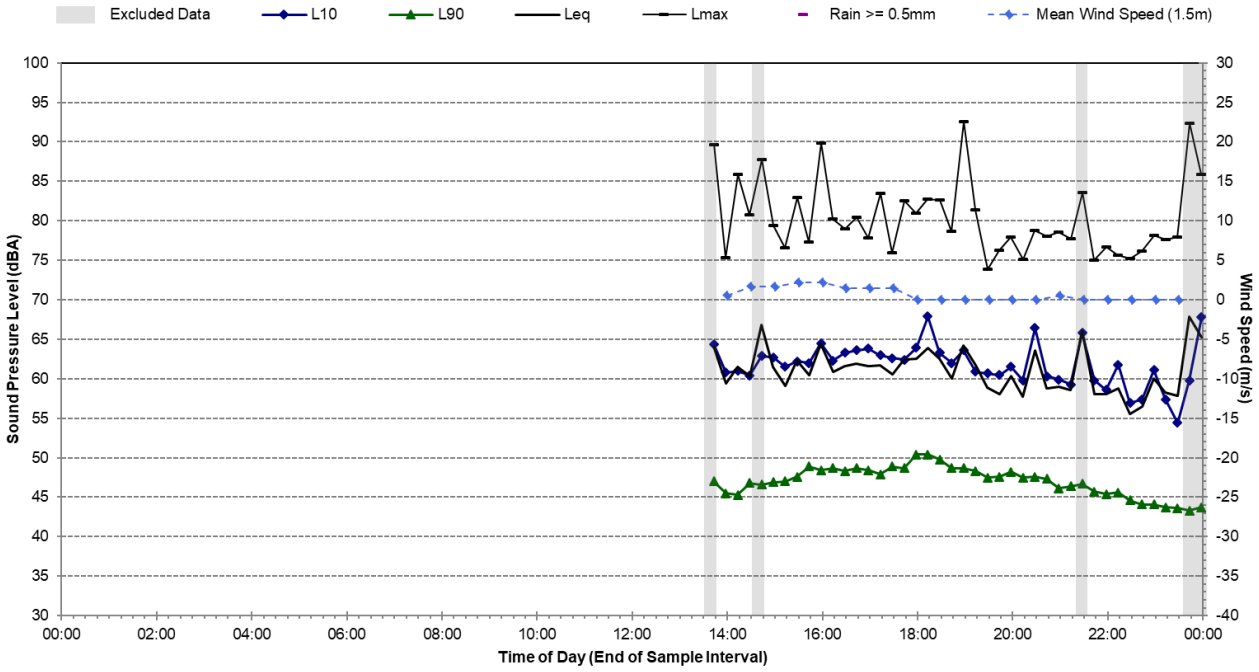
Attended Noise Measurement Results

Date	Start Time	Measured Noise Level (dBA)		
		LA90	LAeq	LAmax
22/07/2019	13:20	45	62	79

Photo of Noise Monitoring Location

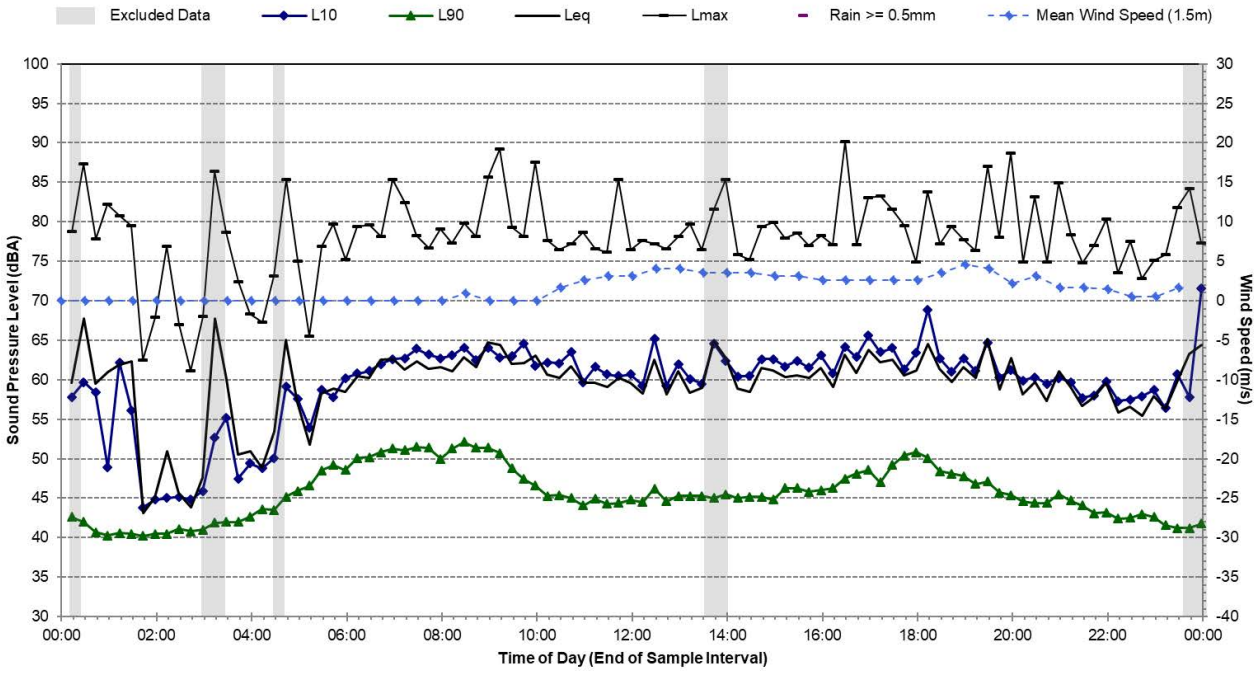
Statistical Ambient Noise Levels

57 Alexandra Ave, Westmead NSW - Monday, 22 July 2019



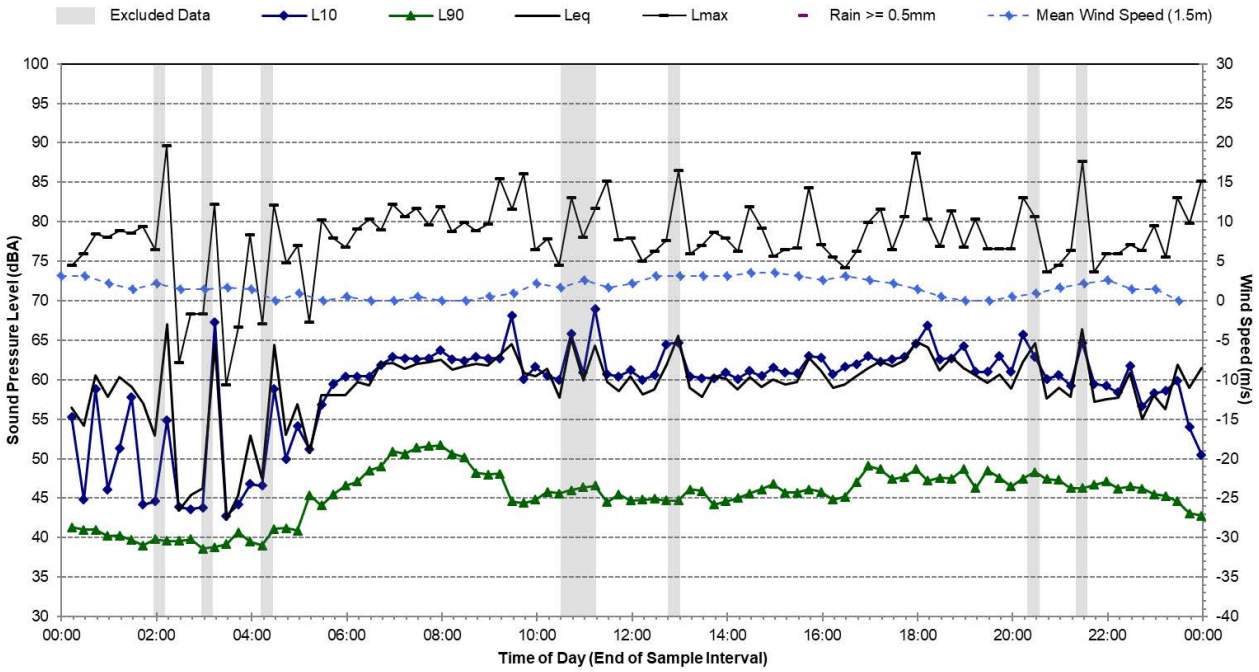
Statistical Ambient Noise Levels

57 Alexandra Ave, Westmead NSW - Tuesday, 23 July 2019



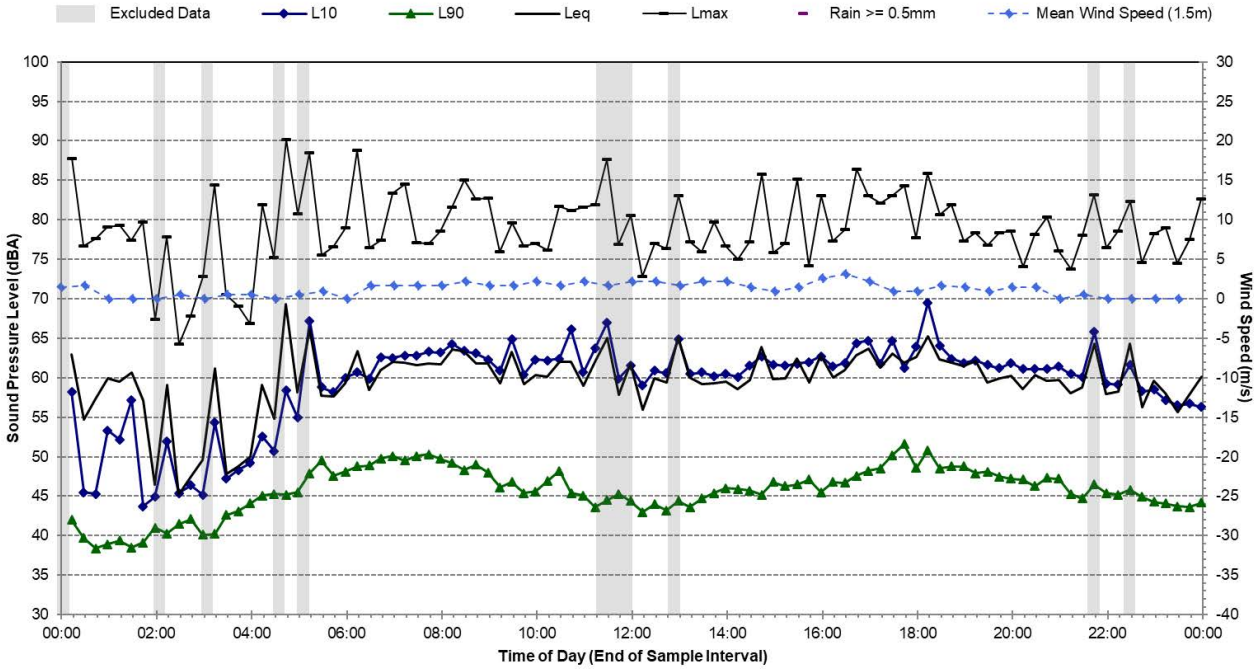
Statistical Ambient Noise Levels

57 Alexandra Ave, Westmead NSW - Wednesday, 24 July 2019



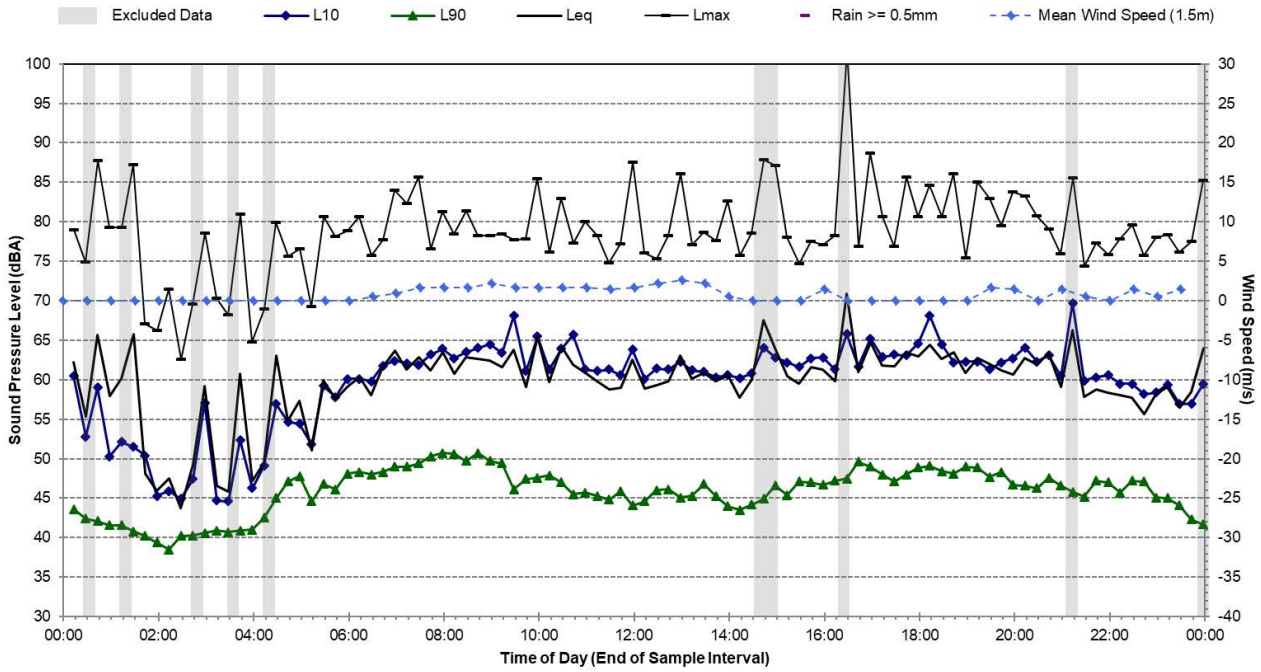
Statistical Ambient Noise Levels

57 Alexandra Ave, Westmead NSW - Thursday, 25 July 2019



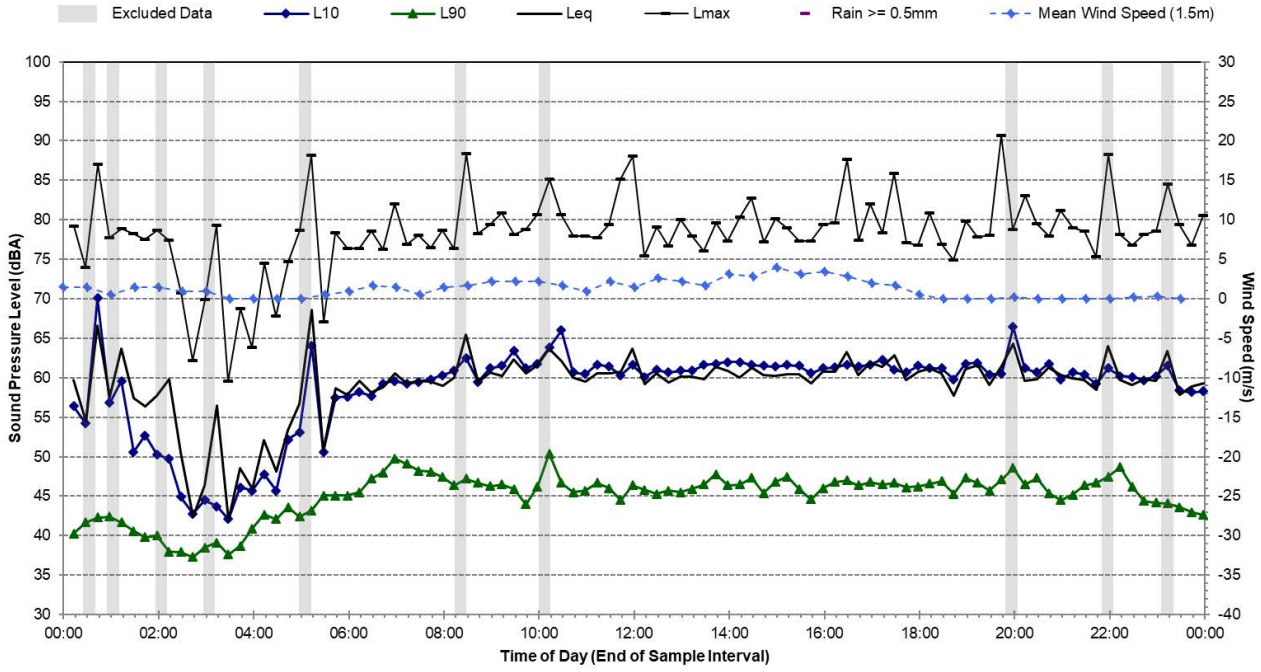
Statistical Ambient Noise Levels

57 Alexandra Ave, Westmead NSW - Friday, 26 July 2019



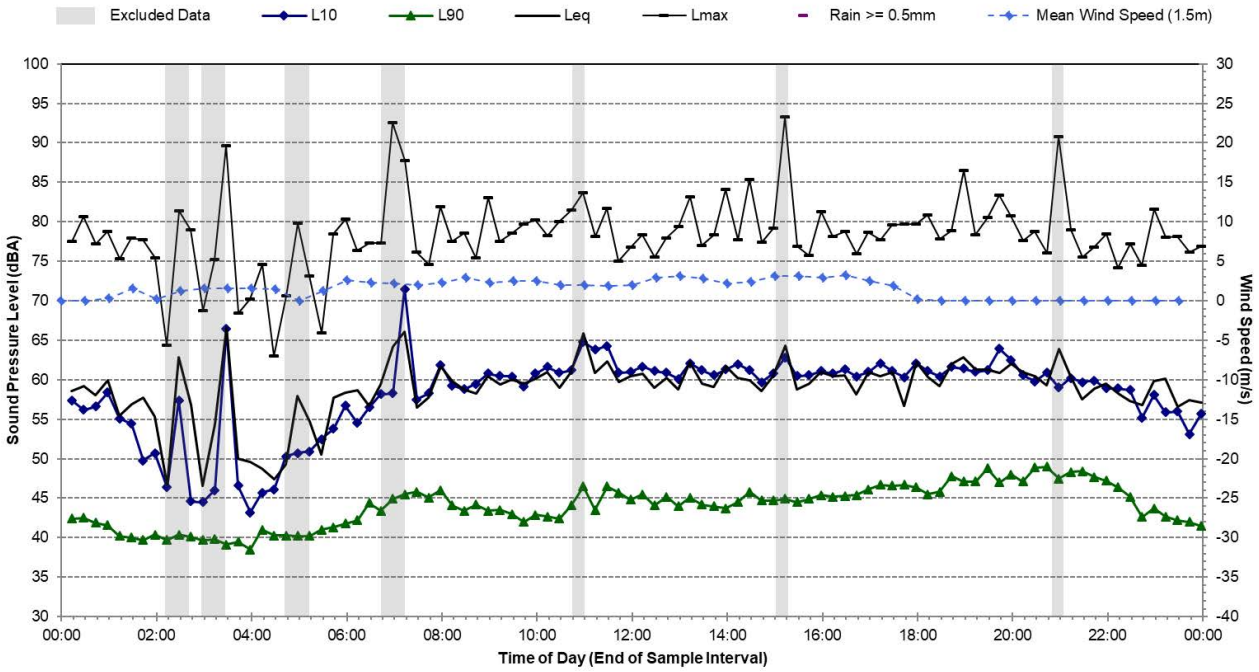
Statistical Ambient Noise Levels

57 Alexandra Ave, Westmead NSW - Saturday, 27 July 2019



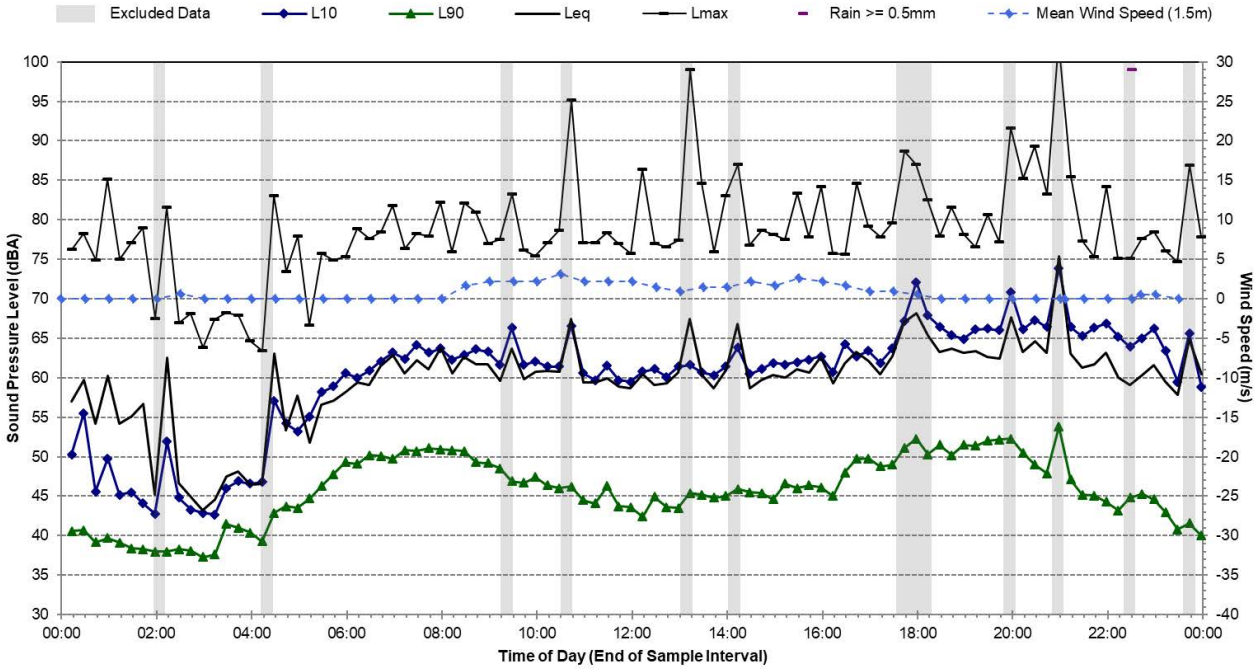
Statistical Ambient Noise Levels

57 Alexandra Ave, Westmead NSW - Sunday, 28 July 2019



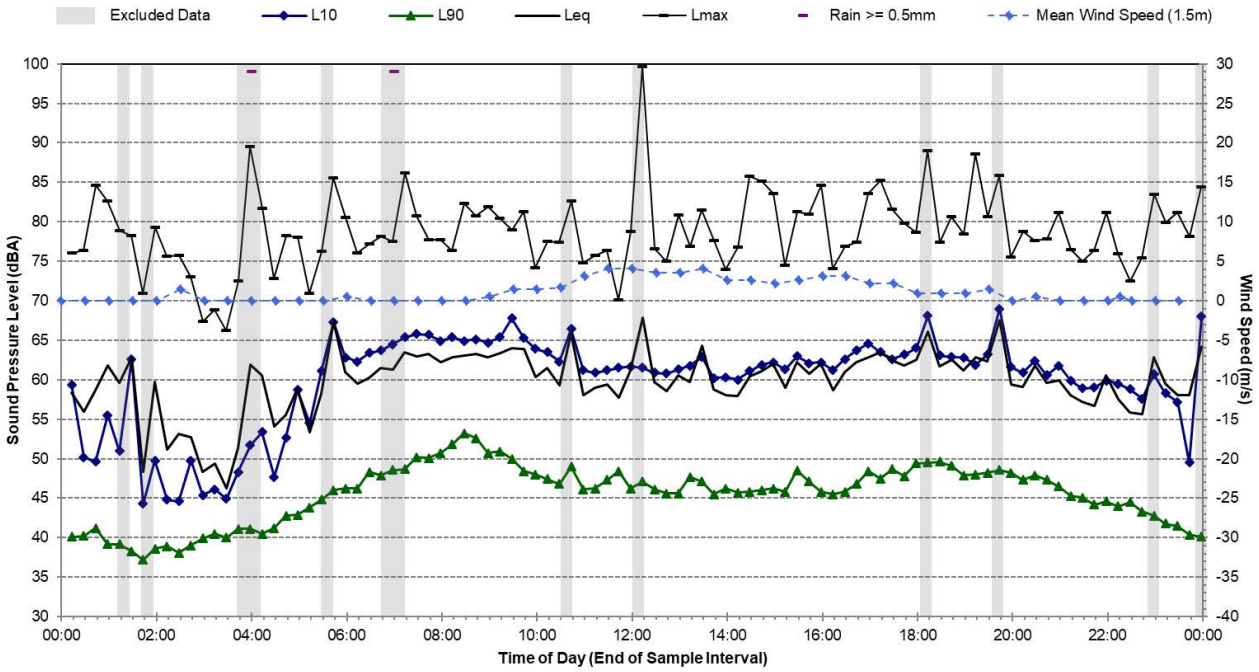
Statistical Ambient Noise Levels

57 Alexandra Ave, Westmead NSW - Monday, 29 July 2019



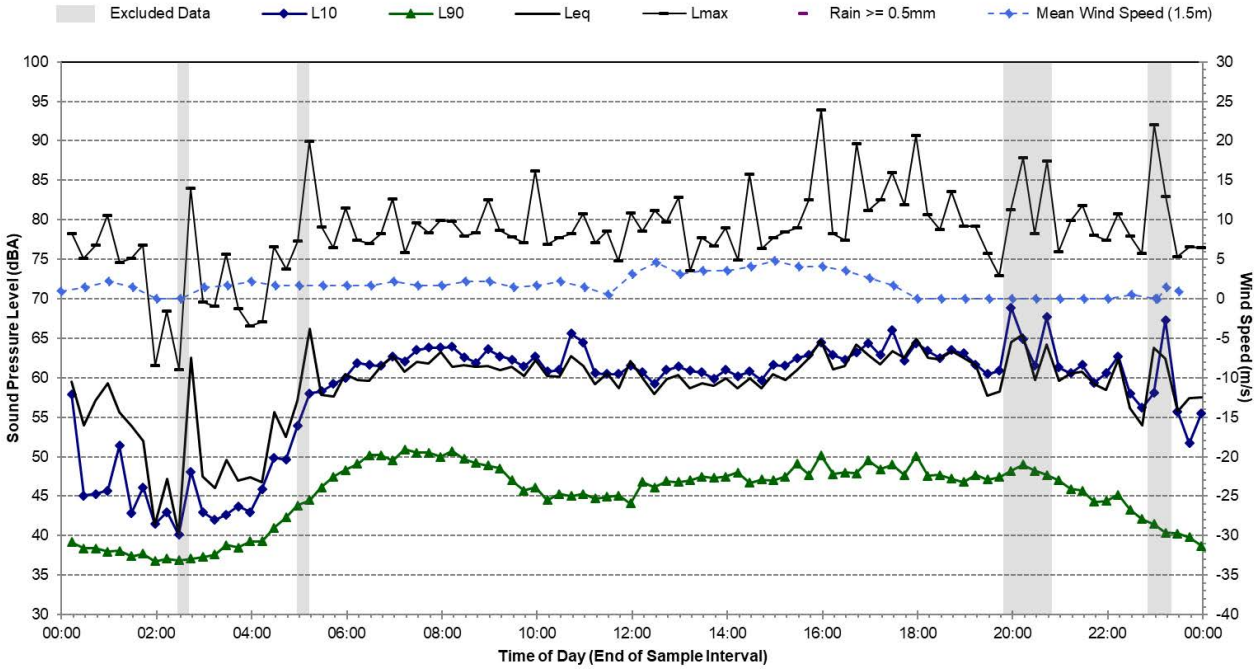
Statistical Ambient Noise Levels

57 Alexandra Ave, Westmead NSW - Tuesday, 30 July 2019



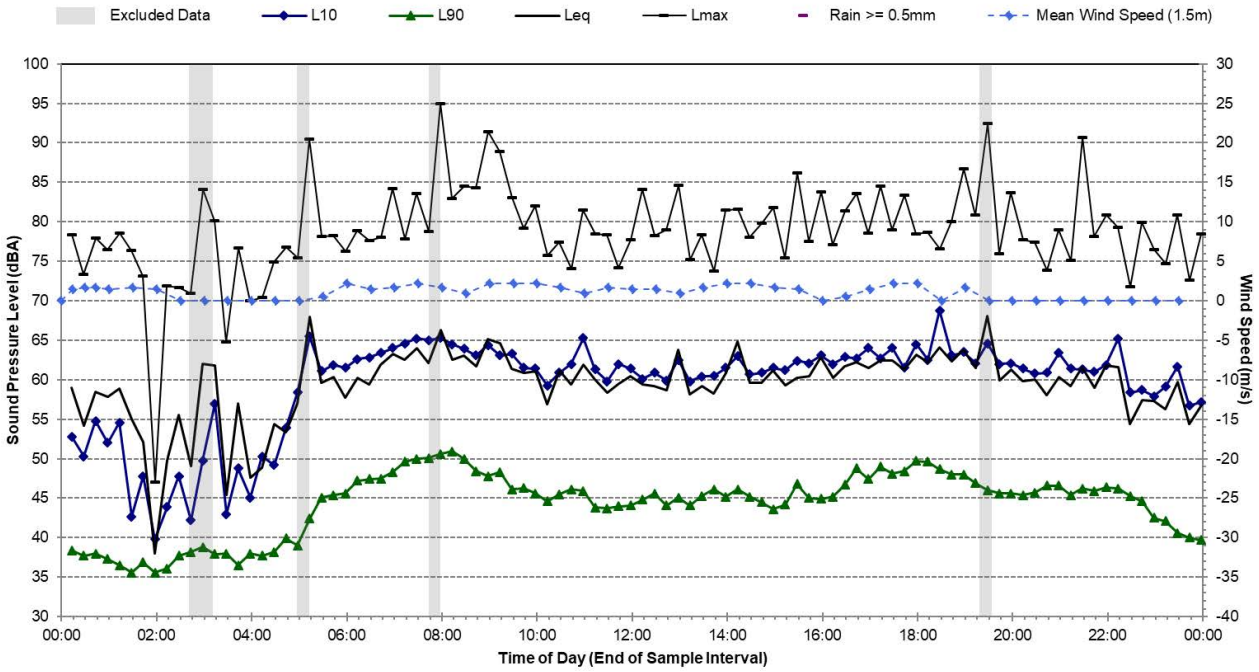
Statistical Ambient Noise Levels

57 Alexandra Ave, Westmead NSW - Wednesday, 31 July 2019



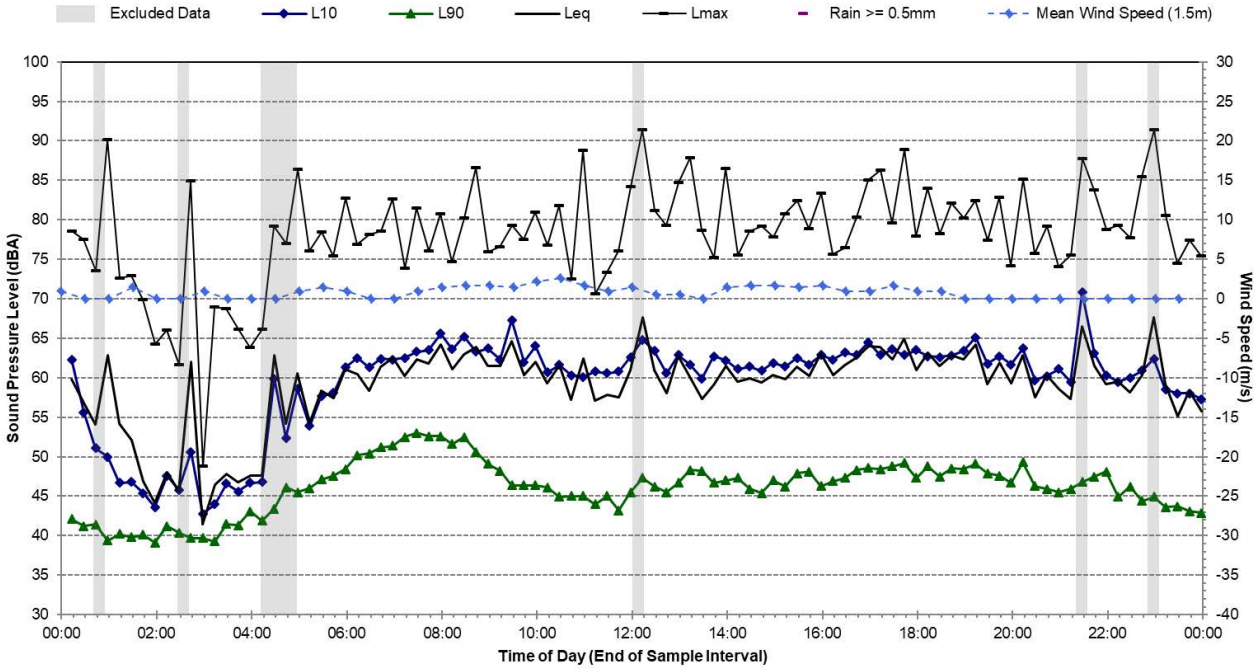
Statistical Ambient Noise Levels

57 Alexandra Ave, Westmead NSW - Thursday, 1 August 2019



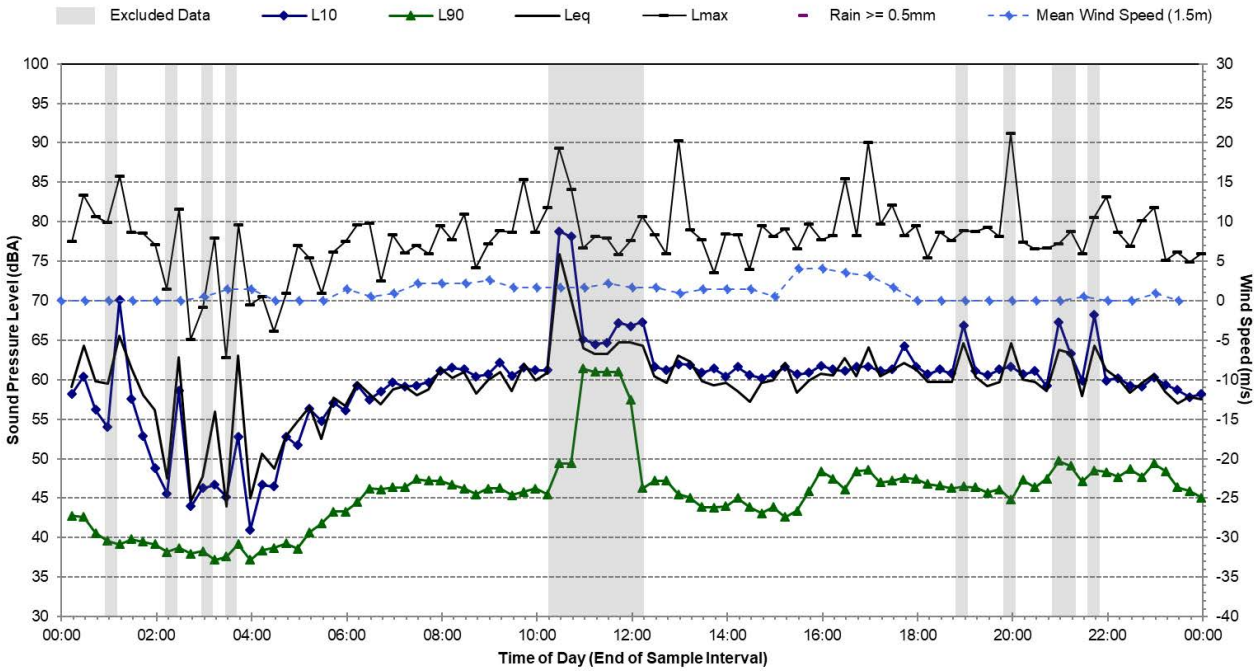
Statistical Ambient Noise Levels

57 Alexandra Ave, Westmead NSW - Friday, 2 August 2019



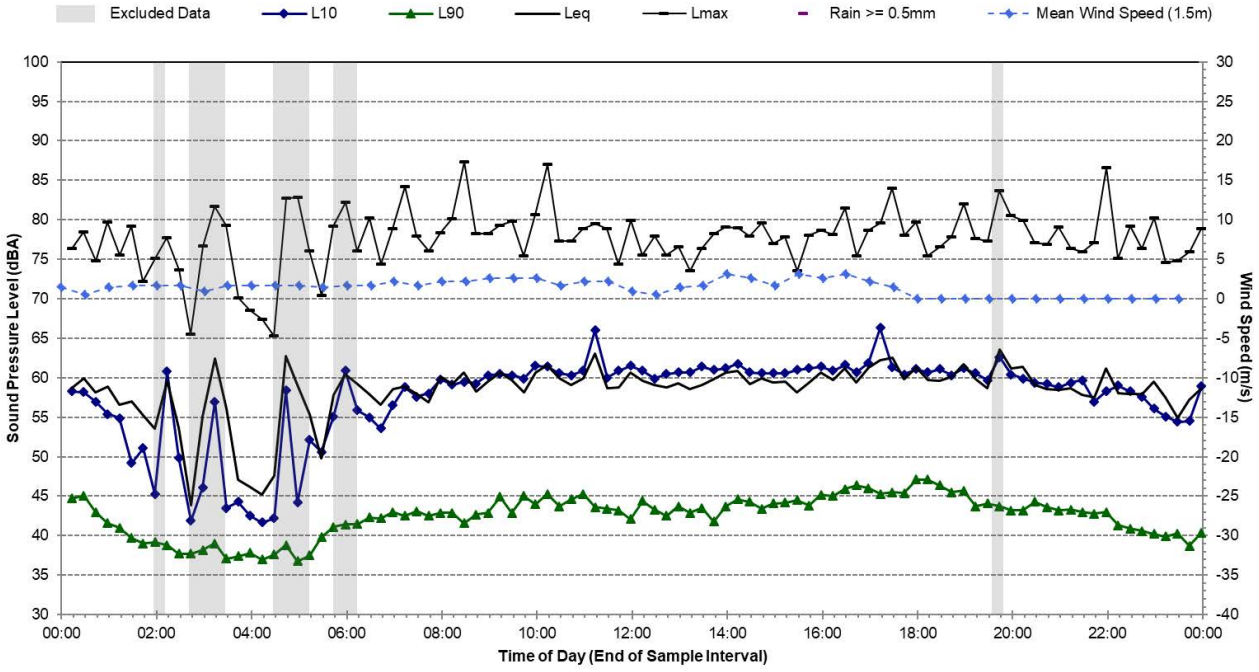
Statistical Ambient Noise Levels

57 Alexandra Ave, Westmead NSW - Saturday, 3 August 2019



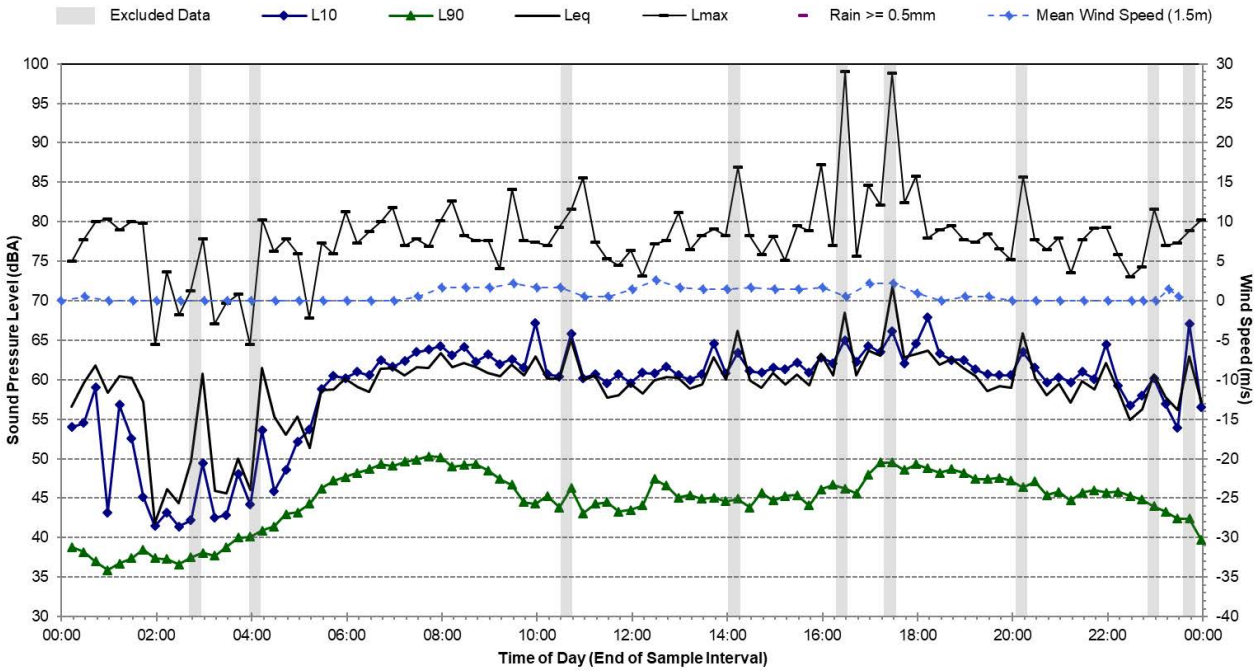
Statistical Ambient Noise Levels

57 Alexandra Ave, Westmead NSW - Sunday, 4 August 2019



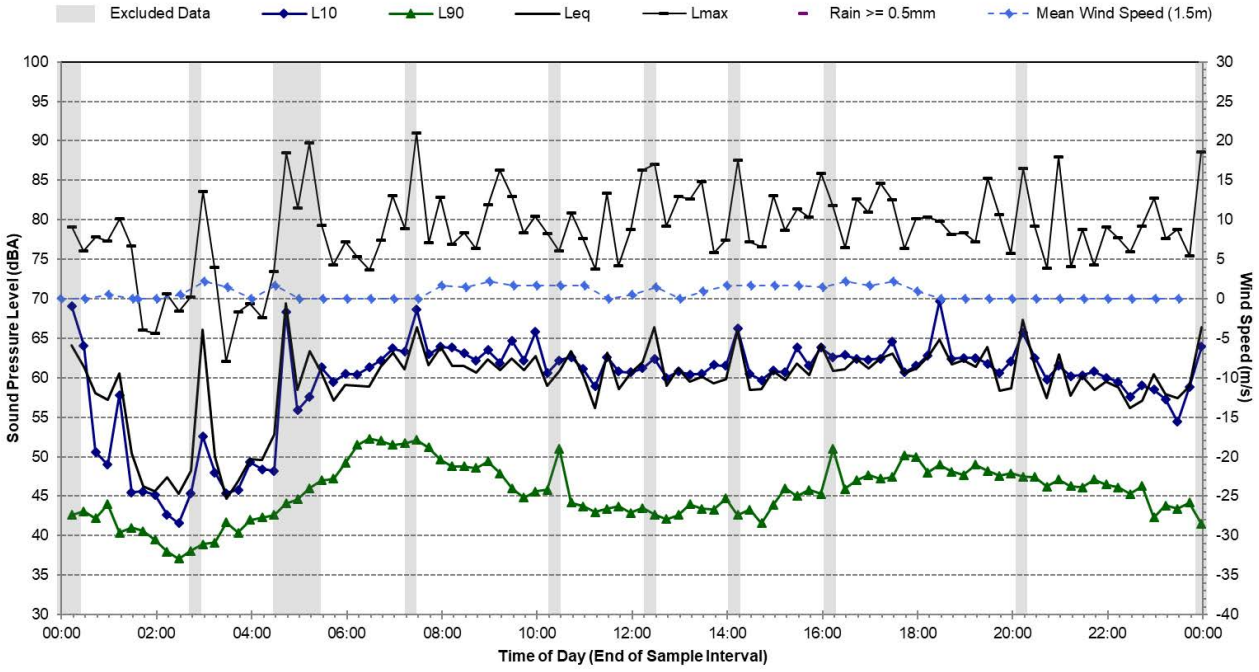
Statistical Ambient Noise Levels

57 Alexandra Ave, Westmead NSW - Monday, 5 August 2019



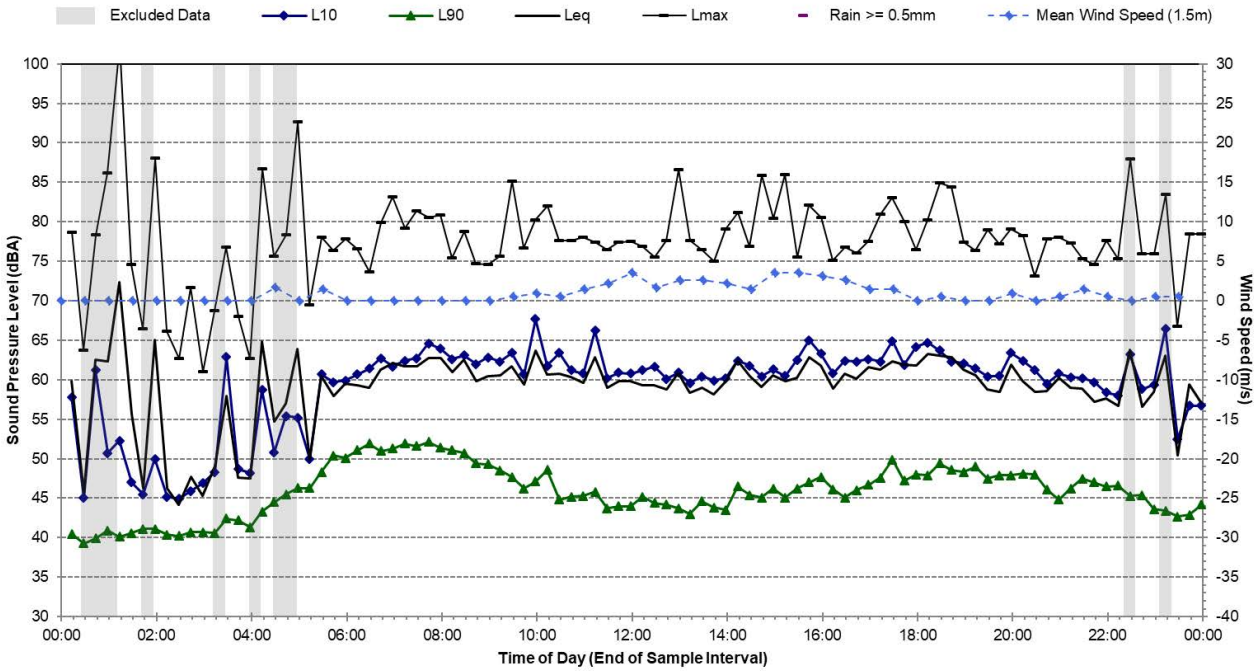
Statistical Ambient Noise Levels

57 Alexandra Ave, Westmead NSW - Tuesday, 6 August 2019



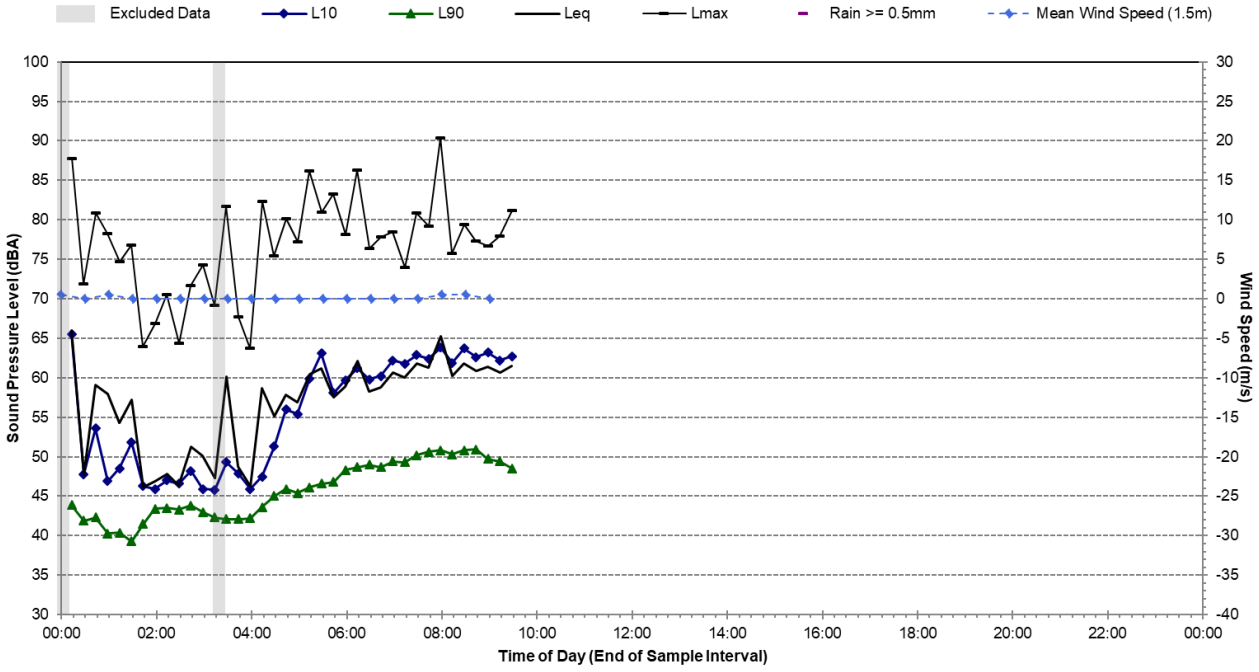
Statistical Ambient Noise Levels

57 Alexandra Ave, Westmead NSW - Wednesday, 7 August 2019



Statistical Ambient Noise Levels

57 Alexandra Ave, Westmead NSW - Thursday, 8 August 2019



Noise Monitoring Location	V.03
Noise Monitoring Address	**47 Grand Ave, Westmead**

Logger Device Type: Svantek 957, Logger Serial No: 23814

Sound Level Meter Device Type: Brüel and Kjær 2260, Sound Level Meter Serial No: 2414604

Ambient noise logger located at 47 Grand Avenue, Westmead. Logger located with view of Grande Avenue to the south and Bridge Road to the west.

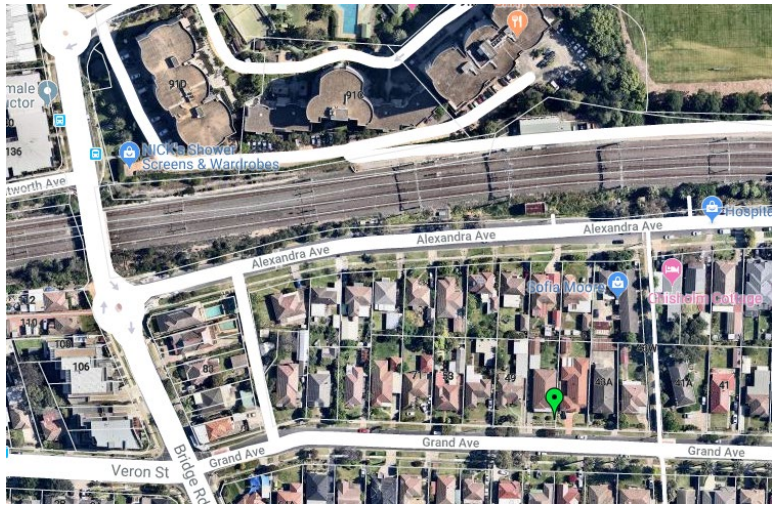
Attended noise measurements indicate the ambient noise environment at this location is dominated by road traffic noise from Grande Avenue as well as other nearby roads. Train passby noise also heard regularly at this location.

Measured noise levels: (L_{Amax}):

22/07/2019: Light-vehicle traffic Grand Avenue: 60-70 dBA, Traffic Bridge Road: 40-42 dBA

Train passby: 40-59 dBA, Intermittent distant construction: 40-41 dBA

Map of Noise Monitoring Location



Ambient Noise Logging Results – ICNG Defined Time Periods

Monitoring Period (22/07/2019 – 08/08/2019)	Noise Level (dBA)			
	RBL	LAeq	L10	L1
Daytime	36	53	55	63
Evening	40	51	54	62
Night-time	37	48	45	56

Ambient Noise Logging Results – RNP Defined Time Periods

Monitoring Period (22/07/2019 – 08/08/2019)	Noise Level (dBA)	
	LAeq(period)	LAeq(1hour)
Daytime (7am-10pm)	52	54
Night-time (10pm-7am)	47	51

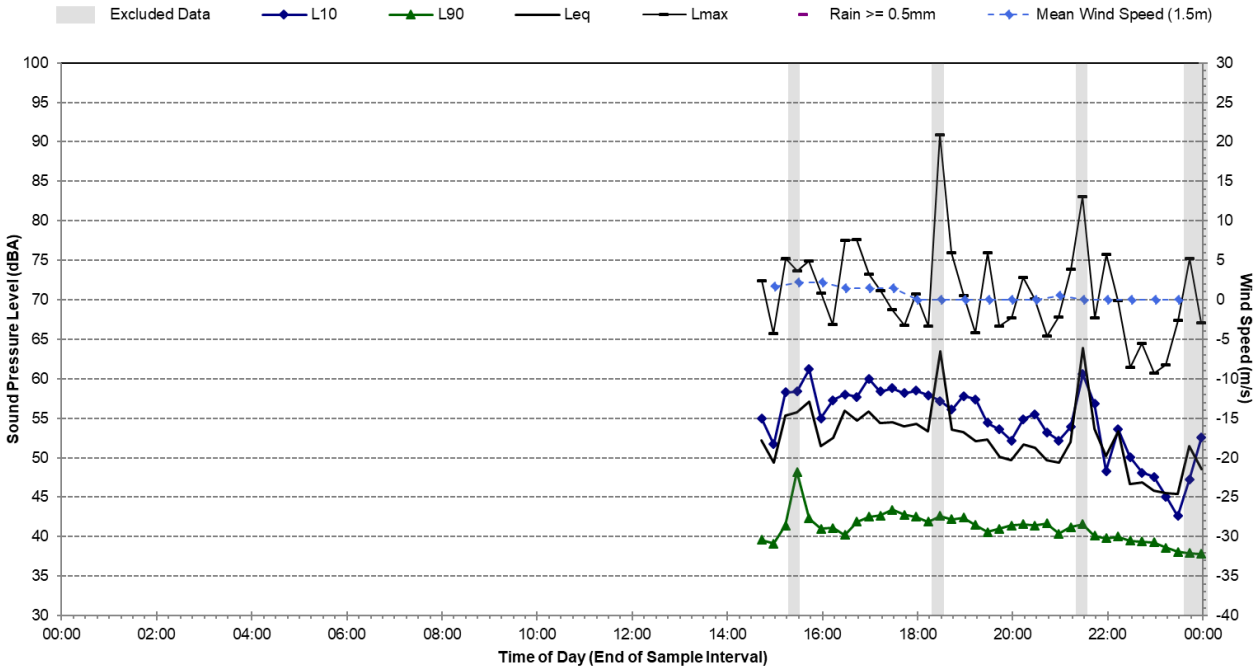
Attended Noise Measurement Results

Date	Start Time	Measured Noise Level (dBA)		
		LA90	LAeq	LAmax
22/07/2019	14:02	39	50	70

Photo of Noise Monitoring Location

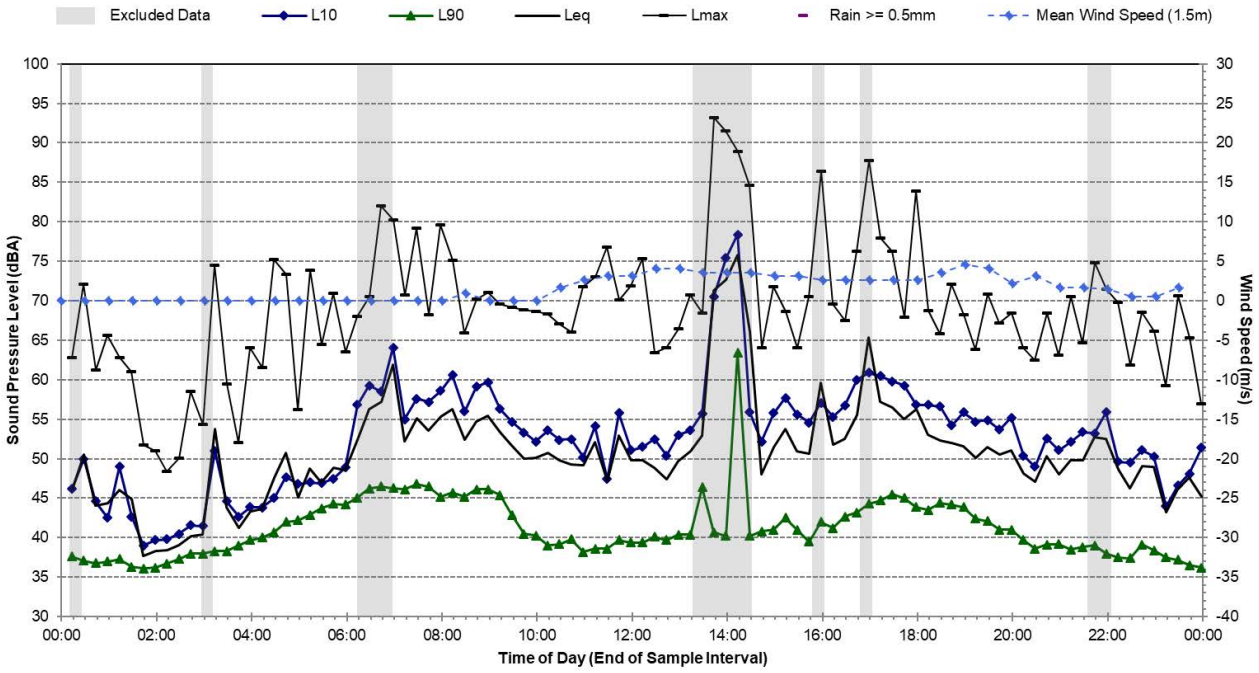
Statistical Ambient Noise Levels

47 Grand Ave, Westmead NSW - Monday, 22 July 2019



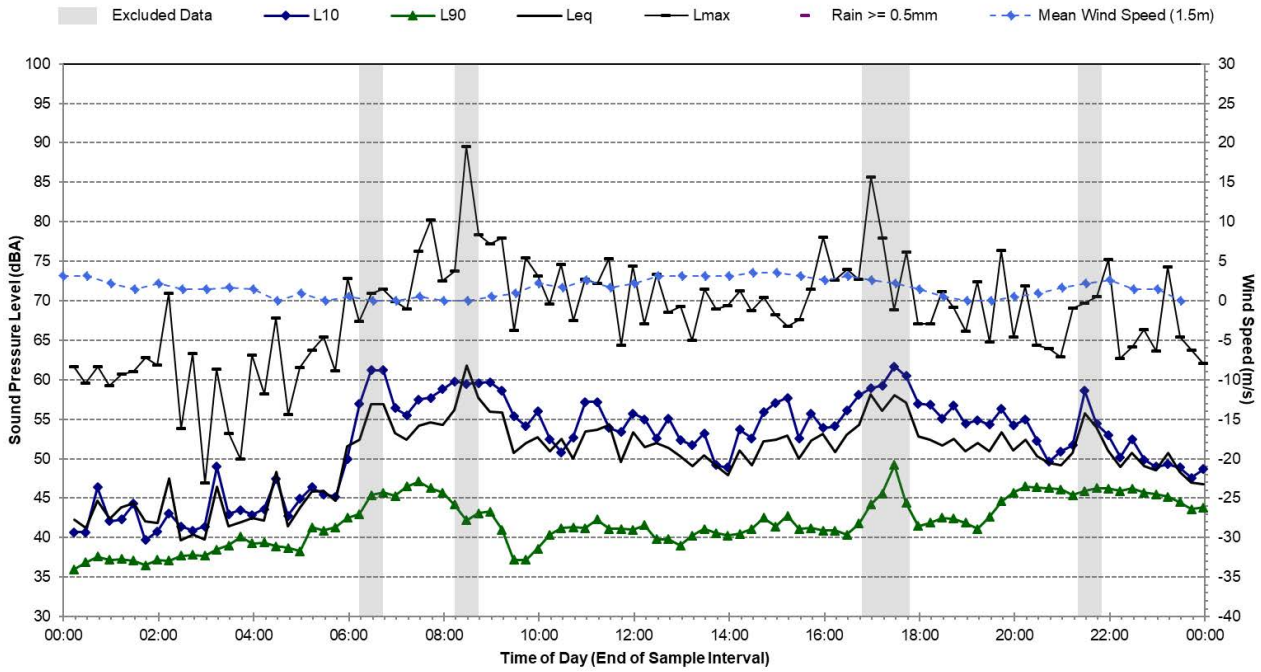
Statistical Ambient Noise Levels

47 Grand Ave, Westmead NSW - Tuesday, 23 July 2019



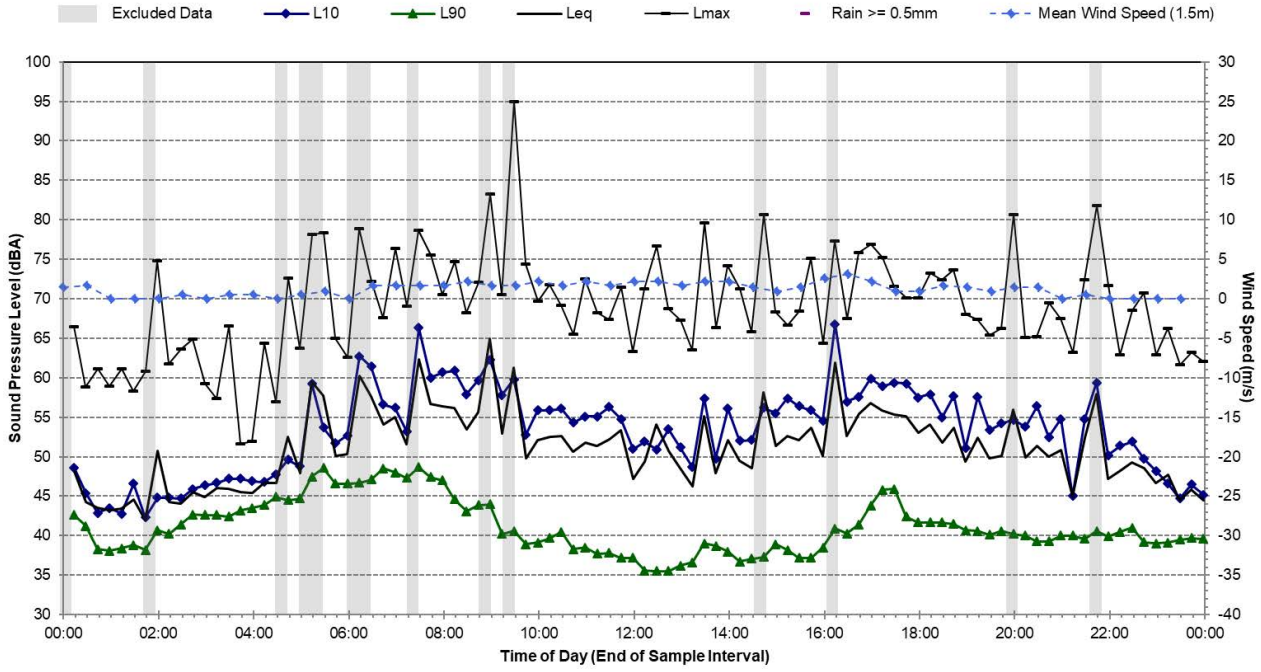
Statistical Ambient Noise Levels

47 Grand Ave, Westmead NSW - Wednesday, 24 July 2019



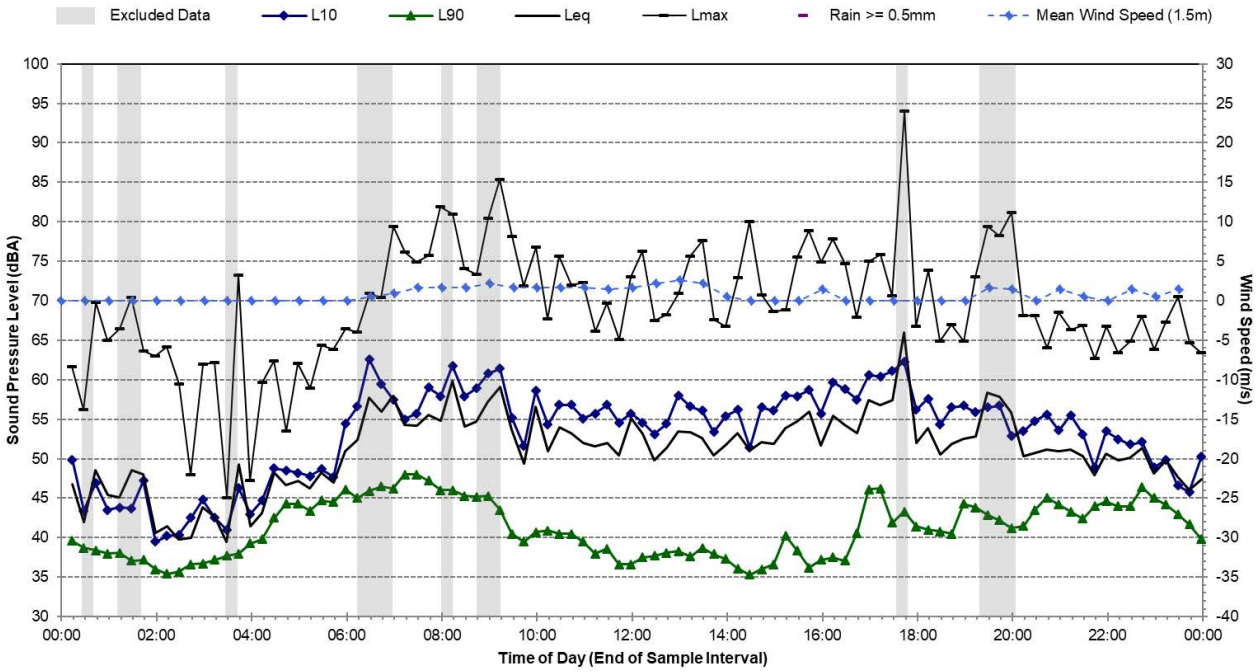
Statistical Ambient Noise Levels

47 Grand Ave, Westmead NSW - Thursday, 25 July 2019



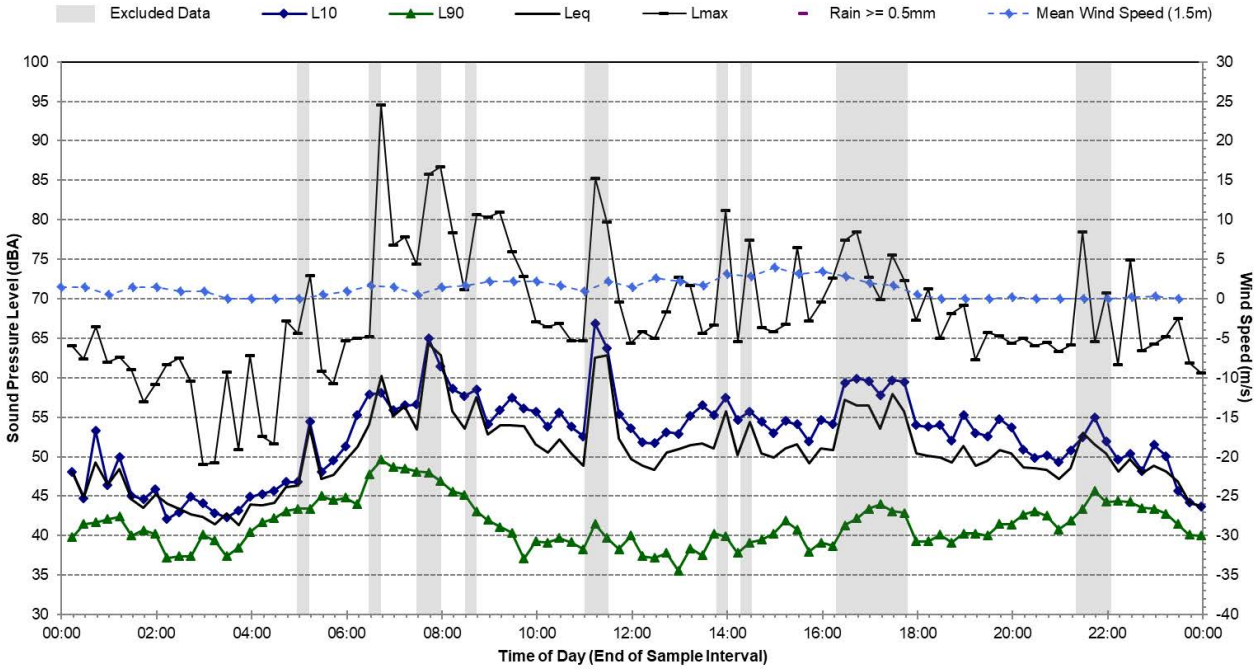
Statistical Ambient Noise Levels

47 Grand Ave, Westmead NSW - Friday, 26 July 2019



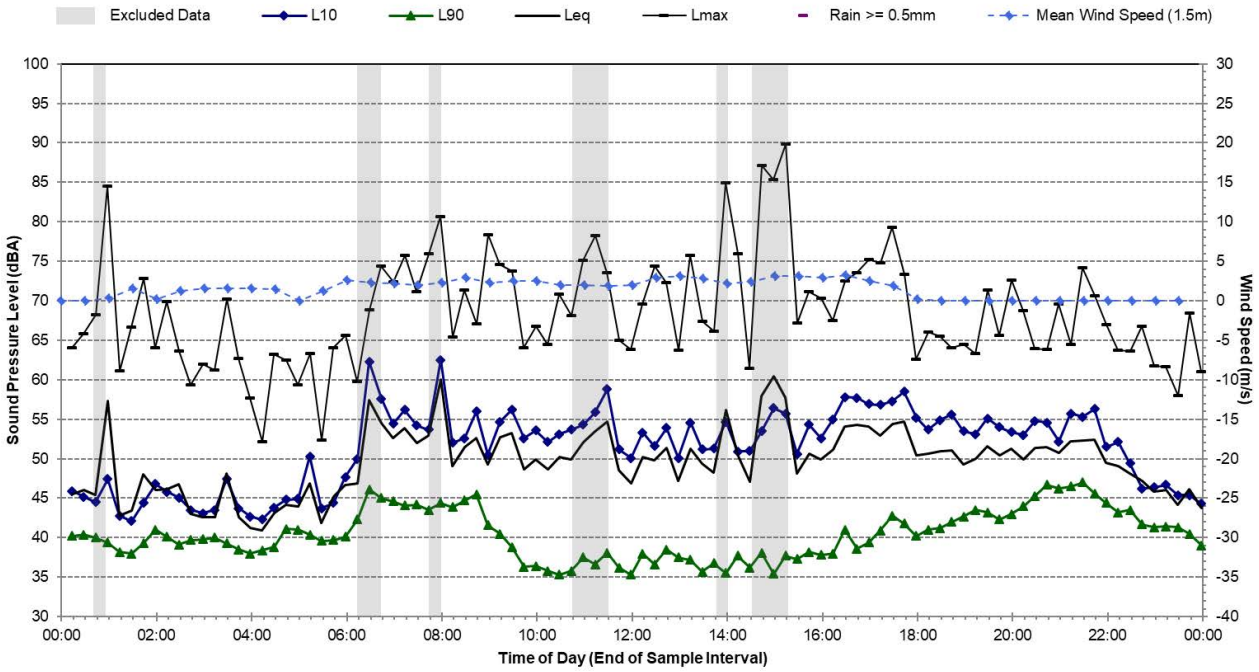
Statistical Ambient Noise Levels

47 Grand Ave, Westmead NSW - Saturday, 27 July 2019



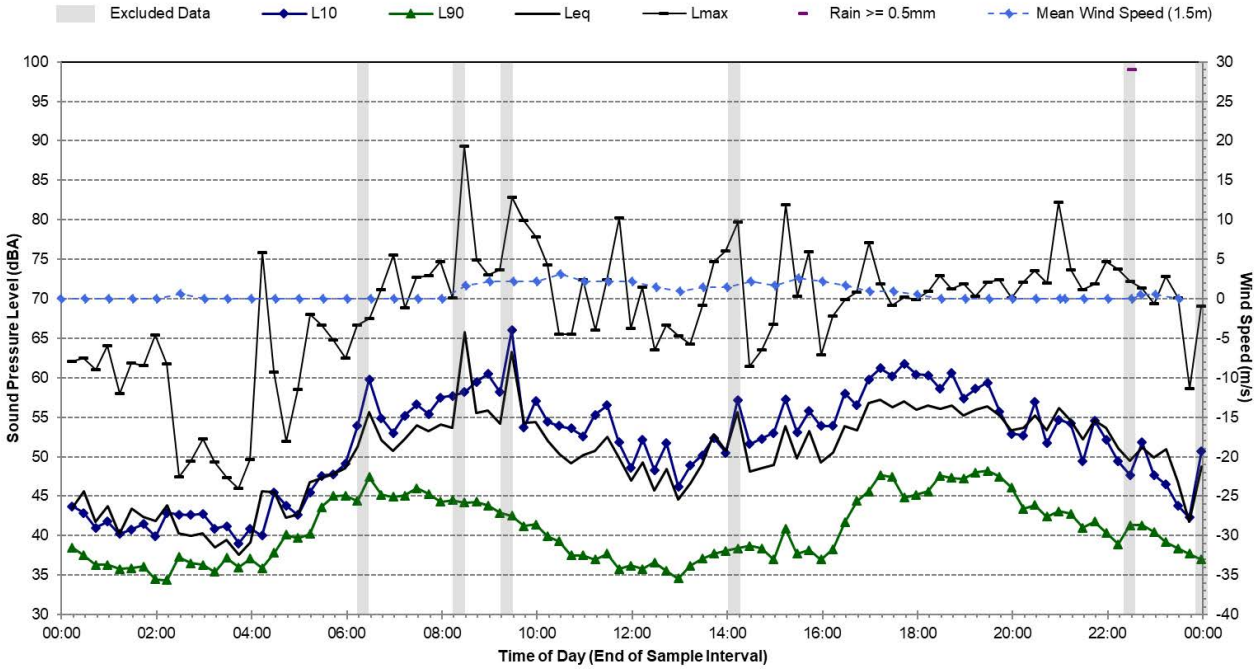
Statistical Ambient Noise Levels

47 Grand Ave, Westmead NSW - Sunday, 28 July 2019



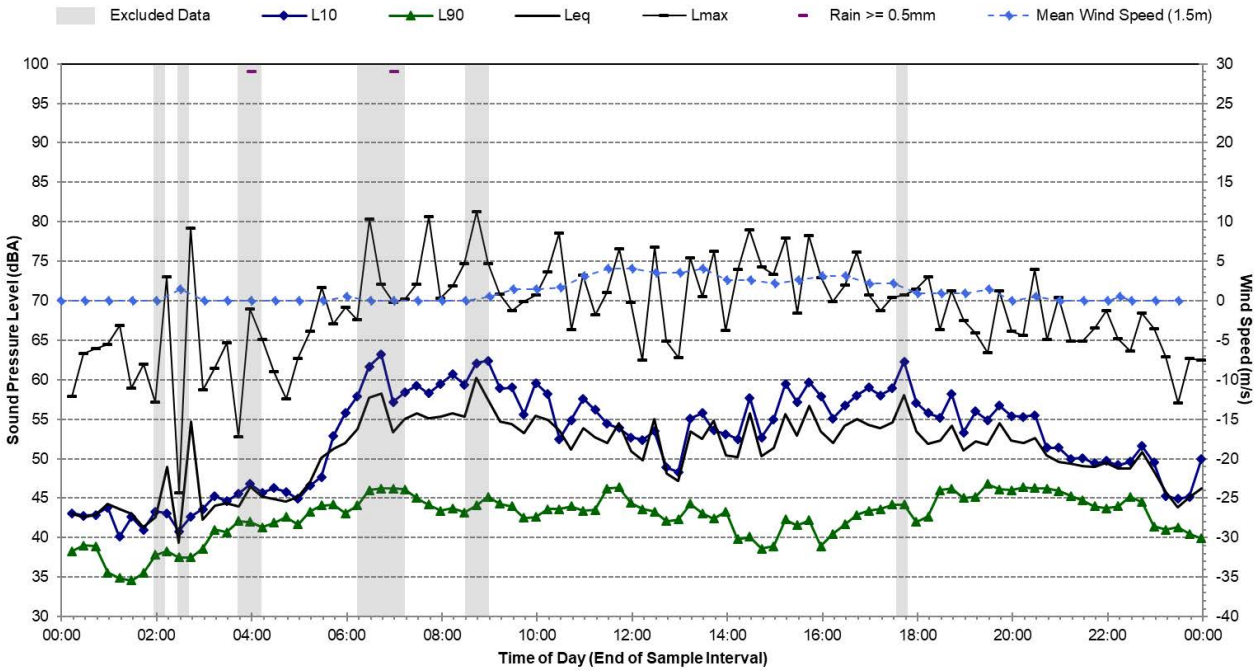
Statistical Ambient Noise Levels

47 Grand Ave, Westmead NSW - Monday, 29 July 2019



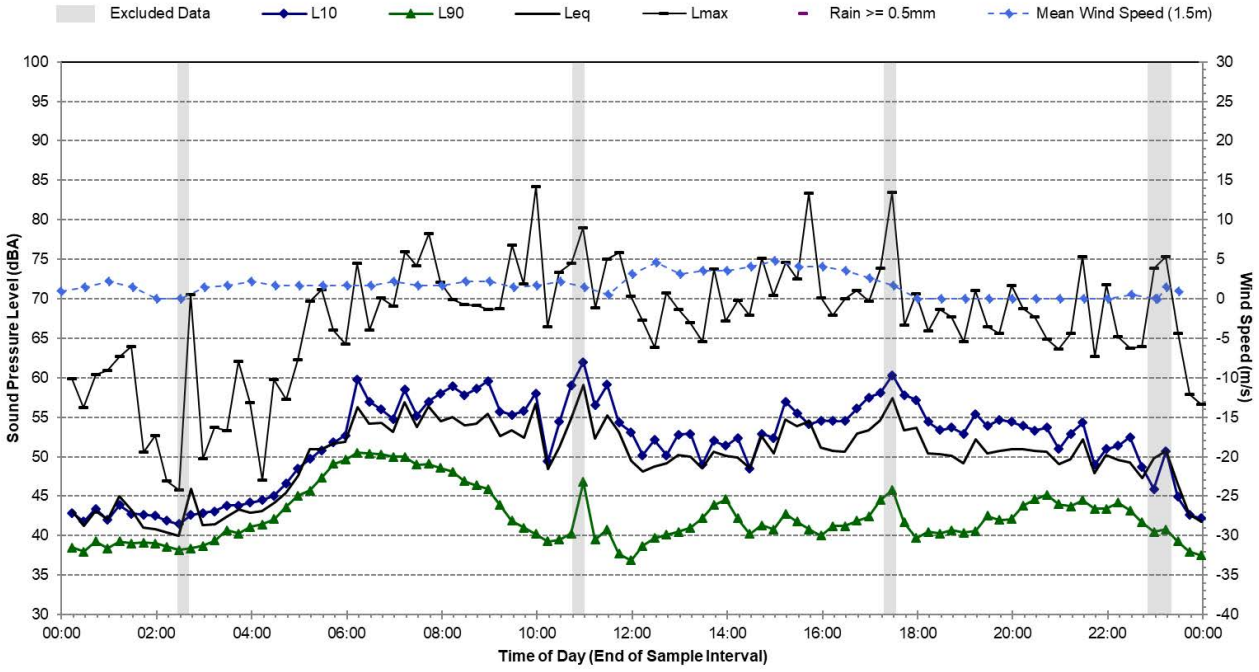
Statistical Ambient Noise Levels

47 Grand Ave, Westmead NSW - Tuesday, 30 July 2019



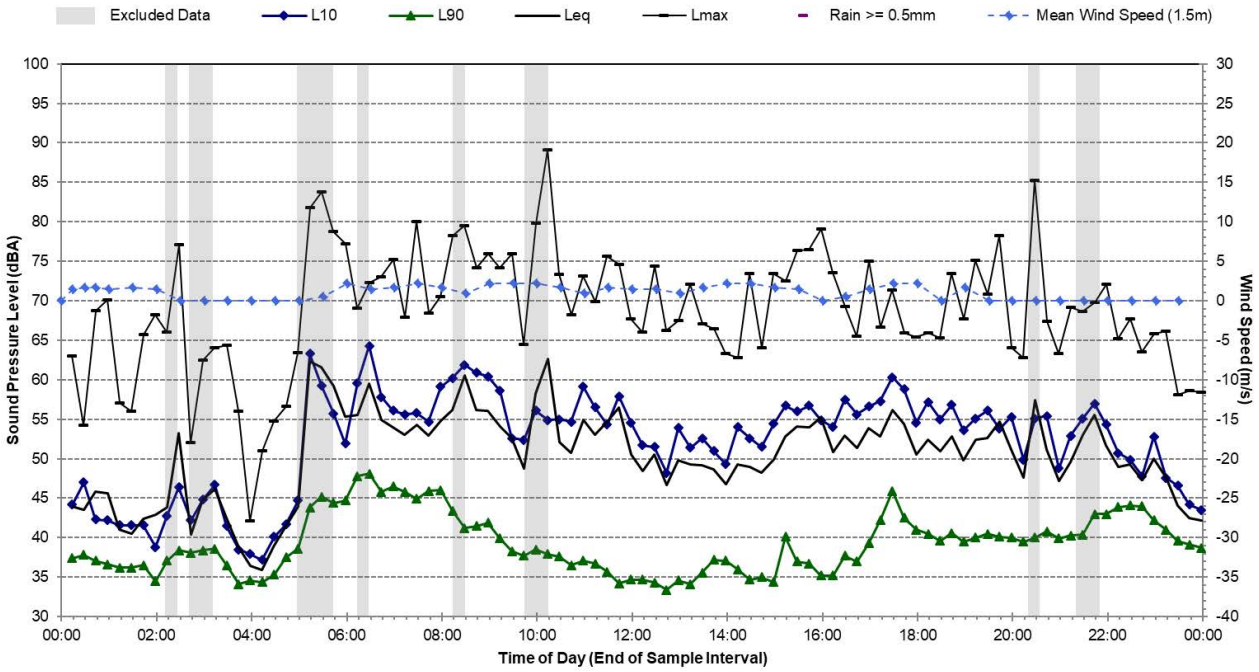
Statistical Ambient Noise Levels

47 Grand Ave, Westmead NSW - Wednesday, 31 July 2019



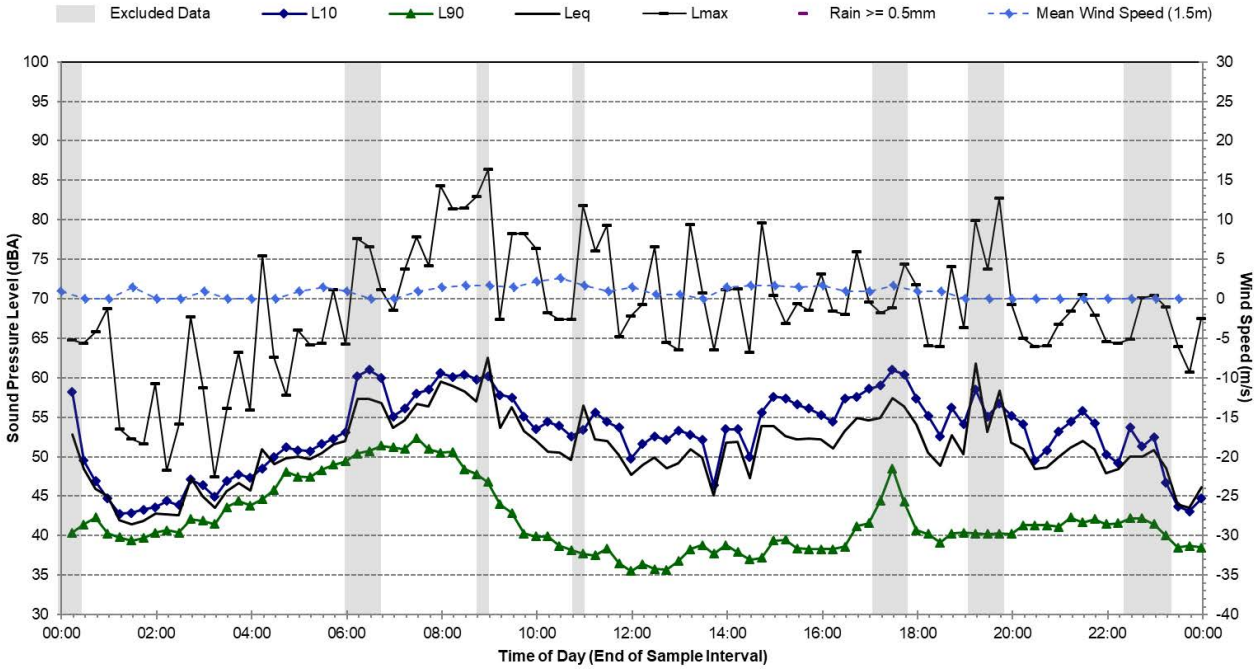
Statistical Ambient Noise Levels

47 Grand Ave, Westmead NSW - Thursday, 1 August 2019



Statistical Ambient Noise Levels

47 Grand Ave, Westmead NSW - Friday, 2 August 2019



Statistical Ambient Noise Levels

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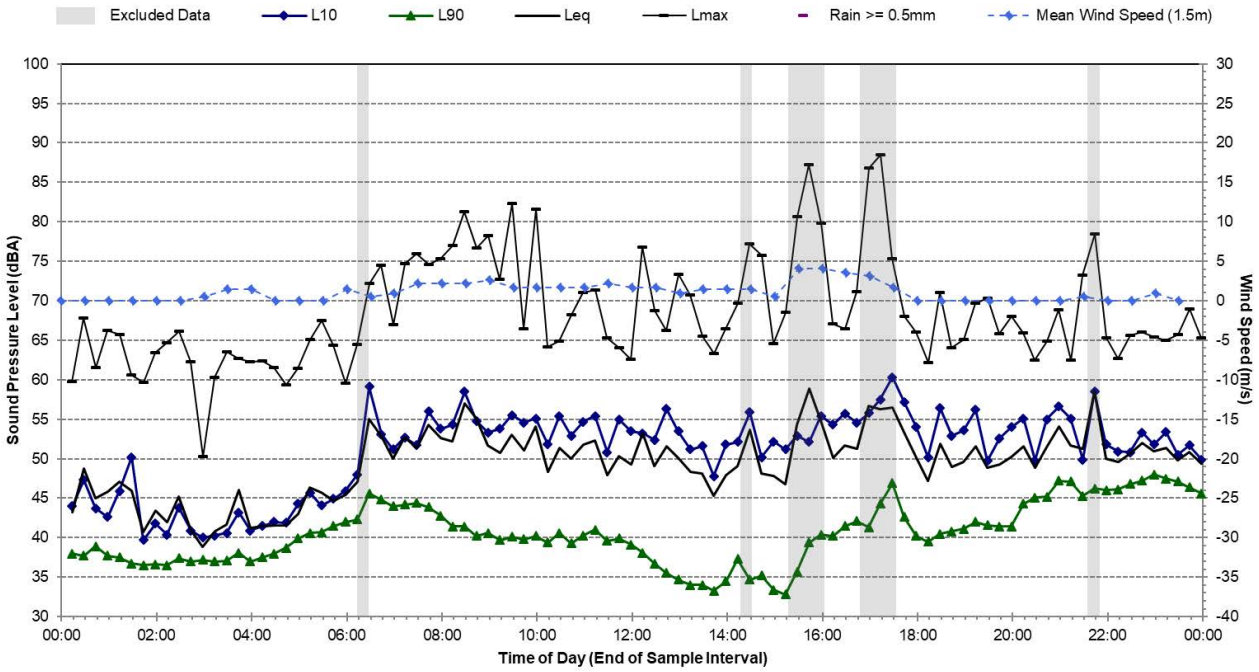
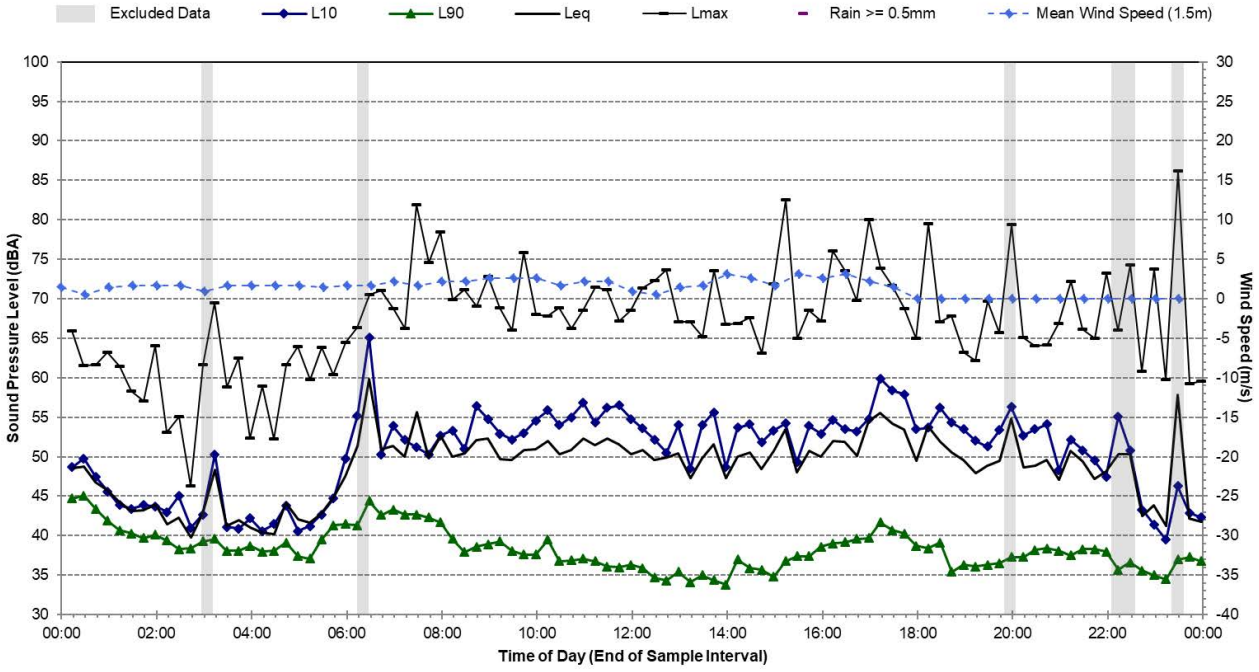


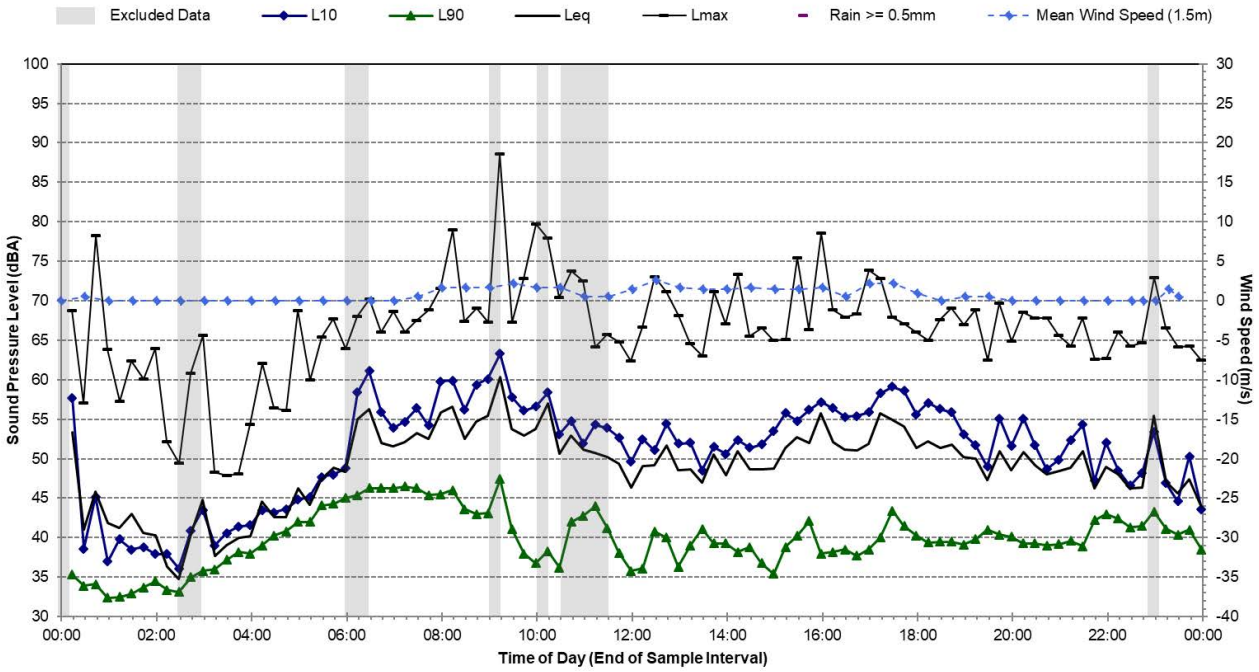
Statistical Ambient Noise Levels

47 Grand Ave, Westmead NSW - Sunday, 4 August 2019



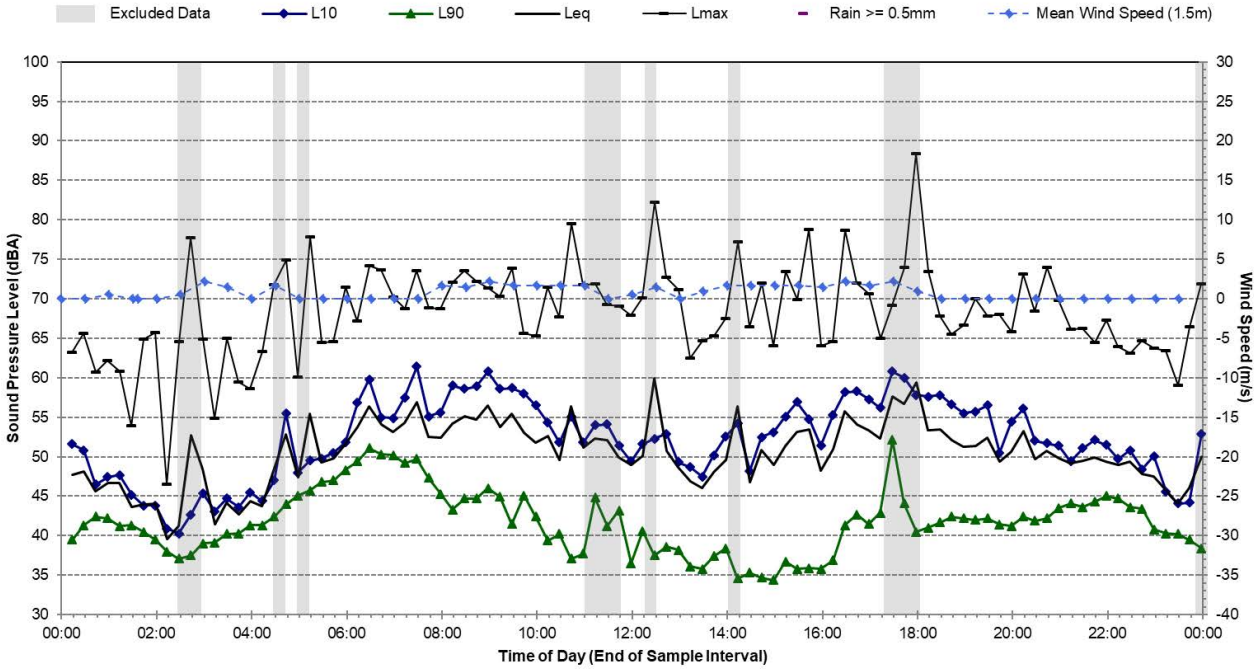
Statistical Ambient Noise Levels

47 Grand Ave, Westmead NSW - Monday, 5 August 2019



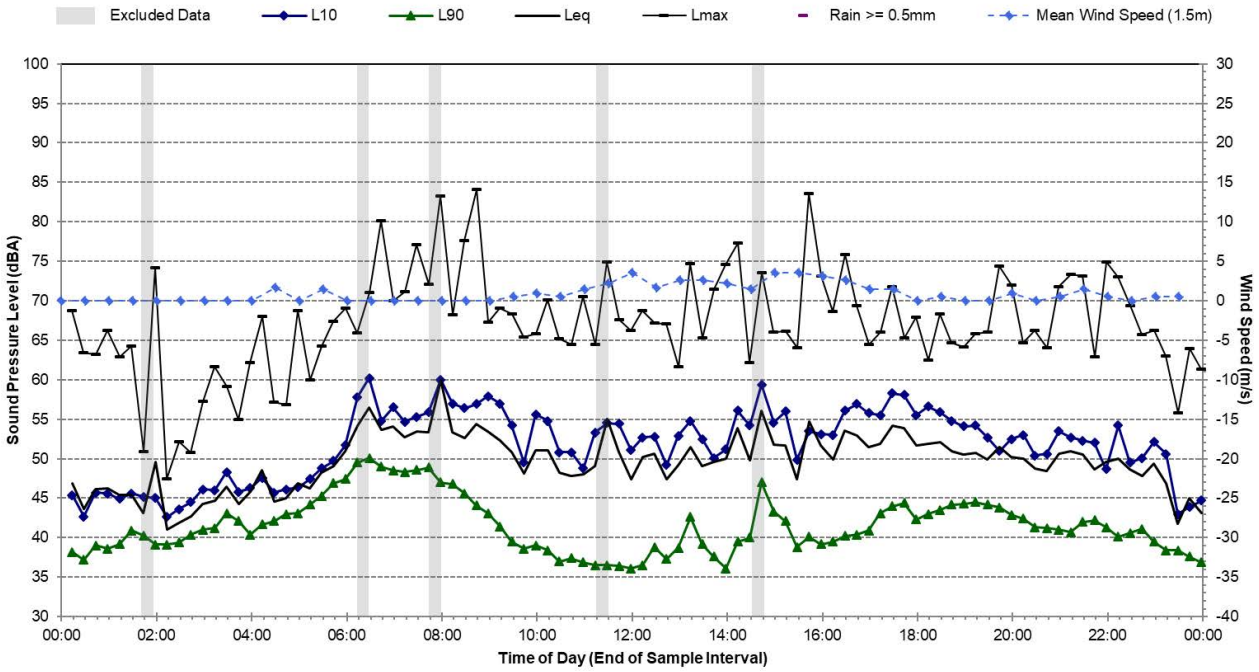
Statistical Ambient Noise Levels

47 Grand Ave, Westmead NSW - Tuesday, 6 August 2019



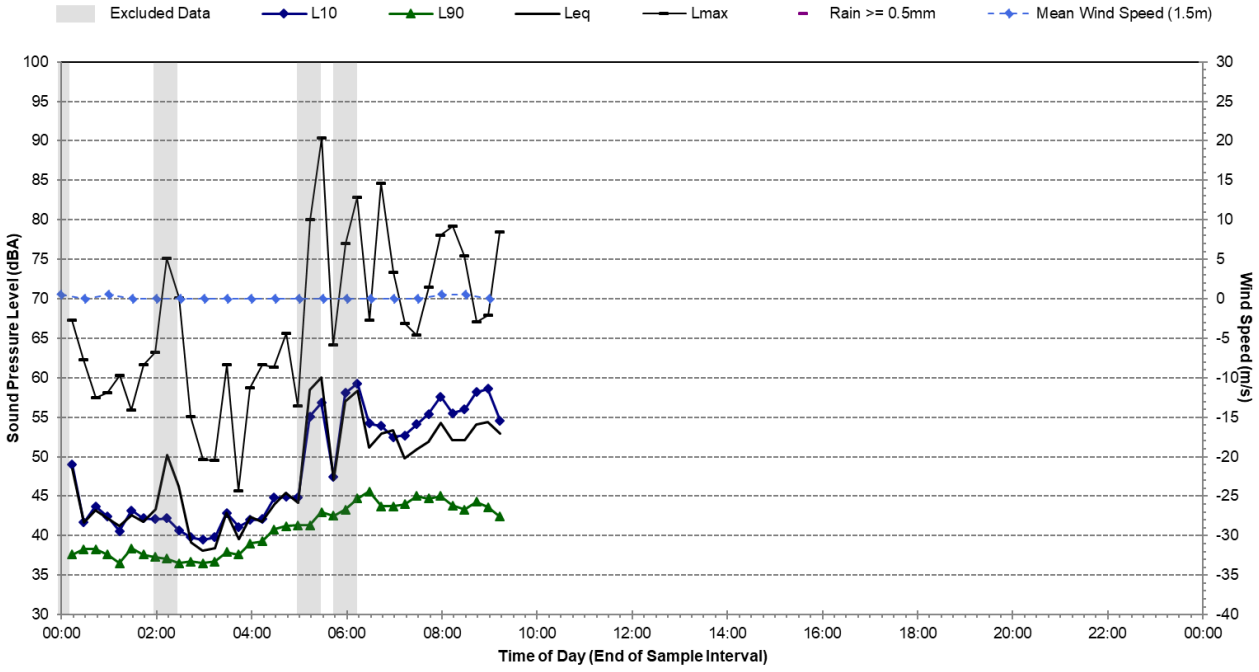
Statistical Ambient Noise Levels

47 Grand Ave, Westmead NSW - Wednesday, 7 August 2019



Statistical Ambient Noise Levels

47 Grand Ave, Westmead NSW - Thursday, 8 August 2019



Noise Monitoring Location	V.04
Noise Monitoring Address	**150 Hawkesbury Rd, Westmead**

Logger Device Type: Svantek 957, Logger Serial No: 23241

Sound Level Meter Device Type: Brüel and Kjær 2260, Sound Level Meter Serial No: 2414604

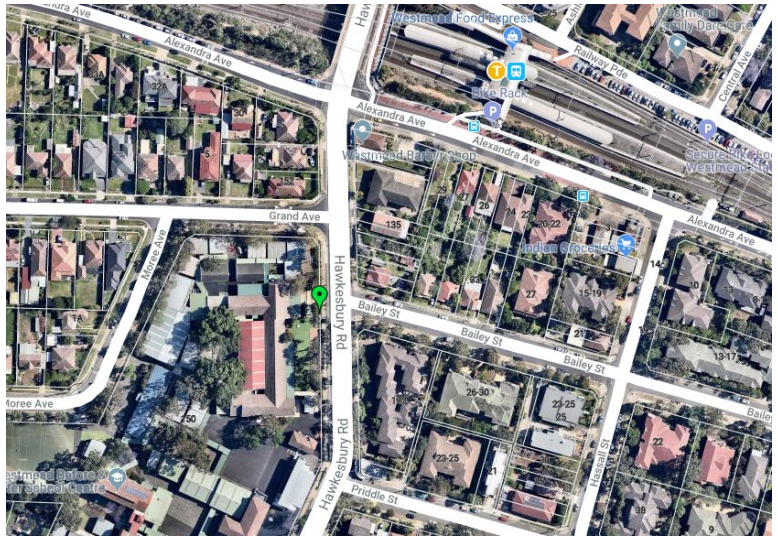
Ambient noise logger located at Westmead Public School at 150 Hawkesbury Road, Westmead. Logger located with view of Hawkesbury Road and Bailey Street to the east.

Attended noise measurements indicate the ambient noise environment at this location is dominated by road traffic noise from Hawkesbury Road as well as other nearby roads.

Measured noise levels: (L_{Amax}):

24/07/2019: Traffic Hawkesbury Road: 55-78 dBA, Light-vehicle traffic Bailey Street: 54-65 dBA
Aircraft: 55-64 dBA, Distant intermittent construction: 48-54 dBA, Birds 50-58 dBA

Map of Noise Monitoring Location



Ambient Noise Logging Results – ICNG Defined Time Periods

Monitoring Period (24/07/2019 – 08/08/2019)	Noise Level (dBA)			
	RBL	LAeq	L10	L1
Daytime	50	65	68	72
Evening	46	64	68	72
Night-time	39	60	61	70

Ambient Noise Logging Results – RNP Defined Time Periods

Monitoring Period (24/07/2019 – 08/08/2019)	Noise Level (dBA)	
	LAeq(period)	LAeq(1hour)
Daytime (7am-10pm)	64	65
Night-time (10pm-7am)	60	64

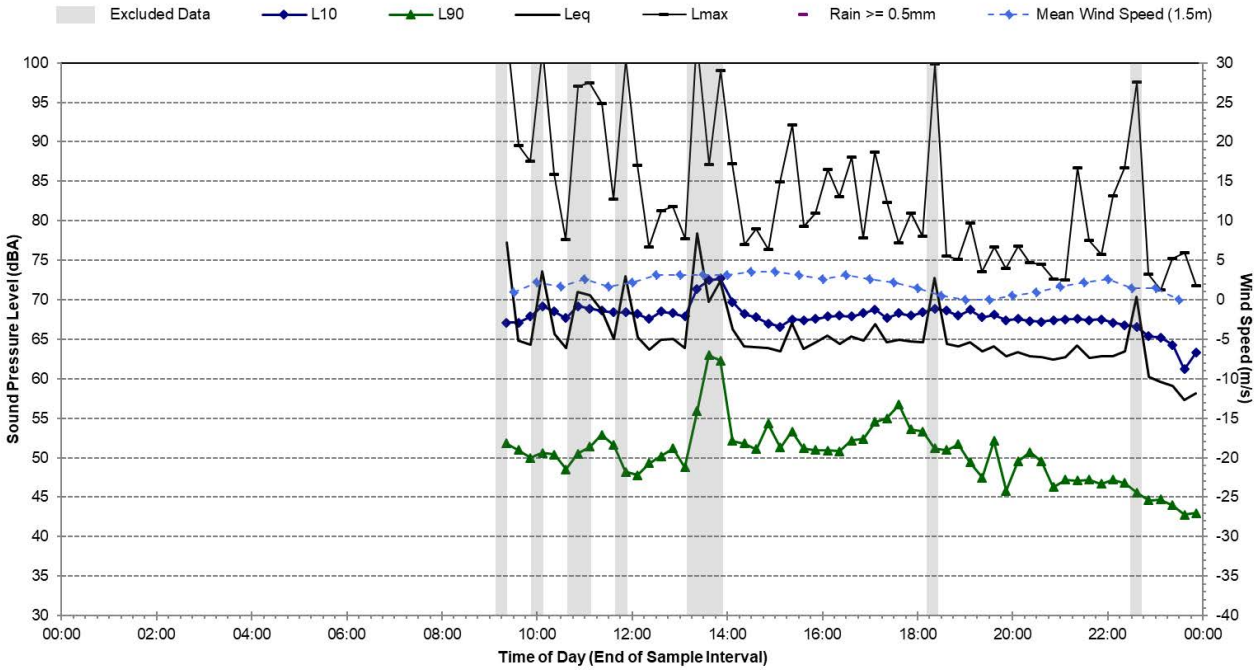
Attended Noise Measurement Results

Date	Start Time	Measured Noise Level (dBA)		
		LA90	LAeq	LAmax
24/07/2019	09:12	52	63	82

Photo of Noise Monitoring Location

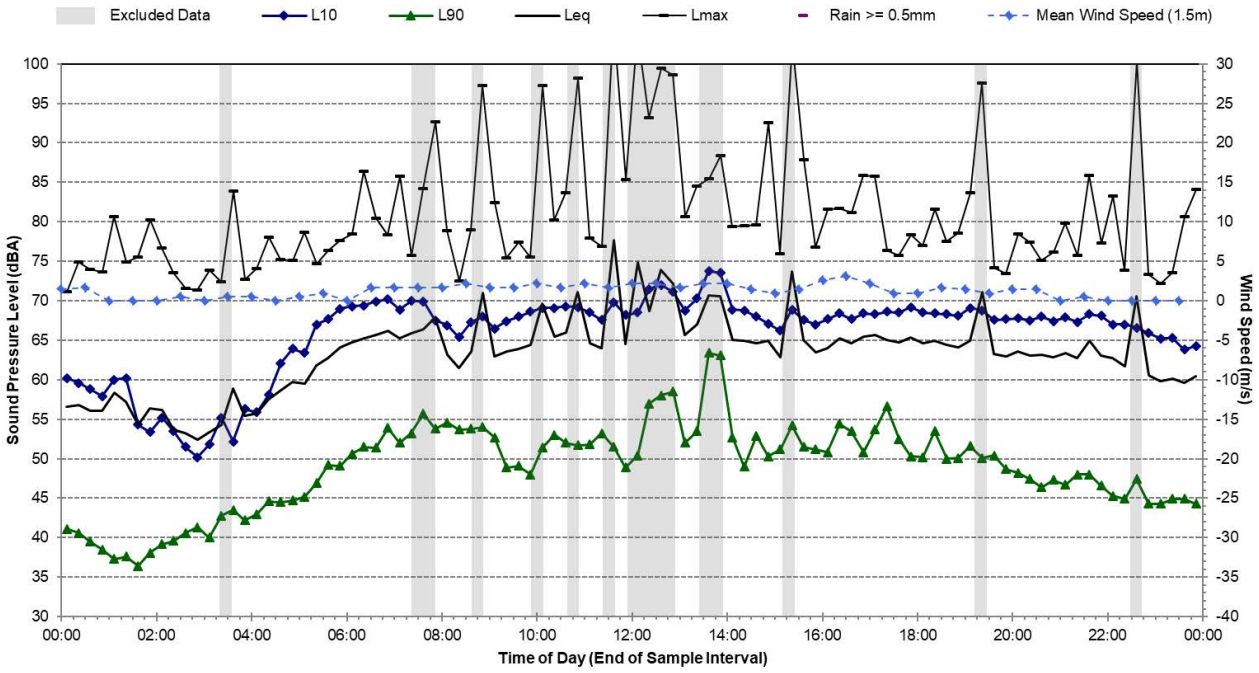
Statistical Ambient Noise Levels

150 Hawkesbury Rd, Westmead NSW - Wednesday, 24 July 2019



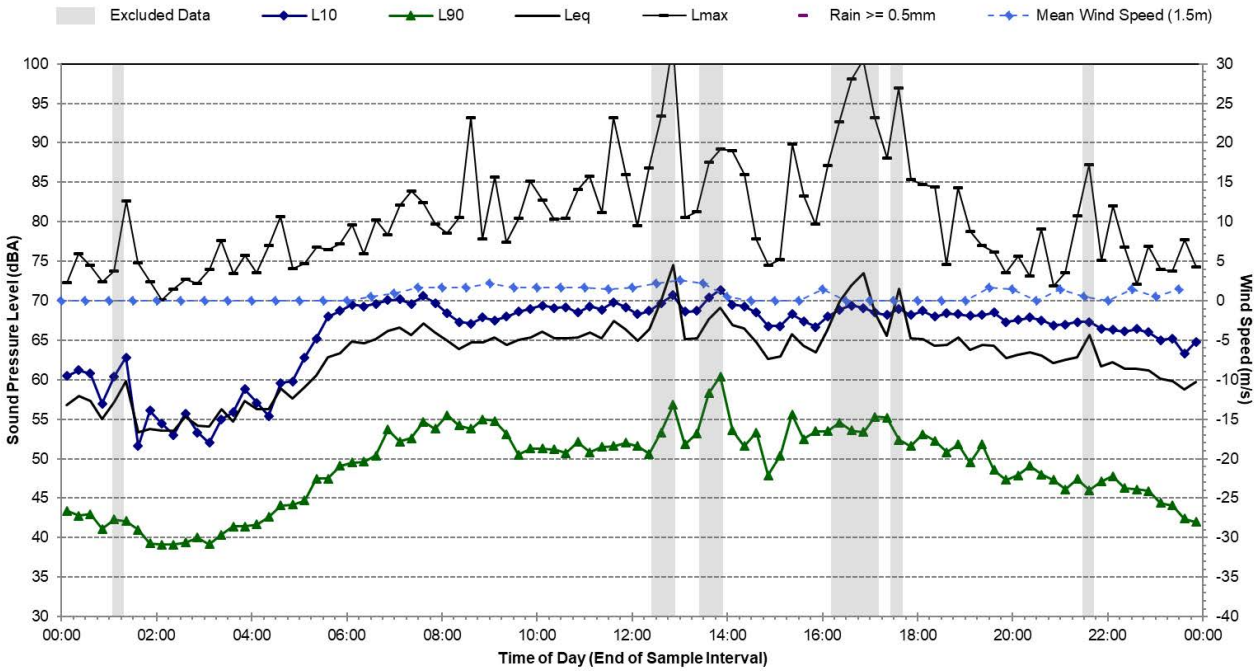
Statistical Ambient Noise Levels

150 Hawkesbury Rd, Westmead NSW - Thursday, 25 July 2019



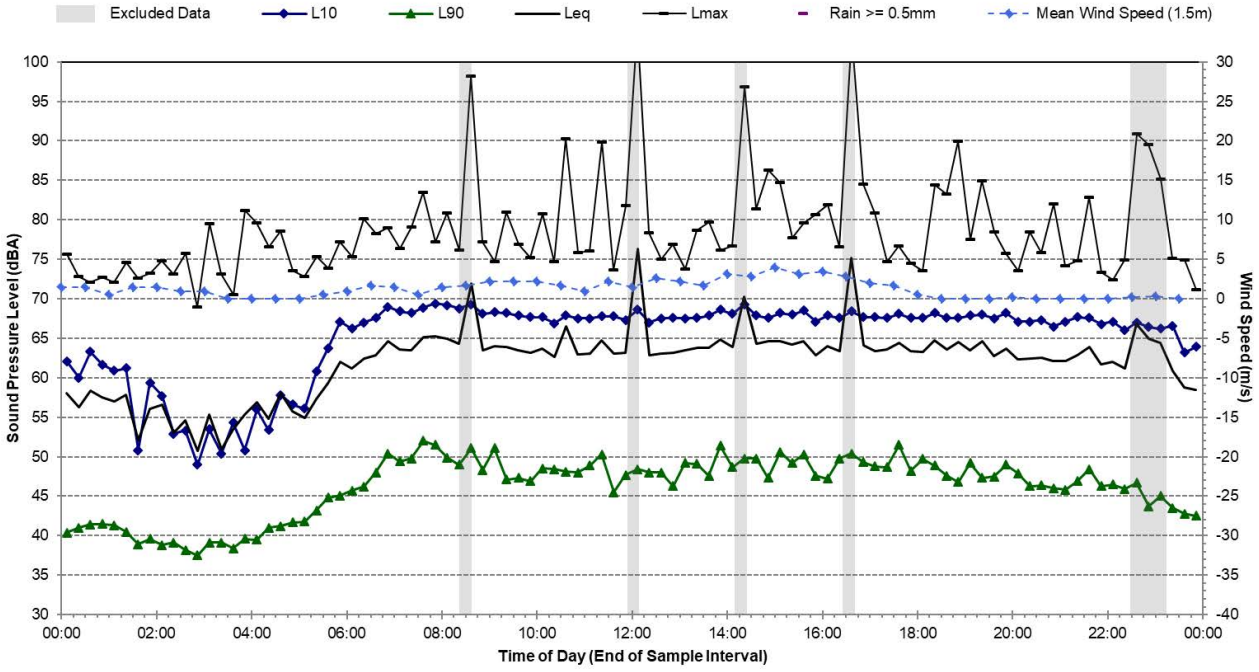
Statistical Ambient Noise Levels

150 Hawkesbury Rd, Westmead NSW - Friday, 26 July 2019



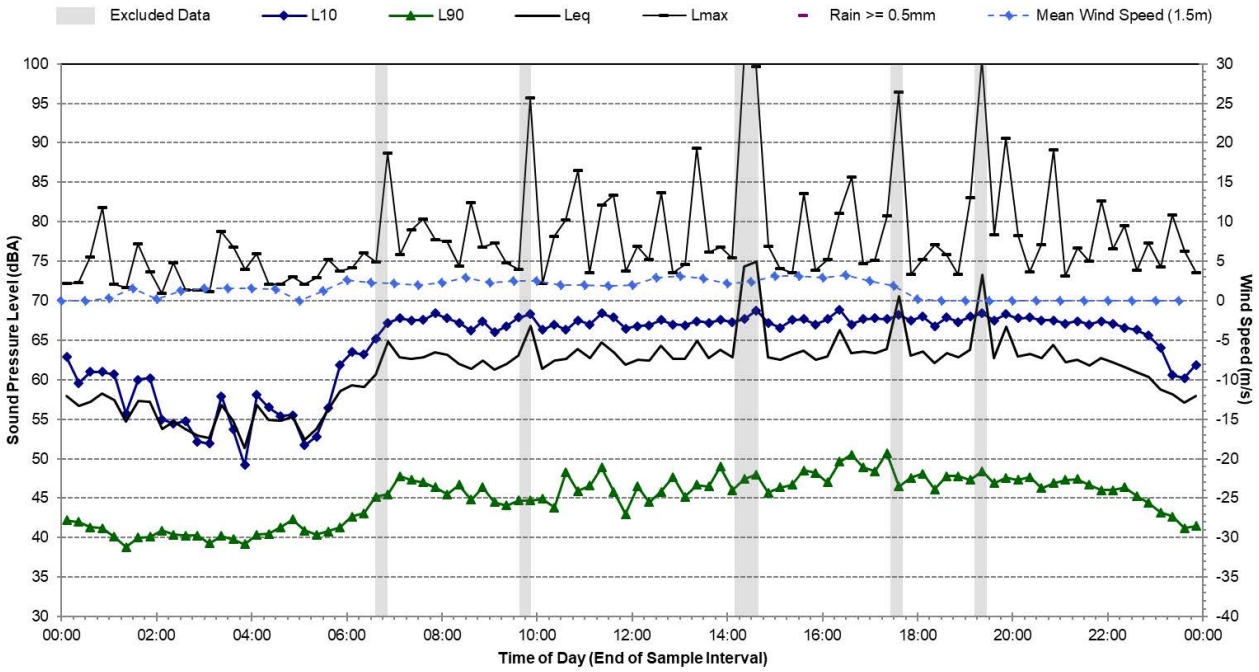
Statistical Ambient Noise Levels

150 Hawkesbury Rd, Westmead NSW - Saturday, 27 July 2019



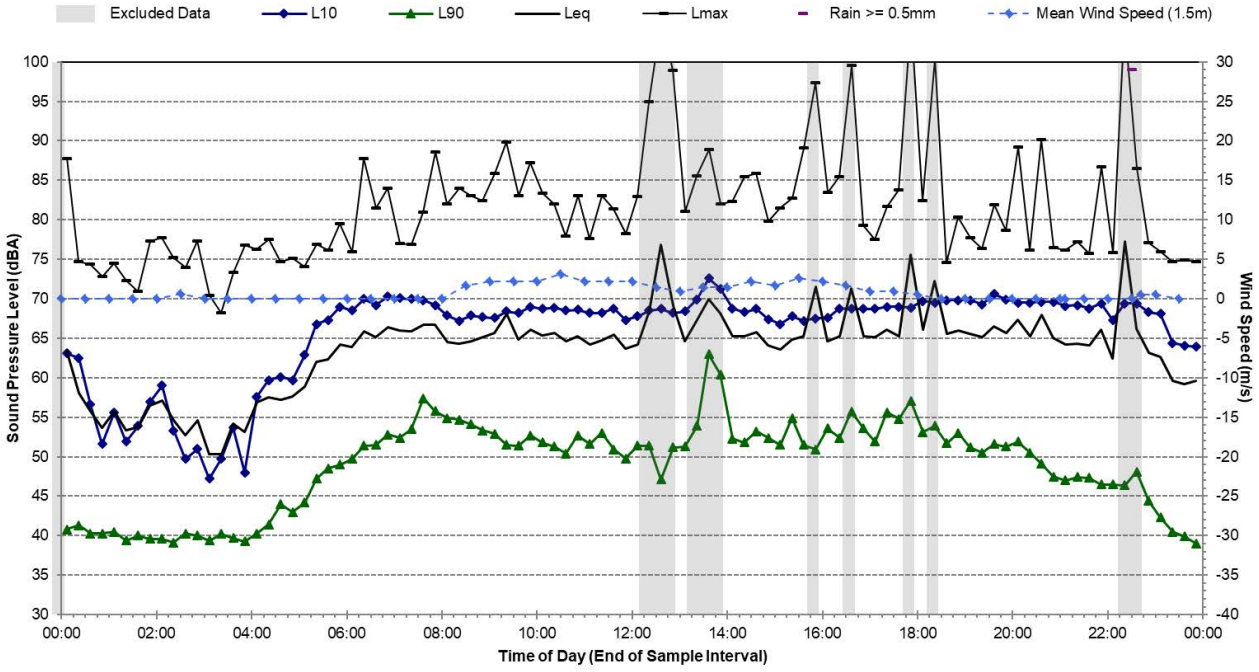
Statistical Ambient Noise Levels

150 Hawkesbury Rd, Westmead NSW - Sunday, 28 July 2019



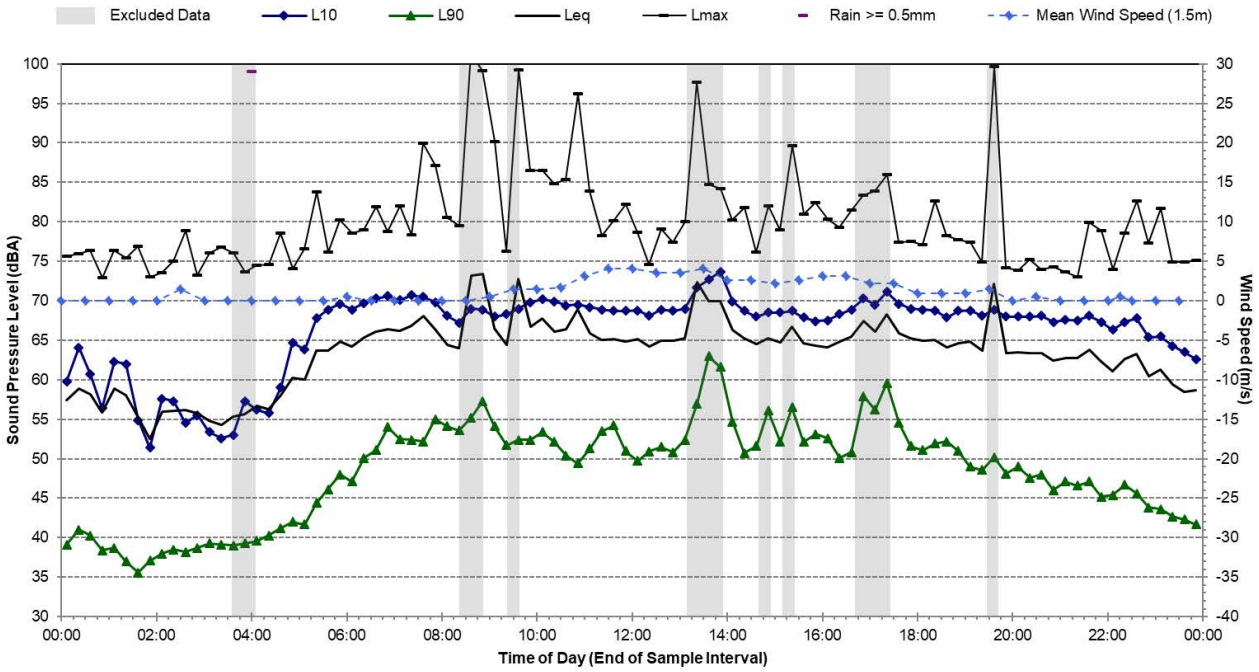
Statistical Ambient Noise Levels

150 Hawkesbury Rd, Westmead NSW - Monday, 29 July 2019



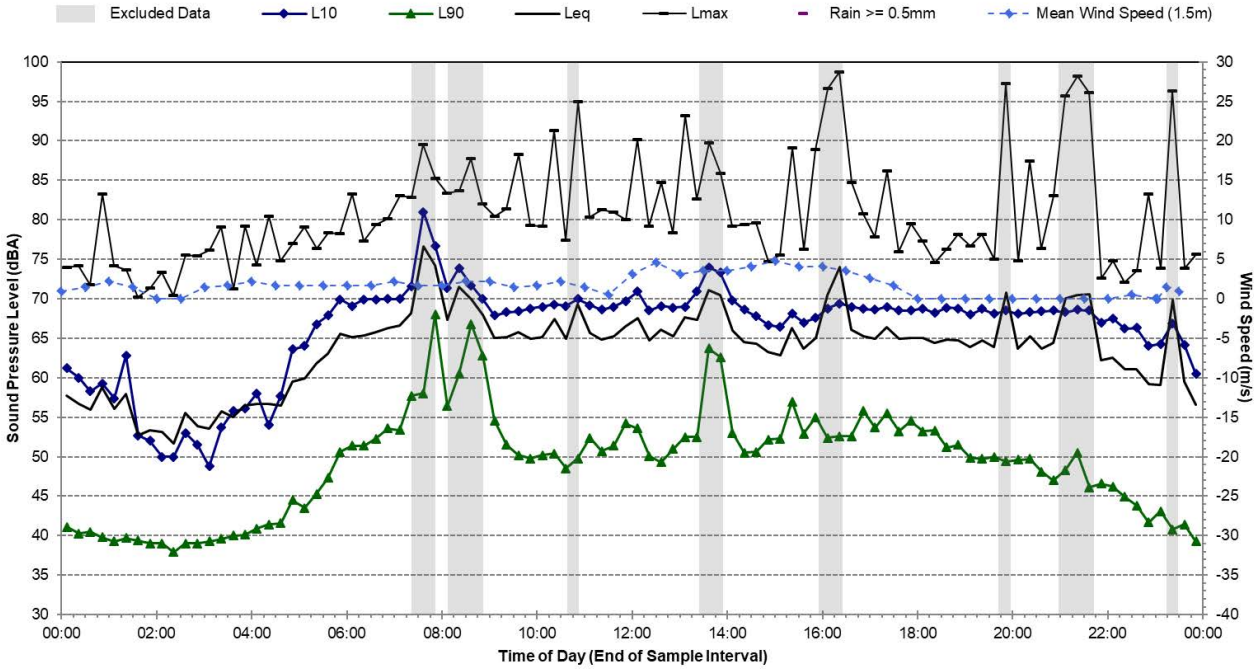
Statistical Ambient Noise Levels

150 Hawkesbury Rd, Westmead NSW - Tuesday, 30 July 2019



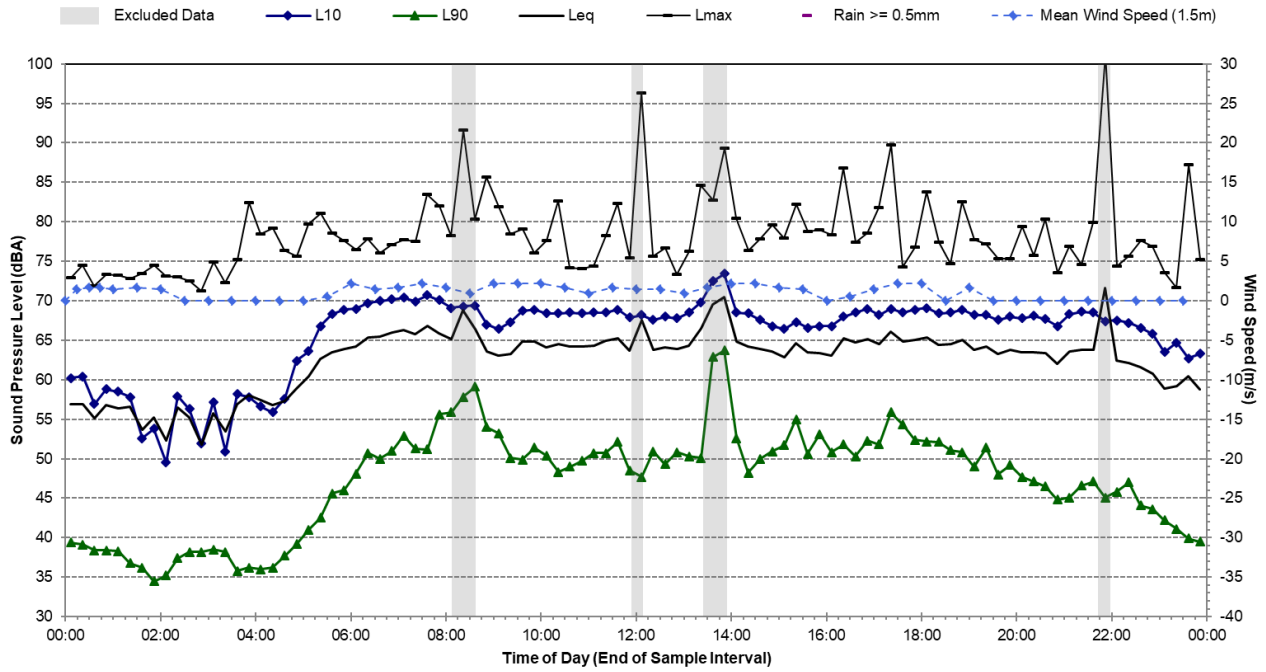
Statistical Ambient Noise Levels

150 Hawkesbury Rd, Westmead NSW - Wednesday, 31 July 2019



Statistical Ambient Noise Levels

150 Hawkesbury Rd, Westmead NSW - Thursday, 1 August 2019



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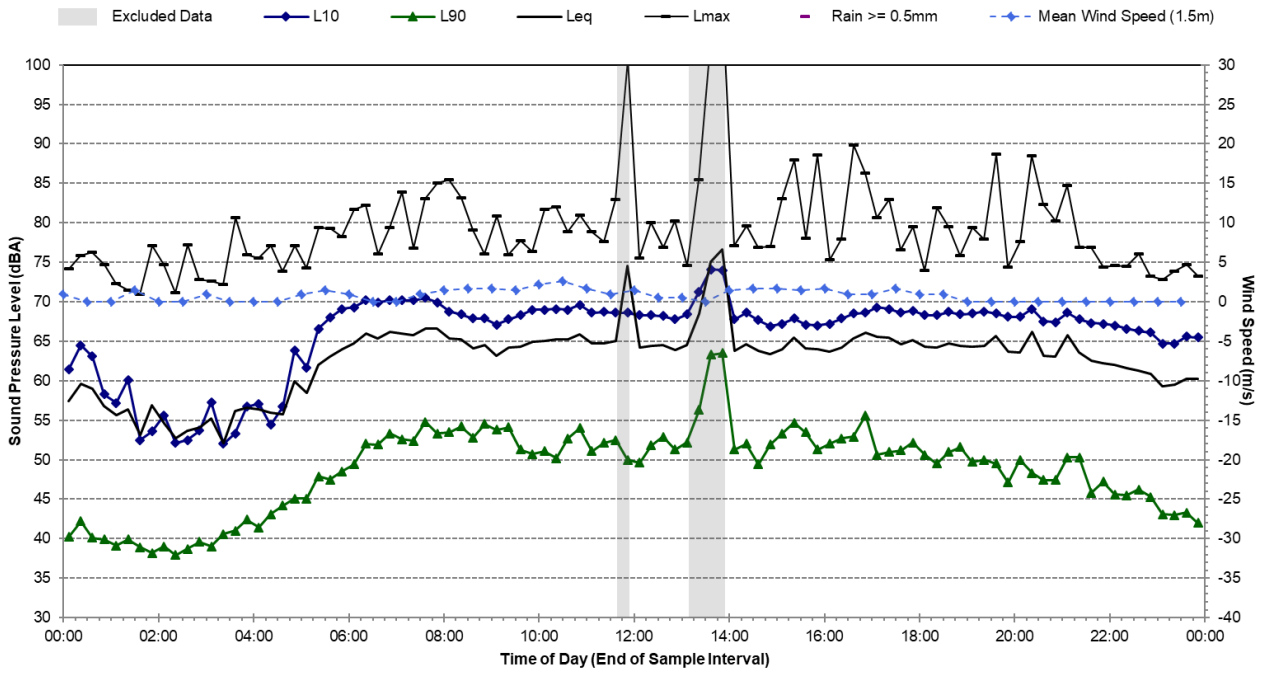
Statistical Ambient Noise Levels

150 Hawkesbury Rd, Westmead NSW - Friday, 2 August 2019



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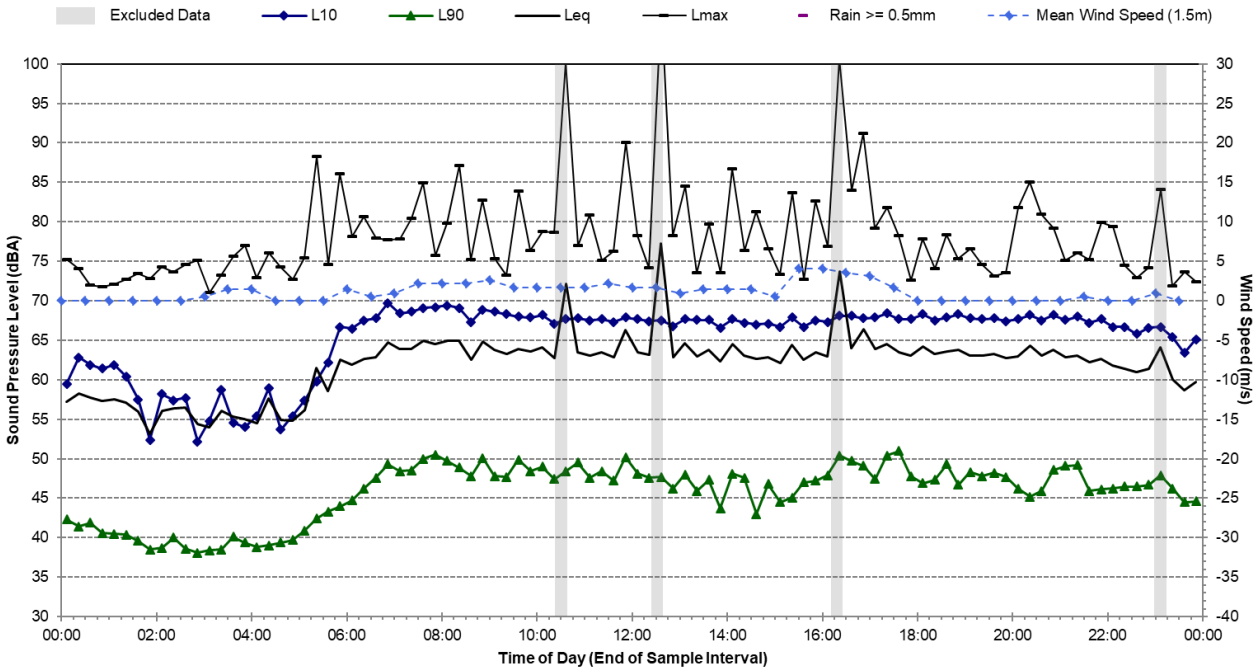
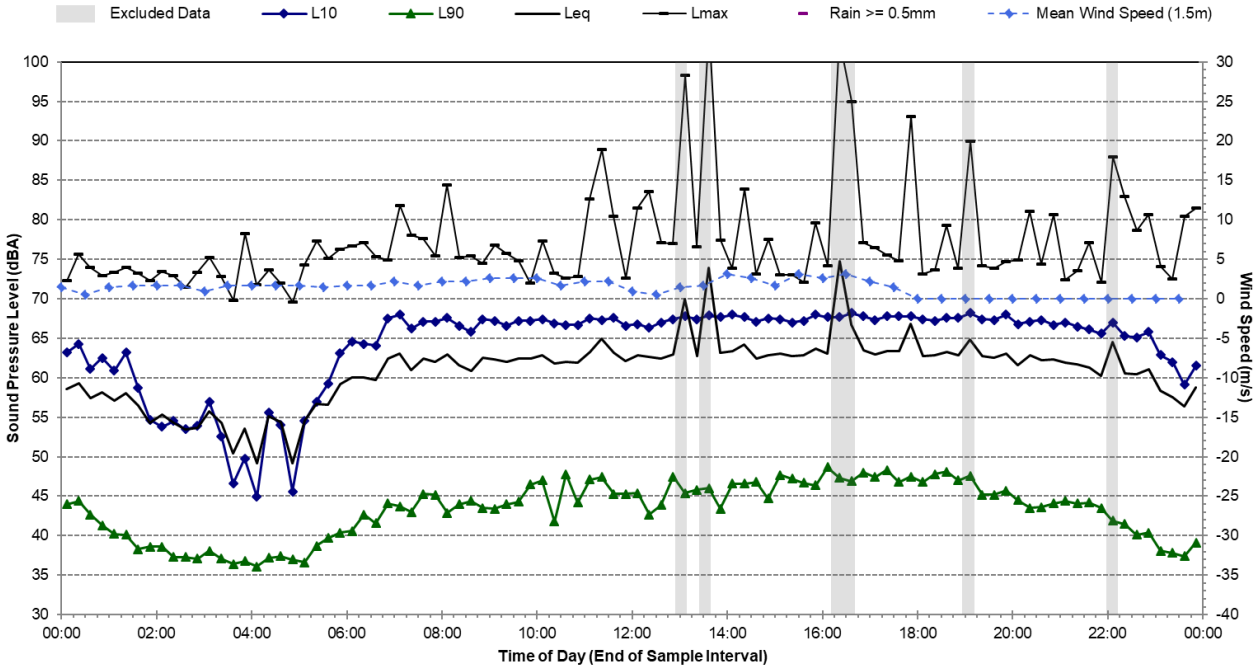
150 Hawkesbury Rd, Westmead NSW - Saturday, 3 August 2019



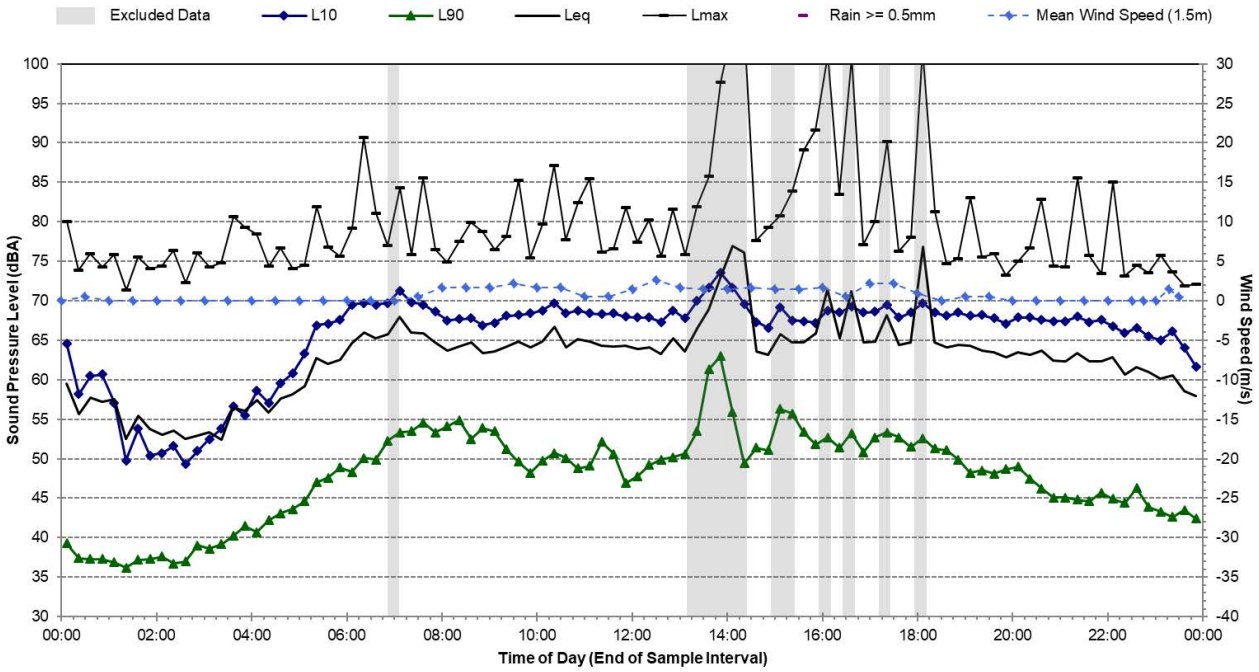
Statistical Ambient Noise Levels

150 Hawkesbury Rd, Westmead NSW - Sunday, 4 August 2019



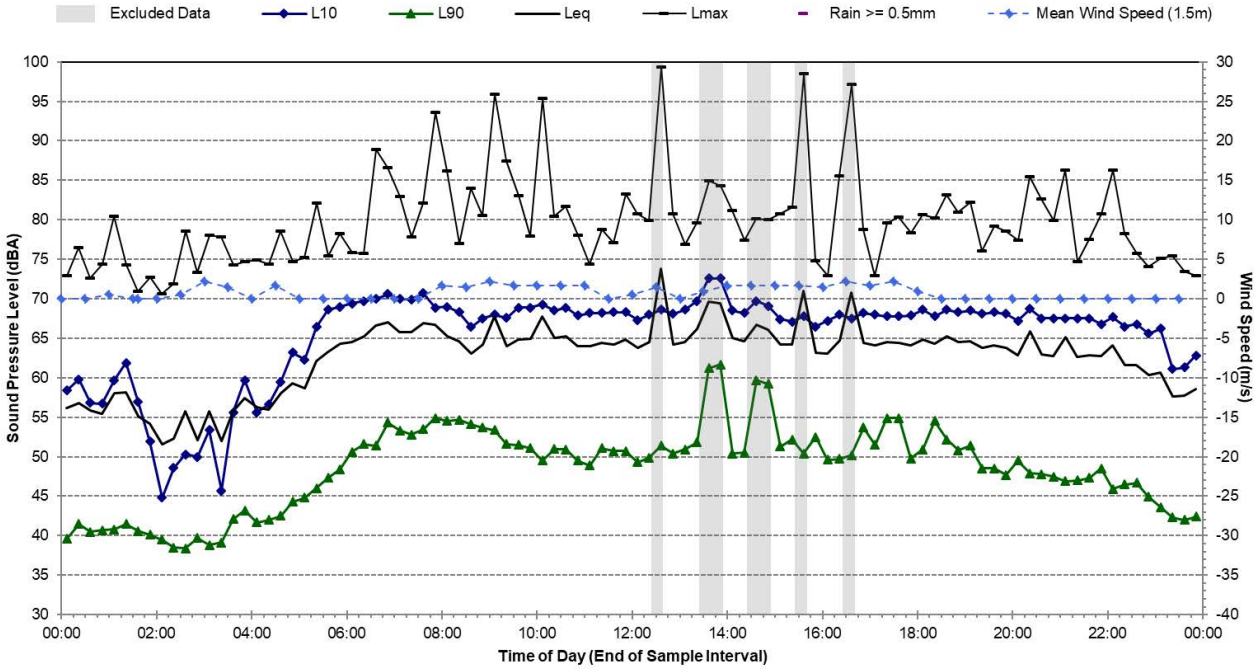
Statistical Ambient Noise Levels

150 Hawkesbury Rd, Westmead NSW - Monday, 5 August 2019



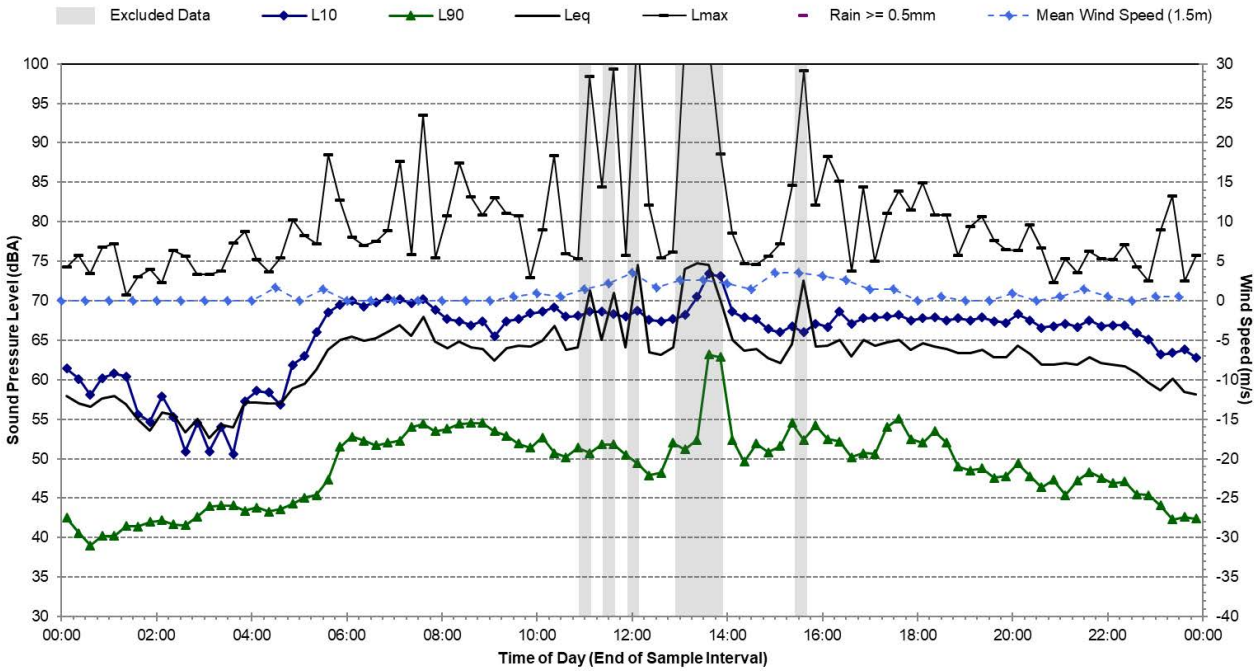
Statistical Ambient Noise Levels

150 Hawkesbury Rd, Westmead NSW - Tuesday, 6 August 2019



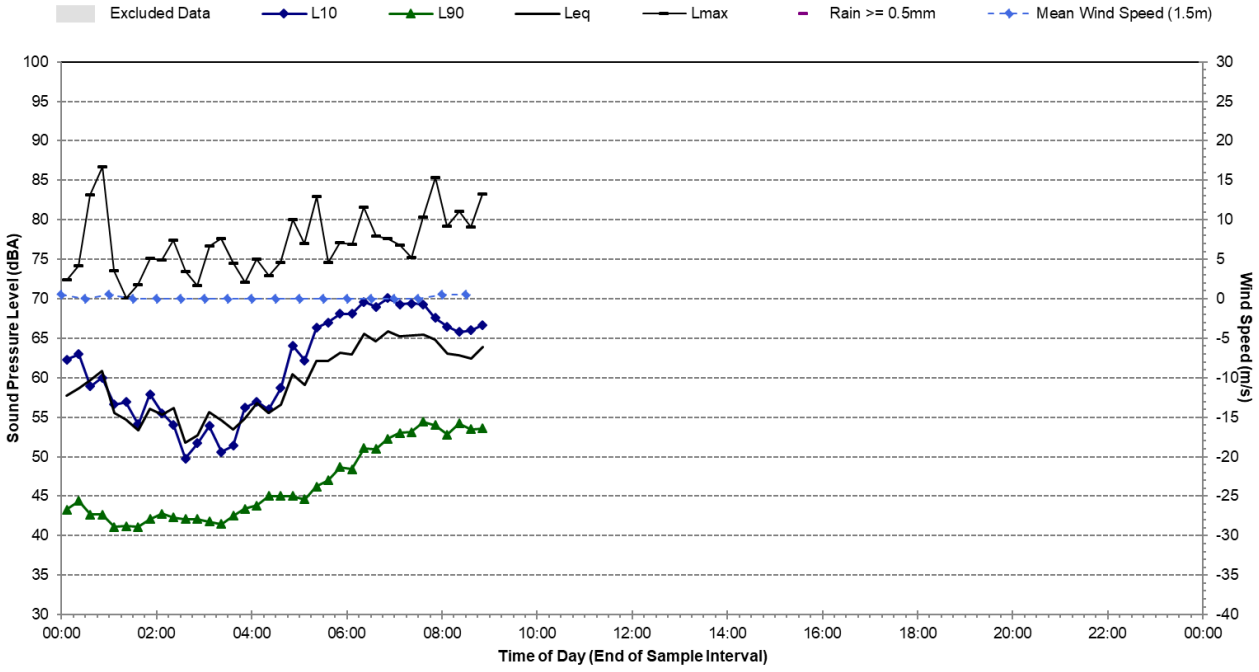
Statistical Ambient Noise Levels

150 Hawkesbury Rd, Westmead NSW - Wednesday, 7 August 2019



Statistical Ambient Noise Levels

150 Hawkesbury Rd, Westmead NSW - Thursday, 8 August 2019



APPENDIX D

Construction Scenarios and Equipment

Table 1 Equipment Lists and Sound Power Levels

Equipment		Backhoe	Compressor	Compressor for Air Scrubber	Concrete Mixer Truck	Concrete Pump	Concrete Saw[1]	Concrete Vibrator	Dozer - D9	Dump Truck (approx. 15 tonne)	Elevated Working Platform	Excavator - Breaker[1]	Excavator - Ripper	Excavator (14 tonne)	Excavator (22 tonne)	Flatbed Truck	Front End Loader	Generator	Grinder[1]	Hand Tools	Jackhammer	Lighting - Diesel Generator	Mobile Crane - Franna	Mobile Crane (35 tonne)	Mobile Crane (100 tonne)	Mobile Crane (400 tonne)	Piling - Bored	Rattle Gun (Hand held)	Road Header	Rock Anchor Drill[1]	Shotcrete Rig	Telehandler	Tower Crane	Truck	Ventilation Scrubber	Water Pump	Welding Equipment
Sound Power Level[2]		102	95	100	103	106	119	102	112	107	97	121	105	100	105	100	110	102	110	94	113	98	98	98	100	106	111	99	113	108	106	92	100	108	98	83	97
Scenario	**Activity**																																				
Enabling Works	Delivery of equipment																			X												X		X			
	Assembly of site facilities	X	X															X		X												X				
	Supporting and loading		X												X			X						X									X		X	
	Demolition using a rockbreaker		X									X			X			X						X									X		X	
Piling	Supporting works				X	X								X										X									X			
	Bored piling with support plant				X	X								X	X									X			X							X			
Surface Construction	General works																	X		X			X														
	Noise intensive works		X															X	X	X			X		X			X					X				X
Initial Excavation	Mucking out			X					X	X				X			X							X										X			
	Through soft soil/rock			X					X	X			X	X			X				X			X						X	X			X			
	Through rock using rockbreaker			X					X	X		X		X			X							X						X	X			X			
Excavation	Mucking out			X					X	X				X			X							X										X			
	Through rock using rockbreaker			X					X	X		X		X			X							X						X	X			X			
Mined Cavern	Spoil removal			X					X								X																X	X			
	Mining with support			X					X								X											X	X	X			X	X			
TBM launch / retrieval / support	Deliveries and on/off loading			X							X					X		X		X								X			X			X			
	TBM support and spoil removal			X					X								X												X				X	X			
	TBM assembly/disassembly and launch			X							X					X		X		X						X		X			X	X		X			
Intersection Modifications	Supporting works														X					X		X											X				
	Noise intensive works						X					X			X					X		X	X											X				
Civil and Earthworks	Supporting works														X					X		X											X				
	Noise intensive works														X		X				X	X				X					X			X				
Concrete batch plant and storage	Segment storage																															X					
	Segment pre-cast factory				X	X		X																										X				

Note 1: Equipment classed as 'annoying' in the ICNG and requires a 5 dB correction.

Note 2: Sound power level data is taken from the DEFRA Noise Database, RMS *Construction and Vibration Guideline* and TfNSW *Construction Noise and Vibration Strategy*.

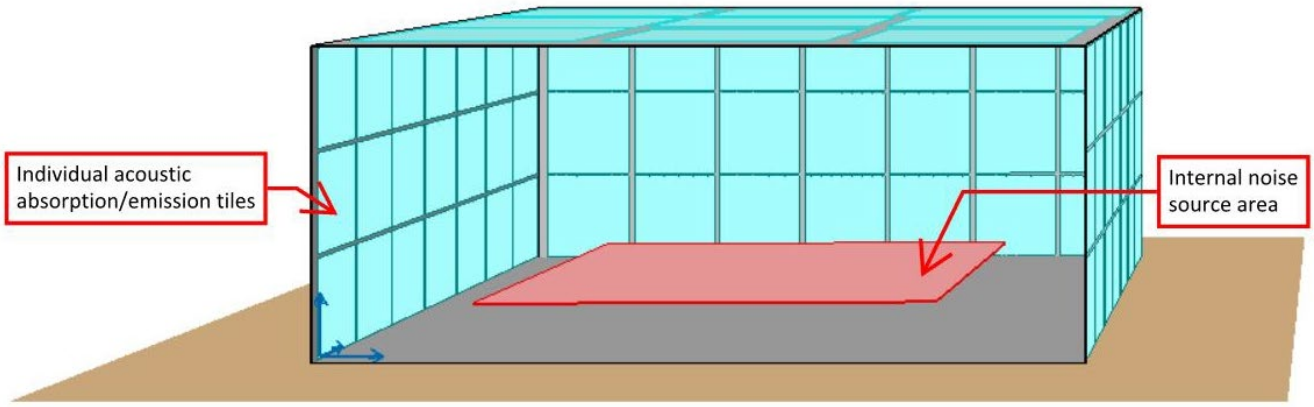
APPENDIX E

Acoustic Shed Acoustic Properties

The acoustic sheds have been modelled with a height of between 15 metres and 25 metres. The footprint of each shed was determined from indicative design information and the sheds were positioned to cover the excavation and internal spoil handling areas.

The sheds were modelled with sound absorption and transmission loss properties applied to each wall, floor and ceiling surface using a five metre grid as shown in **Figure 1**. The various internal construction noise sources were represented in the model using area sources.

Figure 1 Example Acoustic Shed Arrangement



The sheds were modelled with internal acoustic absorption applied to surfaces five metres above ground level and the shed floors were conservatively modelled as reflective as they would mostly be concrete or other equivalent hard ground.

An additional 'doors open' scenario was modelled for locations where trucks are required to drive in and out of the sheds to collect spoil. No specific mitigation measures were included regarding noise transmitted through open doors.

Acoustic absorption and transmission loss values were based on data for products used to construct acoustic sheds on previous stages of Sydney Metro.

A summary of the modelled sound absorption coefficients is shown in **Table 1** and the transmission loss values for each shed element are summarised in **Table 2**.

Table 1 Acoustic Shed Absorption Coefficient Values

Internal Shed Element	Assumed Construction	Absorption Coefficient, α							
		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	Total α_ω
Roof	0.48 mm steel cladding with 55 mm Permastop building blanket (12 kg/m3)	0.15	0.45	0.70	0.70	0.70	0.70	0.70	0.70
Wall above 5 m	78.0 mm SpeedWall panel (400kg/m3) with 55 mm Permastop building blanket (12 kg/m3)	0.15	0.45	0.70	0.70	0.70	0.70	0.70	0.70

Internal Shed Element	Assumed Construction	Absorption Coefficient, α							
		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	Total α_ω
Wall below 5 m	78.0 mm SpeedWall panel (400kg/m3)	0.30	0.40	0.30	0.15	0.10	0.04	0.12	0.10
Open Door1	Opening	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Floor	Concrete	0.02	0.02	0.02	0.02	0.03	0.04	0.05	0.05

Note 1: Open doors are modelled as fully absorptive inside the shed to stop reflections from this element contributing to internal noise levels.

Table 2 Acoustic Shed Transmission Loss Values

Internal Shed Element	Assumed Construction	Sound Reduction, R (dB)							
		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	Total R_w
Roof	0.48 mm steel cladding with 55 mm Permastop building blanket (12 kg/m3)	6	17	28	38	48	59	69	39
Walls1	78.0 mm SpeedWall panel (400kg/m3)1	26	24	32	47	59	70	79	45
Open Door	Opening	0	0	0	0	0	0	0	0

Note 1: 55 mm Permastop building blanket (12 kg/m^3) does not significantly affect transmission loss

Sound power level data for the noisiest equipment used in the sheds was based on data from the Department for Environment Food & Rural Affairs (DEFRA) *Noise Database For Prediction Of Noise On Construction And Open Sites* and is shown in **Table 3**.

The below octave band data was adjusted based on the quantity of equipment and number of construction faces in each scenario.

Table 3 Noise Source Sound Power Level Spectra

Noise Source[1]	Sound Power Level (dB)						
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Breaker Mounted on Excavator	116	116	114	117	111	111	108
Excavator – 15t	106	104	99	98	96	94	89
Dozer	108	109	106	102	102	99	94

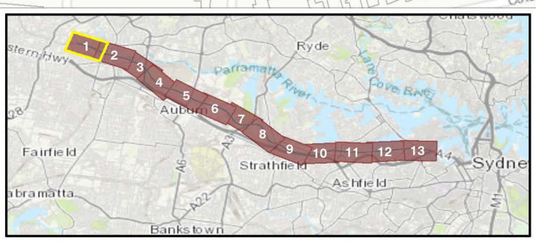
Note 1: Octave band sound power level data based on DEFRA Noise Database.

APPENDIX F

Ground-borne Noise Impacts from TBM Tunnelling

SLR
2 LINCOLN STREET
LANE COVE
NEW SOUTH WALES 2066
AUSTRALIA
T: 61 2 9427 8100
F: 61 2 9427 8200
www.slrconsulting.com

Project No.:	610.18331
Date:	20/03/2020
Drawn by:	ML
Scale:	1:5,000
Sheet Size:	A4
Projection:	GDA 1994 MGA Zone 56



LEGEND

- NCA Boundary
- Project Alignment
- Construction Sites
- Other Sensitive Receivers
- No Exceedance
- Minor (1 to 10 dBA)
- Moderate (11 to 20 dBA)
- High (>20 dBA)

Sydney Metro Authority

Sydney Metro West
Stage 1

Worst-case Ground-borne Noise Impacts from TBM Tunnelling All Periods

61018331 GBN LILY_OPT 20200315_P01

ADJOINS - 61018331 GBN LILY_OPT 20200315_P01

ADJOINS - 61018331 GBN LILY_OPT 20200315_P03

NCA03

Parramatta Stadium
Parramatta Park Queens St
Prince Alfred Park
Marist Pl
Church St
Palmer Ln
Palmer St
Sorrell St
Wide Ave
Elizabeth St
Elizabeth Ln
Thomas St
Alaska St
Queens Ave
Stewart St
Harvey St
New Zealand St
Raupiu Cres
Market St
Lamont St
Robertson St
Stewart Street Reserve
Phillip Ln
Erby Pl
Freemasons Arms Ln
Marsden St
George St
O'Connell St
Church St
Barlow Ln
Argyle Ln
Union St
Macquarie St
Civic Pl
Smith St
Little St
Charles St
Harris Park Heritage Walk
Parkes St
Sydney Water HQ
Darcy St
Parramatta Station
Parramatta
Hassall St
Station St E
Wigram St
Rose St
Una St
Alice St
Kendall St
Ada St
Gordon McKinnon Ln
Albion St
Frank Beames Ln
Valentine Ave
Fitzwilliam St
Fire Horse Ln
Wentworth St
Event Cinemas
Aird St Car Park
Aird St
Westfield Parramatta
Campbell St
Parramatta
Park Pde
Parramatta Golf Club

0 100 200 300 400 500 Meters

H:\Projects-SLR\610-SrvSYD\610-SYD\610.18331 Metro West\06 SLR Data\01 CADGIS\DRAWINGS\40 GBN & VIB\40-10 TBM GBN\02 Processing\61018331 GBN LILY_OPT 20200315.mxd

SLR
2 LINCOLN STREET
LANE COVE
NEW SOUTH WALES 2066
AUSTRALIA
T: 61 2 9427 8100
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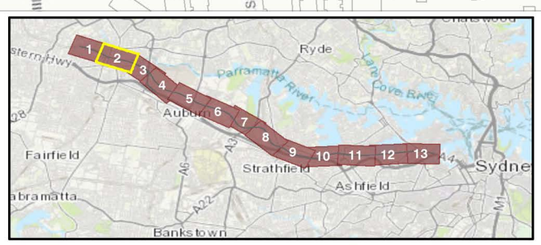
www.slrconsulting.com

Project No.:	610.18331
Date:	20/03/2020
Drawn by:	ML
Scale:	1:5,000
Sheet Size:	A4
Projection:	GDA 1994 MGA Zone 56



LEGEND

- NCA Boundary
- Project Alignment
- Construction Sites
- Other Sensitive Receivers
- No Exceedance
- Minor (1 to 10 dBA)
- Moderate (11 to 20 dBA)
- High (>20 dBA)

Sydney Metro Authority

Sydney Metro West
Stage 1

Worst-case Ground-borne Noise Impacts from TBM Tunnelling All Periods

61018331 GBN LILY_OPT 20200315_P02

ADJOINS - 61018331 GBN LILY_OPT 20200315_P01

ADJOINS - 61018331 GBN LILY_OPT 20200315_P0

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NCA04

NCA05

Harris Park

New Zealand St
Rangitoto Cres
F3 Parramatta
River Rd W
Tramway Ave
Arthur St
Queen's Wharf Reserve
Noller Pde
George St
Hassall St
Parkes St
Harris Park Heritage Walk
Dunlop Ave
Gregory Pl
Alfred St
Oak St
Elizabeth Farm Reserve
Alice St
Weston St
Hope St
Grand Ave
Camellia Station
Rosehill Gardens Racecourse
Rose St
Una St
Good St
Prospect St
Virginia St
Eleanor Ln
Eleanor St
Crown St
Marion St
Burnett Ln
Station St
Wigram St
Gibbon McKinnon Ln
Albion St
Frank Partridge Ln
Peggy Lucas Ln
Irwin St
Shirley St
Watson St

0 100 200 300 400 500 Meters

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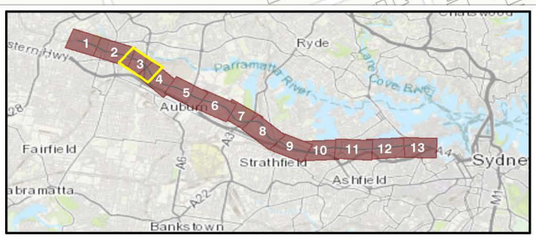

LEGEND

- NCA Boundary
- Project Alignment
- Construction Sites
- Other Sensitive Receivers
- No Exceedance
- Minor (1 to 10 dBA)
- Moderate (11 to 20 dBA)
- High (>20 dBA)

Sydney Metro Authority

Sydney Metro West
Stage 1

Worst-case Ground-borne Noise Impacts from TBM Tunnelling All Periods

61018331 GBN LILY_OPT 20200315_P03

ADJOINS - 61018331 GBN LILY_OPT 20200315_P0

ADJOINS - 61018331 GBN LILY_OPT 20200315_P0

Rosehill Gardens Racecourse

Devon St

Unwin St

Duck River

Duck Creek

Carnarvon St

Carnarvon St

Asquith

Newton St N

Western Mtwy

Western Mtwy

Adderley St W

Parramatta River

Cove Basin

Shirt St

A'Beckett St

Parker St

Meters

0 100 200 300 400 500

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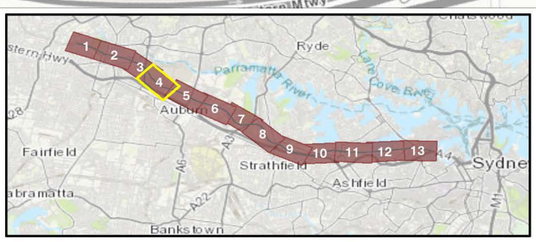

LEGEND

- NCA Boundary
- Project Alignment
- Construction Sites
- Other Sensitive Receivers
- No Exceedance
- Minor (1 to 10 dBA)
- Moderate (11 to 20 dBA)
- High (>20 dBA)

Sydney Metro Authority

Sydney Metro West
Stage 1

Worst-case Ground-borne Noise Impacts from TBM Tunnelling
All Periods

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ADJOINS - 61018331 GBN LILY_OPT 20200315_P04

ADJOINS - 61018331 GBN LILY_OPT 20200315_P06

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Duck River
Millennium Ct
Derby St
Fisher St
Carnarvon St
Asquith St
Beaconsfield St
Deakin St
Adderley St W
Western Mtwy
M4
Stubbs St
Sutton St
Salisbury St
Newton St N
Skarratt St N
Stubbs St N
Mellon St N
Grey St
Bligh St
Churchill St
Stanley St
Carolyn St
Vore St
Egerton St
Fariola St
Wiblen St
Silverwater
Silverwater Rd
A6
Wetherill St N
Day St N
Watt Ave
Avenue of the Americas
Rachael Close
Ottey Ave
Thorpe Pl
Perkins Ave
Northam Ave
Kato Ave
Fanny Blankers-Koen Park
Didriksen Ave
Cuthbert Id
Barker Ave
Henricks Ave
Thompson Ave
Spitz Ave
Tooth Ave
Pereira St
Lane Ave
Charlton Ave
Oerter Ave
Theile Ave
Roycroft Ave
Beaconsfield St
Poppy Ave
Wattle
Lov
Coma
Mod
Ce

0 100 200 300 400 500 Meters

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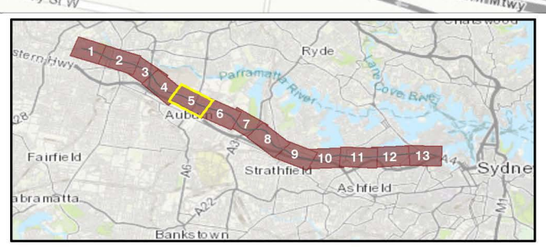

LEGEND

- NCA Boundary
- Project Alignment
- Construction Sites
- Other Sensitive Receivers
- No Exceedance
- Minor (1 to 10 dBA)
- Moderate (11 to 20 dBA)
- High (>20 dBA)

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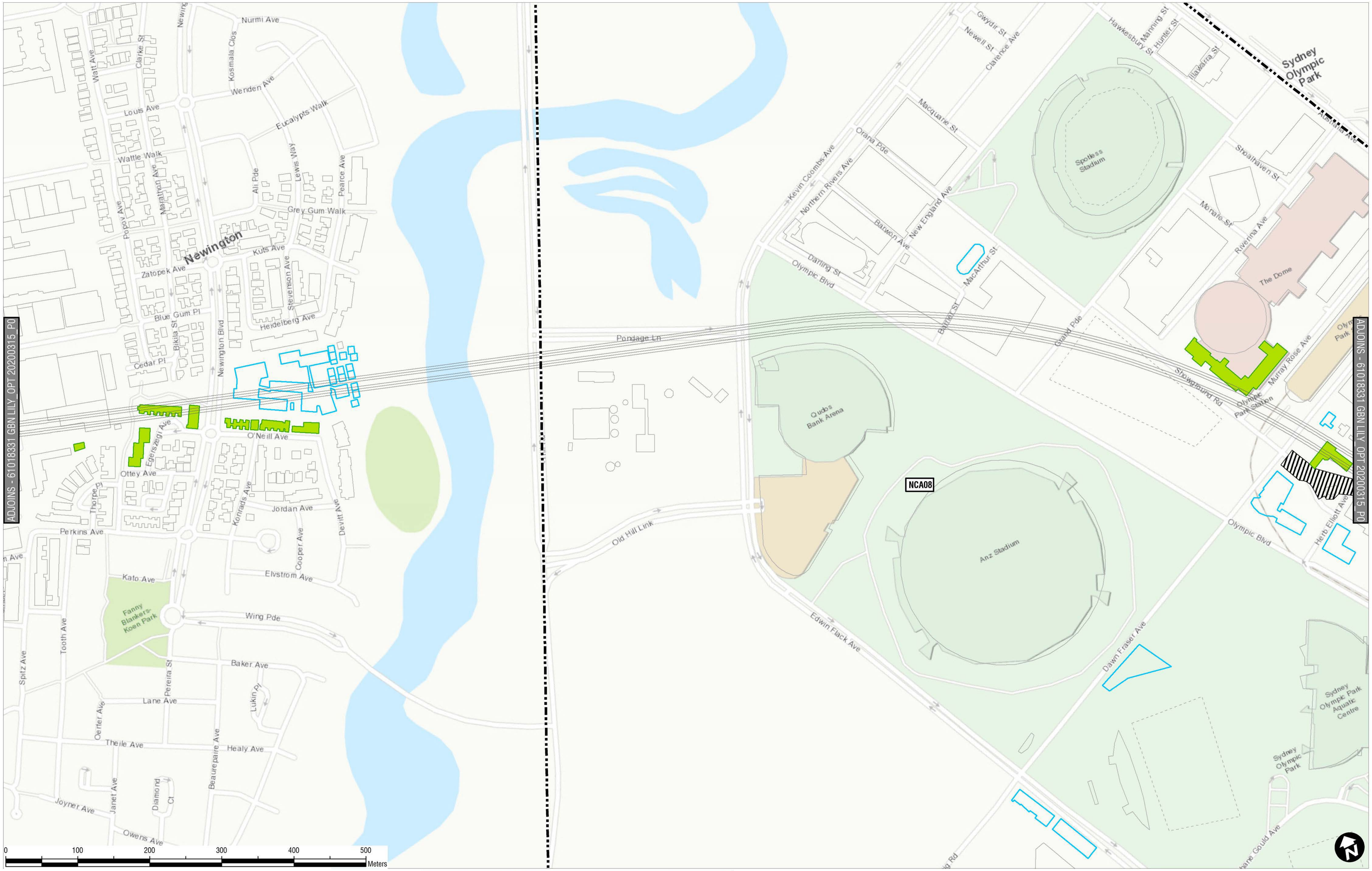
Sydney Metro West
Stage 1

Worst-case Ground-borne Noise Impacts from TBM Tunnelling All Periods

61018331 GBN LILY_OPT 20200315_P05



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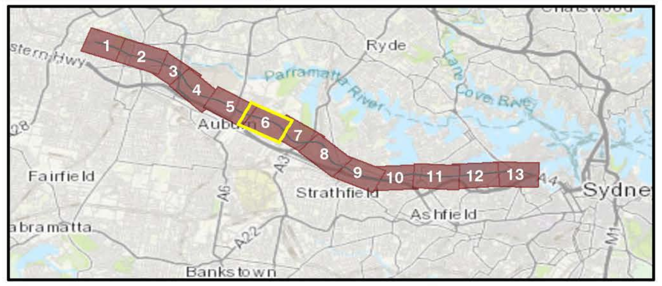

LEGEND

	NCA Boundary		No Exceedance
	Project Alignment		Minor (1 to 10 dBA)
	Construction Sites		Moderate (11 to 20 dBA)
	Other Sensitive Receivers		High (>20 dBA)

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Sydney Metro West
Stage 1

Worst-case Ground-borne Noise Impacts from TBM Tunnelling All Periods

61018331 GBN LILY_OPT 20200315_P06

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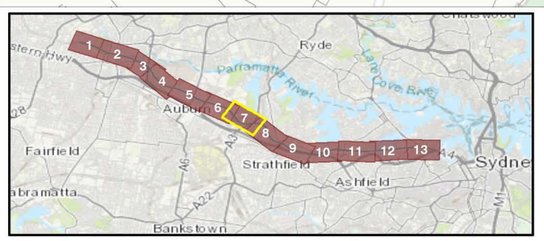

LEGEND

- NCA Boundary
- Project Alignment
- Construction Sites
- Other Sensitive Receivers
- No Exceedance
- Minor (1 to 10 dBA)
- Moderate (11 to 20 dBA)
- High (>20 dBA)

Sydney Metro Authority

Sydney Metro West
Stage 1

Worst-case Ground-borne Noise Impacts from TBM Tunnelling All Periods

61018331 GBN LILY_OPT 20200315_P07

ADJOINS - 61018331 GBN LILY_OPT 20200315_P0

ADJOINS - 61018331 GBN LILY_OPT 20200315_P0

NCA10

NCA11

George St
Rothwell Ave
Conway Ave
Powells Creek Reserve
Argonne St
Mena St
Brussels St
Lorraine St
Warsaw St
Pomeroy St
Hiller St
Corsett St
Gracemere St
Bevorgia St
Tenterfield St
Waratah St
Queen St
Concord Rd
Clermont Ln
Davidson Ave
Clermont Ave
Wellbank St
Cross St
Station St
Homedale Ave
Afton Ave
Castlereagh St
MacNamara Ave
Kentwell Ave
Creewood St
Shipley Ave
Lewis Ln
Addy Ln
Napier St
Packard Ln
Princess Ave
Carrington St
Queen Ln
Thornleigh
Bessington Park
Mason Park
Underwood Rd
Bellona Ave
Coleman Ave
Cartwright Ave
Wentworth Rd N
Wentworth Rd S
Ismay Ave
Hamilton St E
Hamilton St
Malta St
Lemnos St
Elliott St
Allen St
Short St E
North Strathfield
Railway St
George St
Great Western Hwy
Western Mtwy
M4
Powell St
Clarence St
Nipper St
Columbia Ln

0 100 200 300 400 500 Meters

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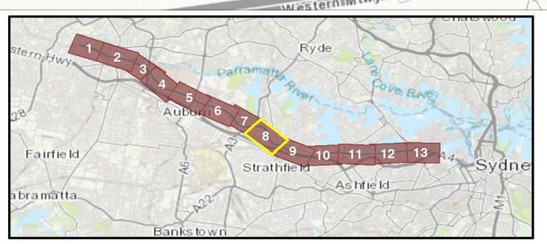


LEGEND

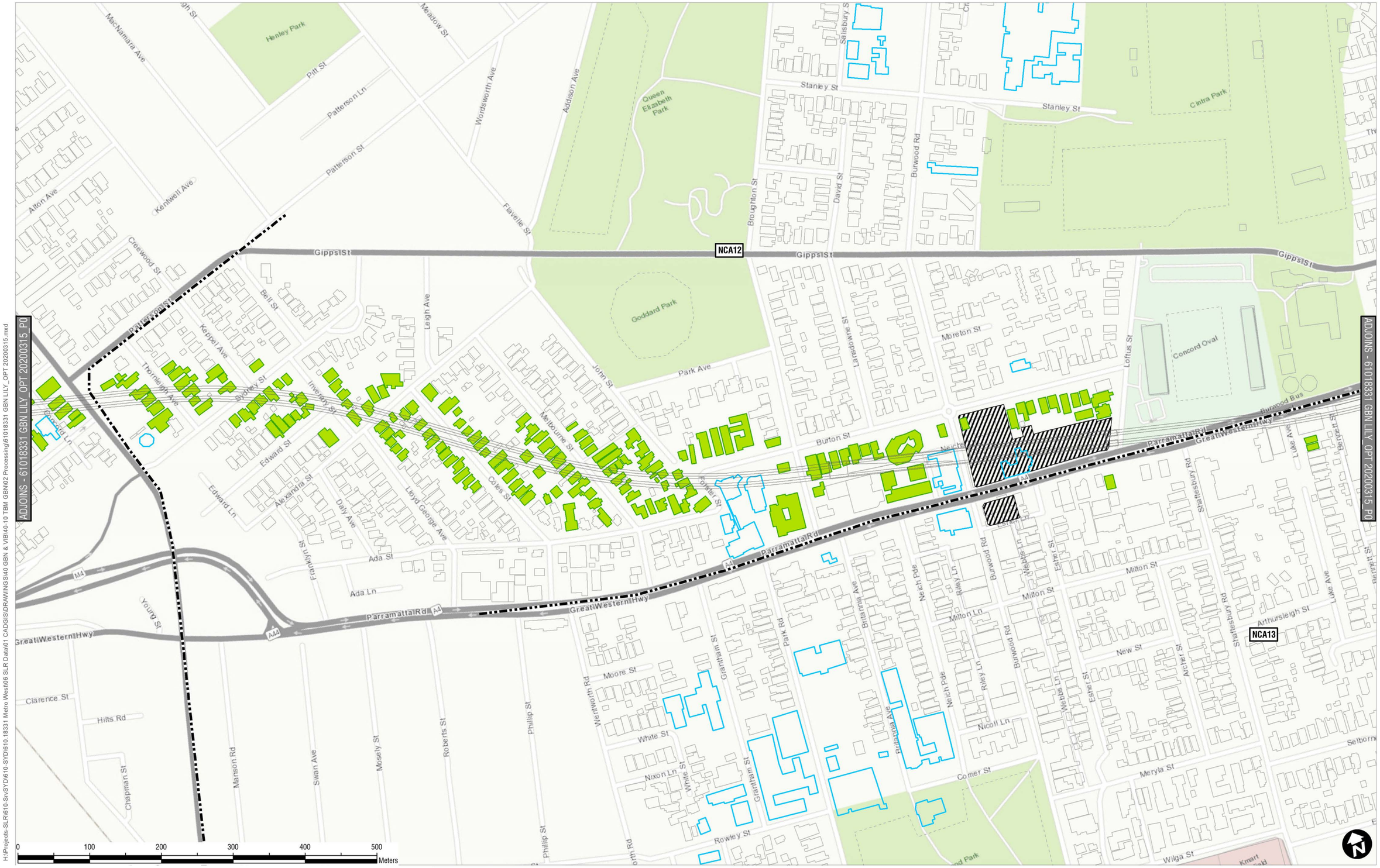
- NCA Boundary
- Project Alignment
- Construction Sites
- Other Sensitive Receivers
- No Exceedance
- Minor (1 to 10 dBA)
- Moderate (11 to 20 dBA)
- High (>20 dBA)

Sydney Metro Authority

Sydney Metro West
Stage 1

Worst-case Ground-borne Noise Impacts from TBM Tunnelling
All Periods

61018331 GBN LILY_OPT 20200315_P08



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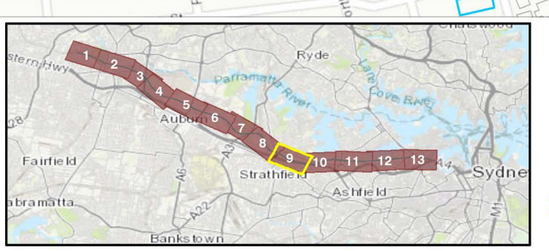

LEGEND

- NCA Boundary
- Project Alignment
- Construction Sites
- Other Sensitive Receivers
- No Exceedance
- Minor (1 to 10 dBA)
- Moderate (11 to 20 dBA)
- High (>20 dBA)

Sydney Metro Authority

Sydney Metro West
Stage 1

Worst-case Ground-borne Noise Impacts from TBM Tunnelling All Periods

61018331 GBN LILY_OPT 20200315_P09

ADJOINS - 61018331 GBN LILY_OPT 20200315_P0

ADJOINS - 61018331 GBN LILY_OPT 20200315_P0

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Cintra Park
Concord Oval
Bamwell Golf Course
Stanley St
Lyons Rd W
Cook Ave
Walker St
Bellbird Clos
Renown St
Thornton St
Watts St
Coonara Clos
Bayview Rd
Regatta Rd
Louden St
Loftus St
Gipps St
Queens Rd
Parramatta Rd
Great Western Hwy
A4
Burwood Bus
Taylor St
Walker St
Spencer St
Wychbury Ln
Wychbury Ave
Stuart St
Arthursleigh St
Shaftesbury Rd
Luke Ave
Bennett St
Lucas Rd
King Edward St
Royce Ave
Alexandra Ave
Alfred St
Short St
Grogan St
Dalmar St
Monash Pde
Selborne St
Princes St
Dawson St
Lang St
Hammond Ave
Byron St
Scott St
NCA13
NCA14
Friend Ave
Corden Ave
James St
Preston Ave
Udall Ave
McGrath Av
Lyons Rd W
Marda St
Bevin Ave
Henry St
Elizabeth St
Newcastle St
William St
Rowe St
Kings Park Crt
Myler St
Kings Park Rd
Lancelot St
Garfield St
Kings Rd
Cross St
Scott St
School St
Queens Rd
Parramatta Rd
Great Western Hwy
Cowland St
Lavender St
York Ave
Arlington St
Longview St

0 100 200 300 400 500 Meters

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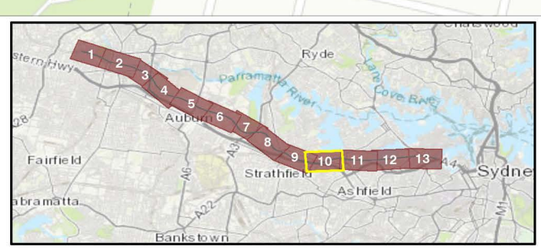

LEGEND

- NCA Boundary
- Project Alignment
- Construction Sites
- Other Sensitive Receivers
- No Exceedance
- Minor (1 to 10 dBA)
- Moderate (11 to 20 dBA)
- High (>20 dBA)

Sydney Metro Authority

Sydney Metro West
Stage 1

Worst-case Ground-borne Noise Impacts from TBM Tunnelling All Periods

61018331 GBN LILY_OPT 20200315_P010

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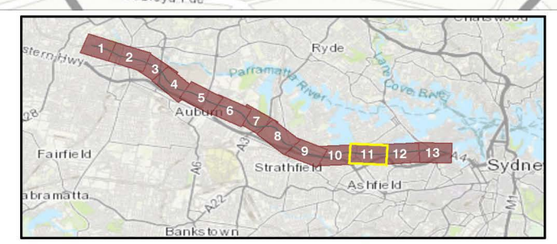

LEGEND

- NCA Boundary
- Project Alignment
- Construction Sites
- Other Sensitive Receivers
- No Exceedance
- Minor (1 to 10 dBA)
- Moderate (11 to 20 dBA)
- High (>20 dBA)

Sydney Metro Authority

Sydney Metro West
Stage 1

Worst-case Ground-borne Noise Impacts from TBM Tunnelling All Periods

61018331 GBN LILY_OPT 20200315_P011

ADJOINS - 61018331 GBN LILY_OPT 20200315_P0

ADJOINS - 61018331 GBN LILY_OPT 20200315_P0

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Rodd Island
Sydney Harbour NP-Rodd Island
Neild Park
Henley Marine Dr
Bay Run
Rodd Point
Hood Ave
Brisbane Ave
NCA17
Rodd Park
Bay Run
King George Park
Waterfront Dr
North Cres
Military Dr
Wharf Rd
Supply Rd
Sydney Conservatorium of Music
Kirkbride Way
Central Ave
South Cres
South Ln
Glover St
Leichhardt Oval
Leichhardt Park
Mary St
Chapel St
Morton St
Church St
Fraser St
Bayside St
Commercial Rd
Campbell Ave
Frederick St
Cavill St
Cottage Way
Garden Way
Glendale Dr
Balmain Rd
Carrington St
Grove St
O'Neill St
O'Neill Ln
Justin St
Maida St
Grove Ln
The Boulevarde
May St
Point St
Perry St
Lilyfield Rd
Canal Rd
Trilock St
Crescent St
Dobroyd Ln
Kingston St
Dobroyd Pde
Dobroyd Pde
Parramatta River
Bay Run
Mallyawuli St
Bay Run
Bay Run
Waterfront Dr
Wharf Rd
Military Dr
Bay Run
Glover St
Perry St
Parramatta River
Cove Bay
Ryde
Auburn
Fairfield
Strathfield
Ashfield
Bankstown
Sydne
1
2
3
4
5
6
7
8
9
10
11
12
13
A3
A6
A22
A4
M1

0 100 200 300 400 500 Meters

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LEGEND

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- Moderate (11 to 20 dBA)
- High (>20 dBA)

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Stage 1

Worst-case Ground-borne Noise Impacts from TBM Tunnelling
All Periods

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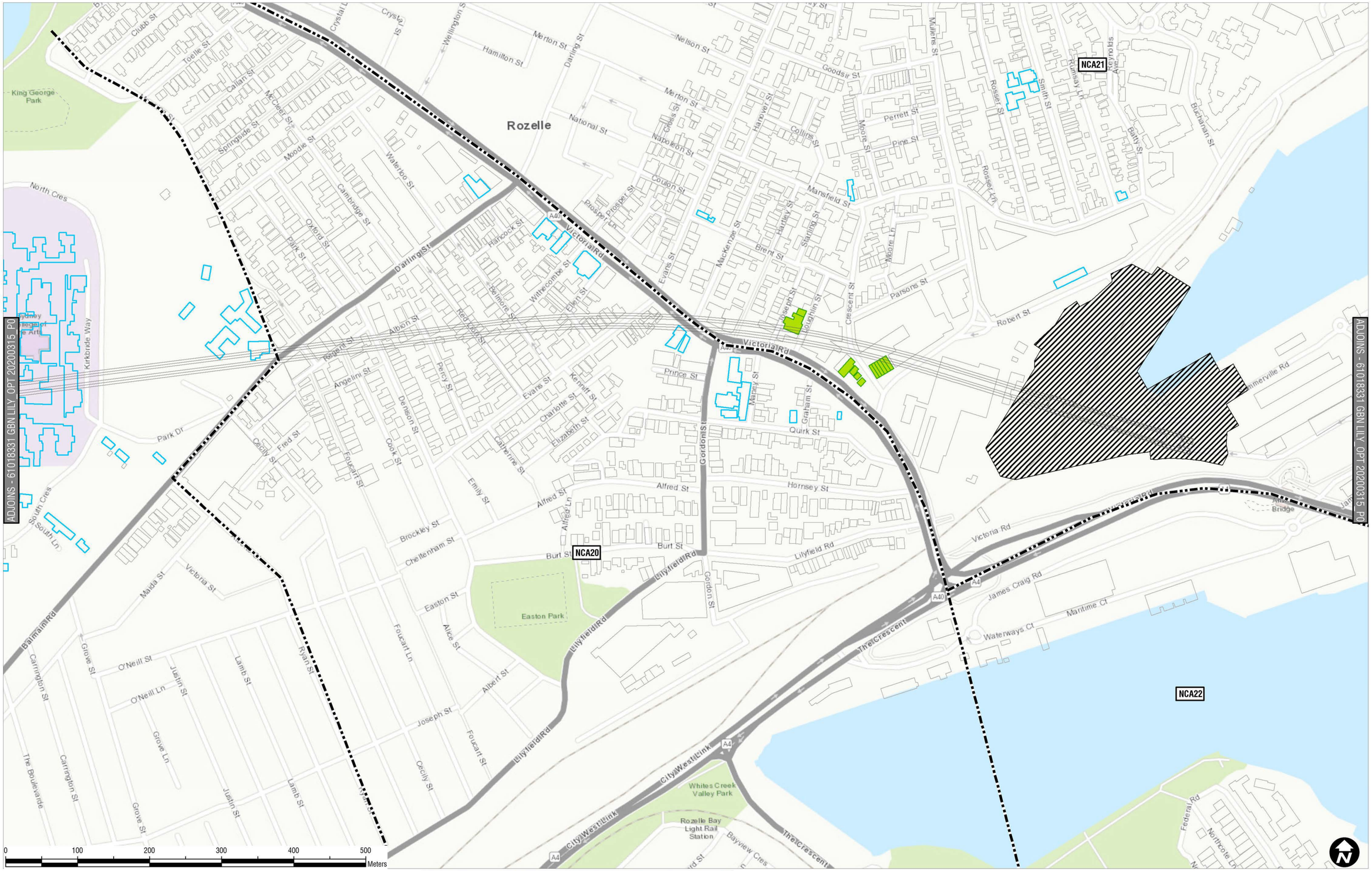

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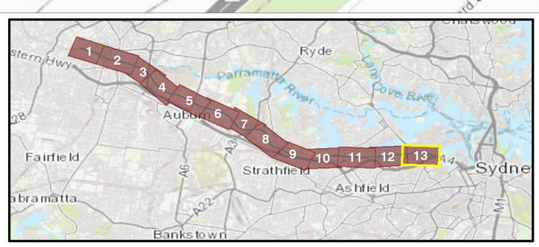

LEGEND

- NCA Boundary
- Project Alignment
- Construction Sites
- Other Sensitive Receivers
- No Exceedance
- Minor (1 to 10 dBA)
- Moderate (11 to 20 dBA)
- High (>20 dBA)

Sydney Metro Authority

Sydney Metro West
Stage 1

Worst-case Ground-borne Noise Impacts from TBM Tunnelling All Periods

61018331 GBN LILY_OPT 20200315_P013

APPENDIX G

Vibration Impacts from TBM Tunnelling

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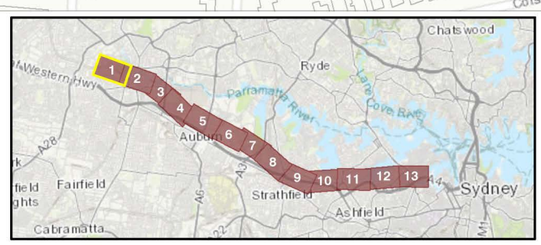

LEGEND

- Project Alignment
- NCA Boundary
- Construction Sites
- Other Sensitive Receivers
- Outdoor Areas
- Vibration Sensitive Equipment
- Heritage/Conservation Listed
- Vibration Sensitive Heritage
- Human Comfort Criteria Exceedance
- Cosmetic Damage Screening Criteria Exceedance
- Sensitive Equipment Screening Criteria Exceedance

Sydney Metro Authority

Sydney Metro West
Stage 1

Worst-case Vibration Impacts from TBM Tunnelling Day Time

61018331 HCV Day 20200409_P01

ADJOINS - 61018331 HCV Day 20200409_P0

ADJOINS - 61018331 HCV Day 20200409_P0

NCA03

0 100 200 300 400 500 Meters

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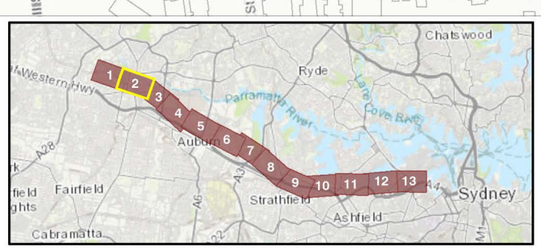

LEGEND

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- Heritage/Conservation Listed
- Vibration Sensitive Heritage
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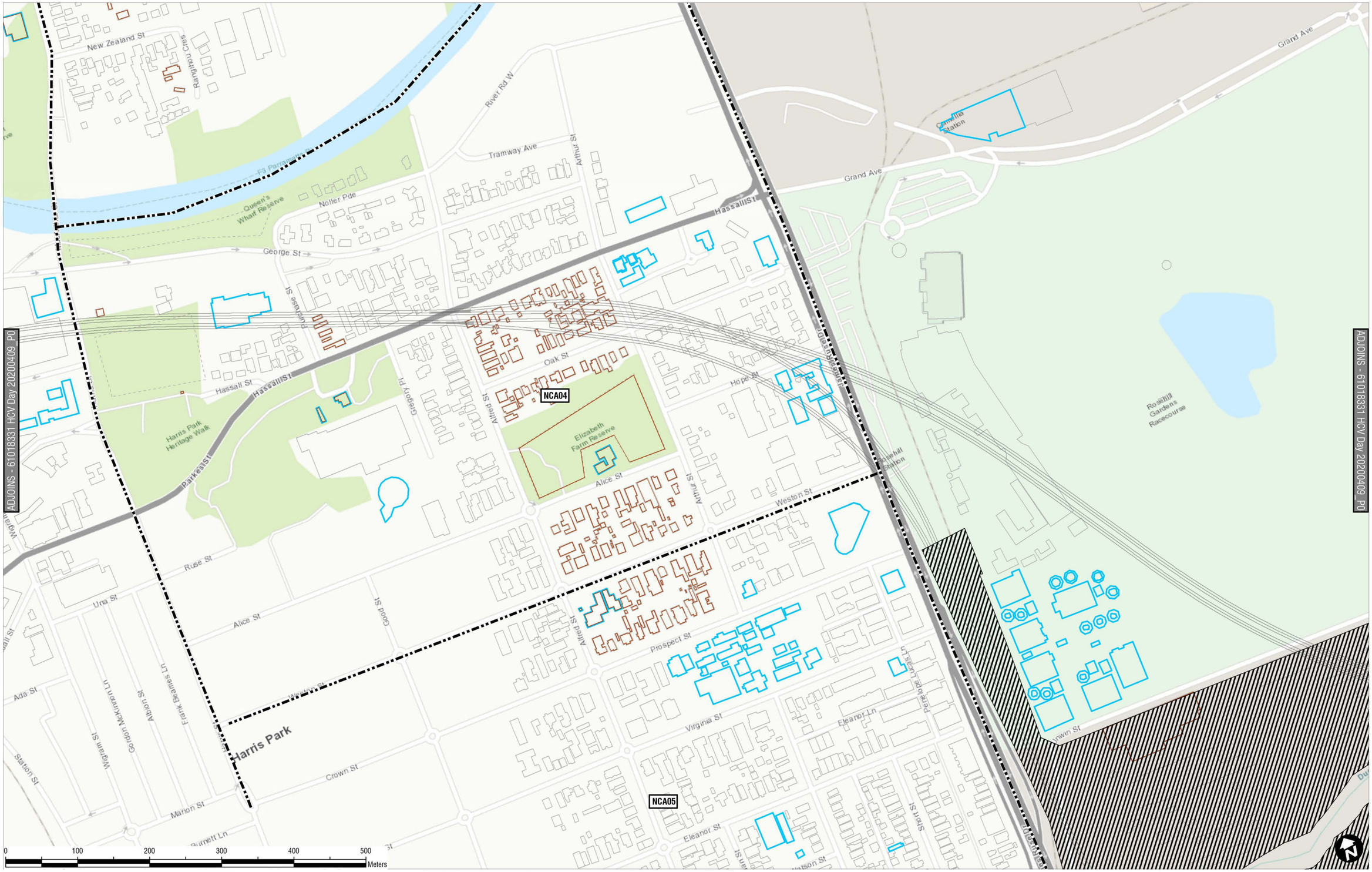
Sydney Metro Authority

Sydney Metro West
Stage 1

Worst-case Vibration Impacts from TBM Tunnelling Day Time

61018331 HCV Day 20200409_P02



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ADJOINS - 61018331 HCV Day 20200409_P0

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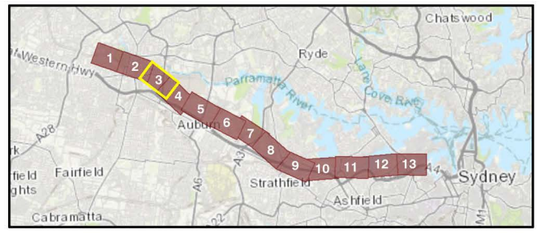

LEGEND

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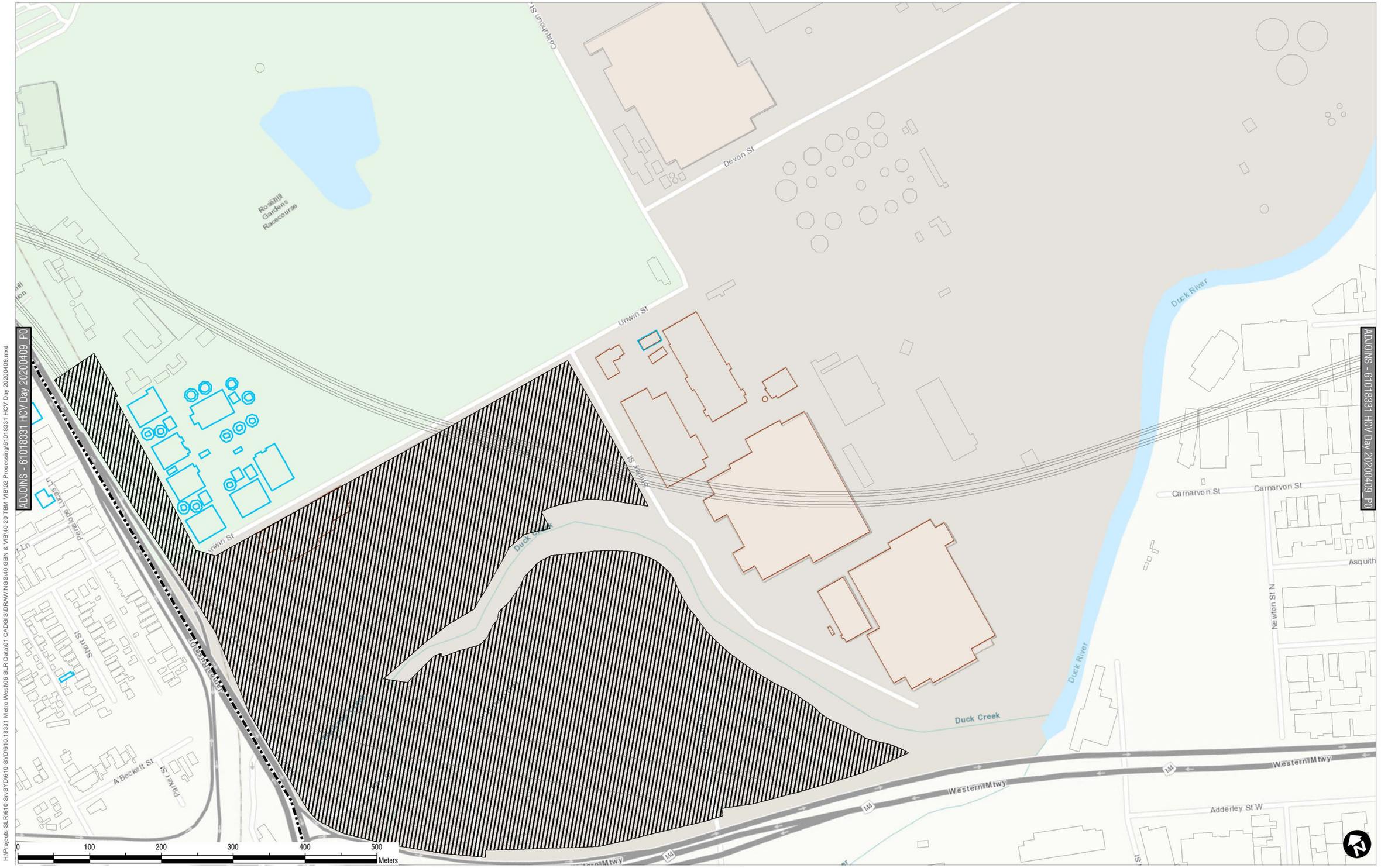
Sydney Metro Authority

Sydney Metro West
Stage 1

Worst-case Vibration Impacts from TBM Tunnelling Day Time

61018331 HCV Day 20200409_P03



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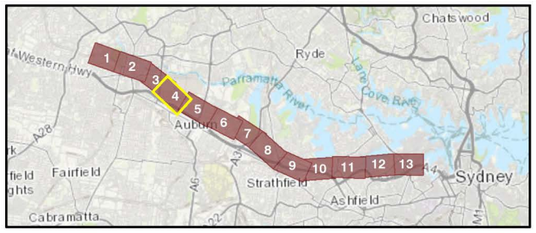

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Sydney Metro Authority

Sydney Metro West
Stage 1

Worst-case Vibration Impacts from TBM Tunnelling Day Time

61018331 HCV Day 20200409_P04

ADJOINS - 61018331 HCV Day 20200409_P04

ADJOINS - 61018331 HCV Day 20200409_P06

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Duck River
Millennium Ct
Derby St
Fisher St
Carnarvon St
Asquith St
Beaconsfield St
Deakin St
Western Mtwy
M4
Adderley St W
Stubbs St
Newton St N
Skarratt St N
Stubbs St N
Sutton St
Salisbury St
Carolyn St
Vore St
Egerton St
Fariola St
Silverwater
Wiblen St
Mellon St N
Grey St
Bligh St
Churchill St
Stanley St
Silverwater Rd
A6
Wetherill St N
Barker Ave
Day St N
Avenue of the Americas
Watt Ave
Popov Ave
Wattle
Ottey Ave
Thorpe Pl
Perkins Ave
Northam Ave
Cuthbert
Didriksen Ave
Henricks Ave
Thompson Ave
Spitz Ave
Tooth Ave
Kato Ave
Fanny Blankers-Koen Park
Pereira St
Lane Ave
Charlton Ave
Oerter Ave
Theile Ave
Roycroft Ave
Beaconsfield St
Egerszegi Ave

0 100 200 300 400 500 Meters

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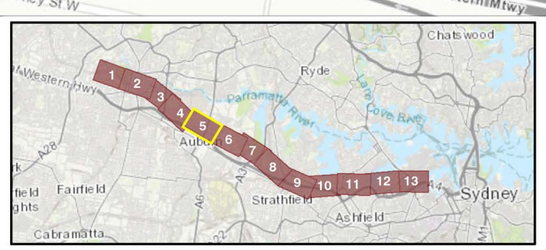

LEGEND

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Worst-case Vibration Impacts from TBM Tunnelling Day Time

61018331 HCV Day 20200409_P05

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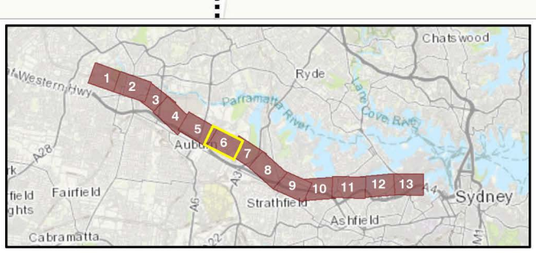

LEGEND

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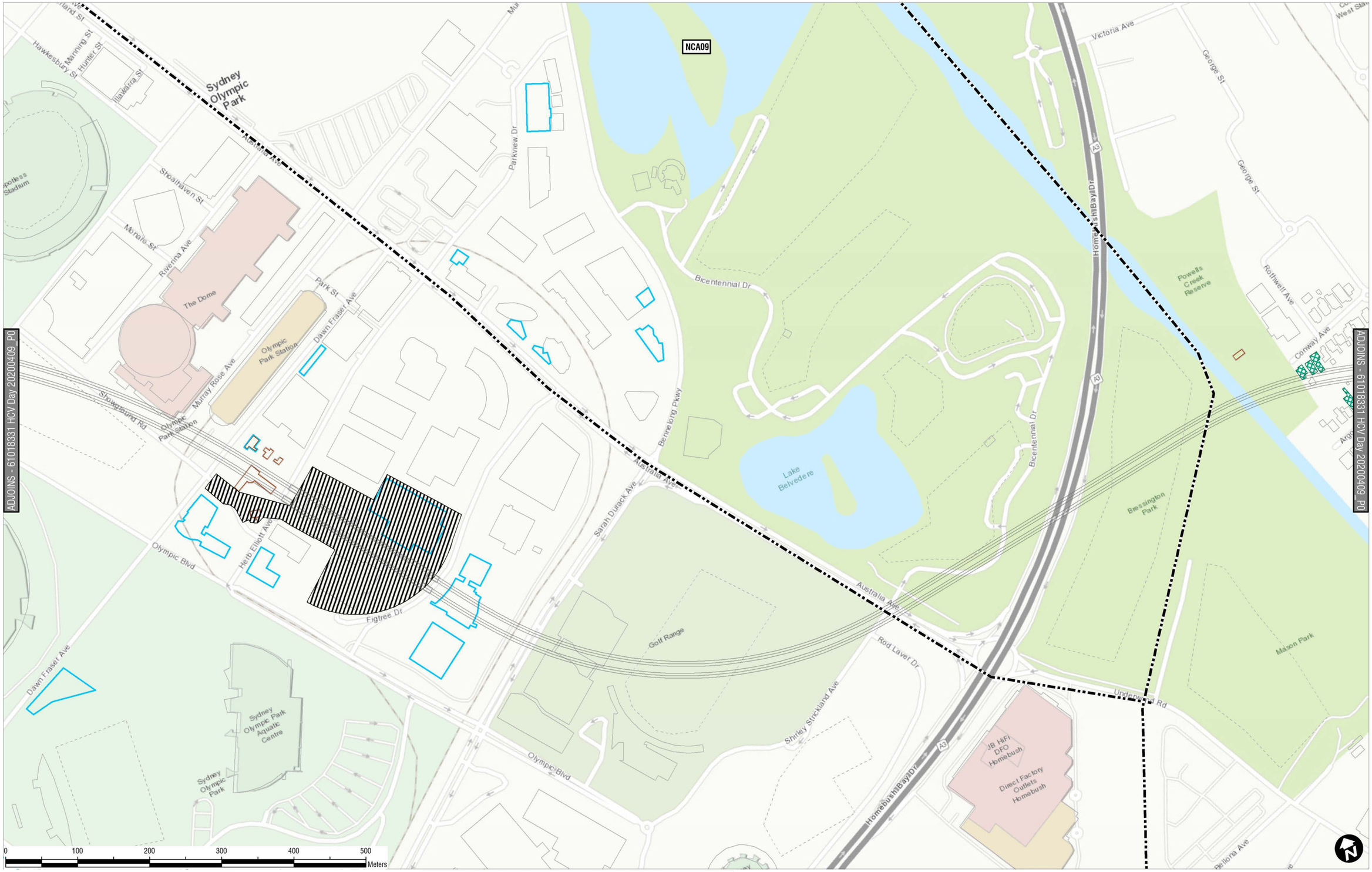
Sydney Metro Authority

Sydney Metro West
Stage 1

Worst-case Vibration Impacts from TBM Tunnelling
Day Time

61018331 HCV Day 20200409_P06



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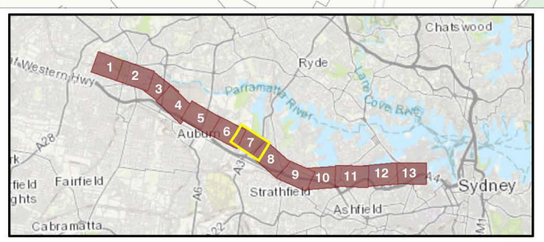

LEGEND

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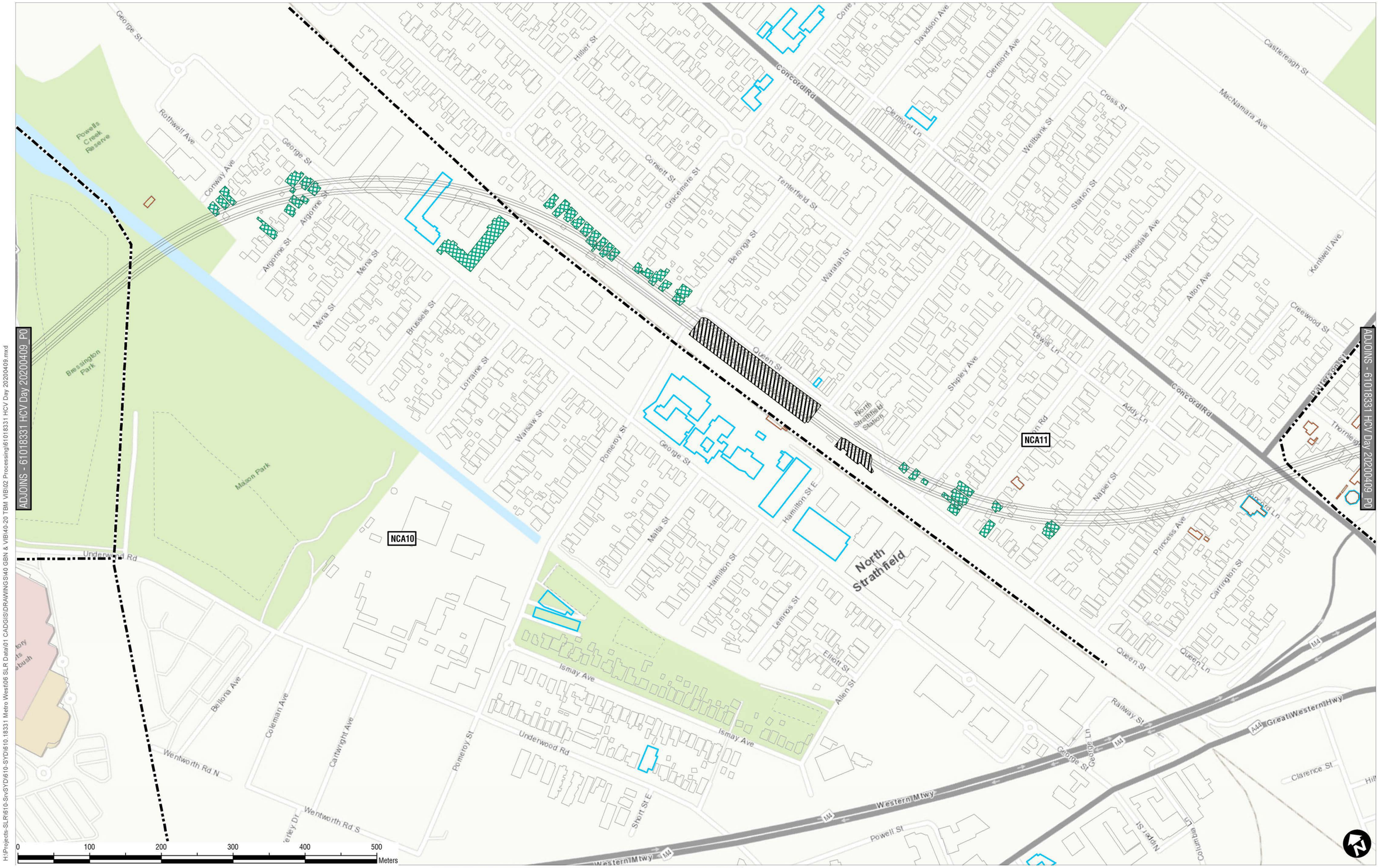
Sydney Metro Authority

Sydney Metro West
Stage 1

Worst-case Vibration Impacts from TBM Tunnelling Day Time

61018331 HCV Day 20200409_P07



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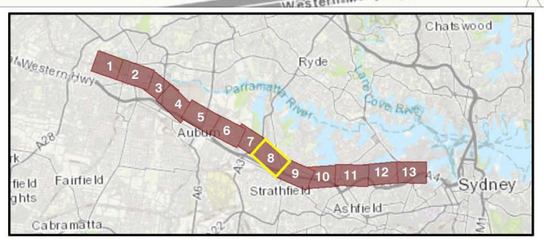

LEGEND

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Sydney Metro Authority

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Stage 1

Worst-case Vibration Impacts from TBM Tunnelling Day Time

61018331 HCV Day 20200409_P08

ADJOINS - 61018331 HCV Day 20200409_P08

ADJOINS - 61018331 HCV Day 20200409_P10

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Henley Park
MacNamara Ave
Pitt St
Patterson Ln
Patterson St
Meadow St
Wordsworth Ave
Addison Ave
Queen Elizabeth Park
Flavelle St
Salisbury St
Stanley St
Cintra Park
Broughton St
David St
Burwood Rd
Alton Ave
Kentwell Ave
Crewood St
Gippsl St
NCA12
Goddard Park
Bell St
Leigh Ave
Keppel Ave
Thornleigh Ave
Sydney St
Inverell St
Edward St
Edward Ln
Alexandra St
Daly Ave
Lloyd George Ave
Coles St
Franklyn St
Ada St
Ada Ln
John St
Park Ave
Melbourne St
Foster St
Burton St
Larkcombe St
Moreton St
Loftus St
Concord Oval
Burnood Bus
Parramatta Rd
Great Western Hwy
Neich Pde
Riley Ln
Milton St
Milton Ln
Esher St
Shaftesbury Rd
Arthursleigh St
Lake Ave
Bennett St
NCA13
New St
Archer St
Nicoll Ln
Meryla St
Comer St
Selborne
Wilga St
Kmart
M4
A44
Great Western Hwy
Parramatta Rd
Young St
Clarence St
Hills Rd
Chapman St
Manson Rd
Swan Ave
Mosely St
Roberts St
Phillip St
Wentworth Rd
Moore St
White St
Nixon Ln
Rowley St
Graham St
Park Rd
Britannia Ave
Neich Pde
Riley Ln
Burwood Rd
Nicoll Ln
Comer St
Weths Ln
Esher St

0 100 200 300 400 500 Meters

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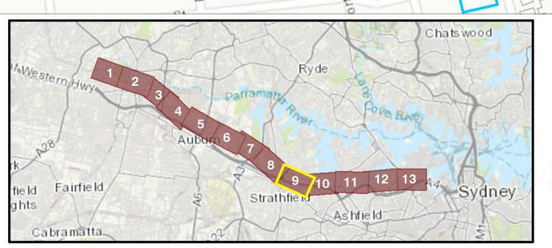

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Sydney Metro Authority

Sydney Metro West
Stage 1

Worst-case Vibration Impacts from TBM Tunnelling Day Time

61018331 HCV Day 20200409_P09

ADJOINS - 61018331 HCV Day 20200409_P0

ADJOINS - 61018331 HCV Day 20200409_P0

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Cintra Park
Stanley St
Lyons Rd W
Cook Ave
Walker St
Bellbird Clos
Bamwell Golf Course
Friend Ave
Corden Ave
James St
Preston Ave
Udall Ave
McGrath Av
Renown St
Thornton St
Watts St
Coonara Clos
Bayview Rd
Regatta Rd
Louden St
Loftus St
Concord Oval
Gipps St
Queens Rd
Taylor St
Walker St
Parramatta Rd
Great Western Hwy
A4
Burwood Bus
Shaftesbury Rd
Luke Ave
Bennett St
Lucas Rd
Spencer St
Wychbury Ln
Wychbury Ave
Stuart St
Arthursleigh St
NCA13
King Edward St
Royce Ave
Alexandra Ave
Alfred St
Short St
Grogan St
Dalmar St
Monash Pde
Selborne St
Princes St
Dawson St
Lang St
Hammond Ave
Byron St
Scott St
Marda St
Bevin Ave
Jarvis Ln
Elizabeth St
Newcastle St
Henry St
Myler St
Lancelot St
Rowe St
Kings Park Crt
Kings Park Rd
Hycraft Walk
William St
Garfield St
School Ln
Kings Rd
Cross St
NCA14
Que
Coulland St
Lavender St
York Ave
Arlington St
Longview St
0 100 200 300 400 500 Meters

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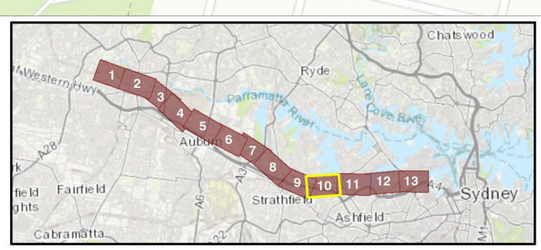

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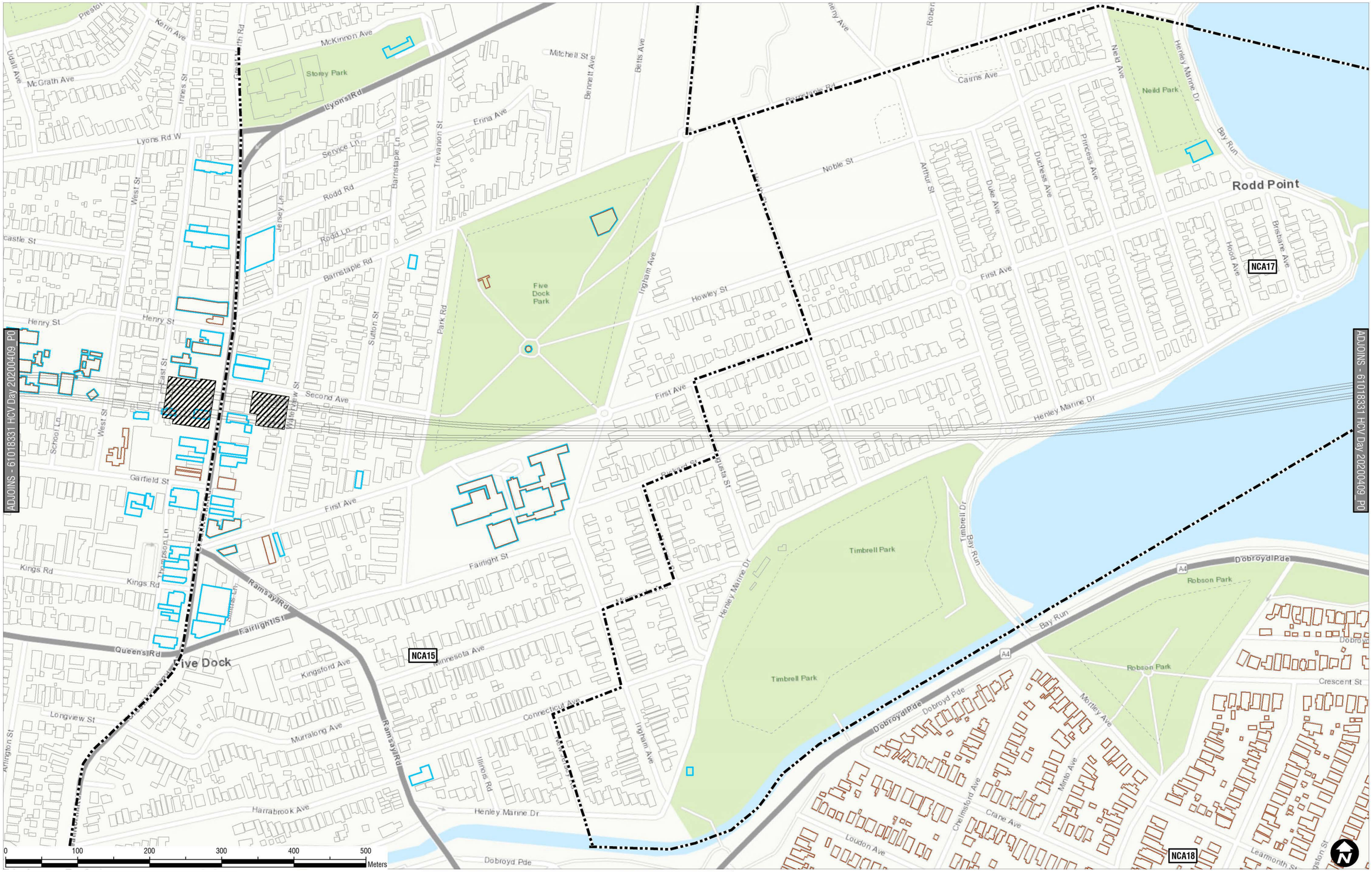
Sydney Metro Authority

Sydney Metro West
Stage 1

Worst-case Vibration Impacts from TBM Tunnelling Day Time

61018331 HCV Day 20200409_P010



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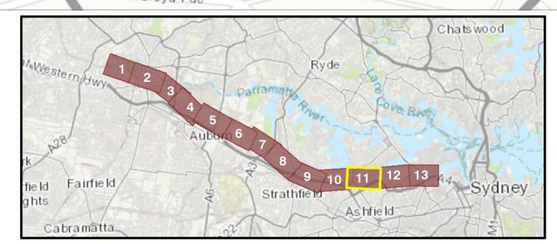

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Stage 1

Worst-case Vibration Impacts from TBM Tunnelling Day Time

61018331 HCV Day 20200409_P011

ADJOINS - 61018331 HCV Day 20200409_P0

ADJOINS - 61018331 HCV Day 20200409_P0

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Neild Park
Henley Marine Dr
Bay Run
Rodd Point
Hood Ave
Brisbane Ave
NCA17
Rodd Park
Rodd Island
Sydney Harbour NP-Rodd Island
Bay Run
King George Park
Byrnes
Waterfront Dr
North Cres
Bay Run
Waterfront Dr
Military Dr
Wharf Rd
Supply Rd
Sydney Coll of the Arts
Kirkoride Way
Bay Run
Leichhardt Oval
Leichhardt Park
Glover St
Central Ave
South Cres
South Ln
Mary St
Chapel St
Frazer St
Morton St
Church St
Callan St
Cottage Way
Garden Way
Glendale Dr
Balmain Rd
Marda St
Grove St
O'Neill St
O'Neill Ln
Justin St
Carrington St
The Boulevarde
Grove Ln
May St
Perry St
Point St
Dobroyd Pde
Park
Bay Run
Dobroyd Ln
Kingston St
Crescent St
Dobroyd Pde
Parramatta River
Trillock St
Carrol Rd
Bay Run
Mahyawui St
Bayside St
Frazer St
Commercial Rd
Mary St
Campbell Ave
Glover St
Frederick St
Wharf Rd
Perry St
Lilyfield Rd

0 100 200 300 400 500 Meters

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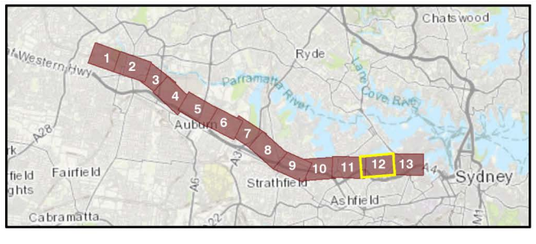

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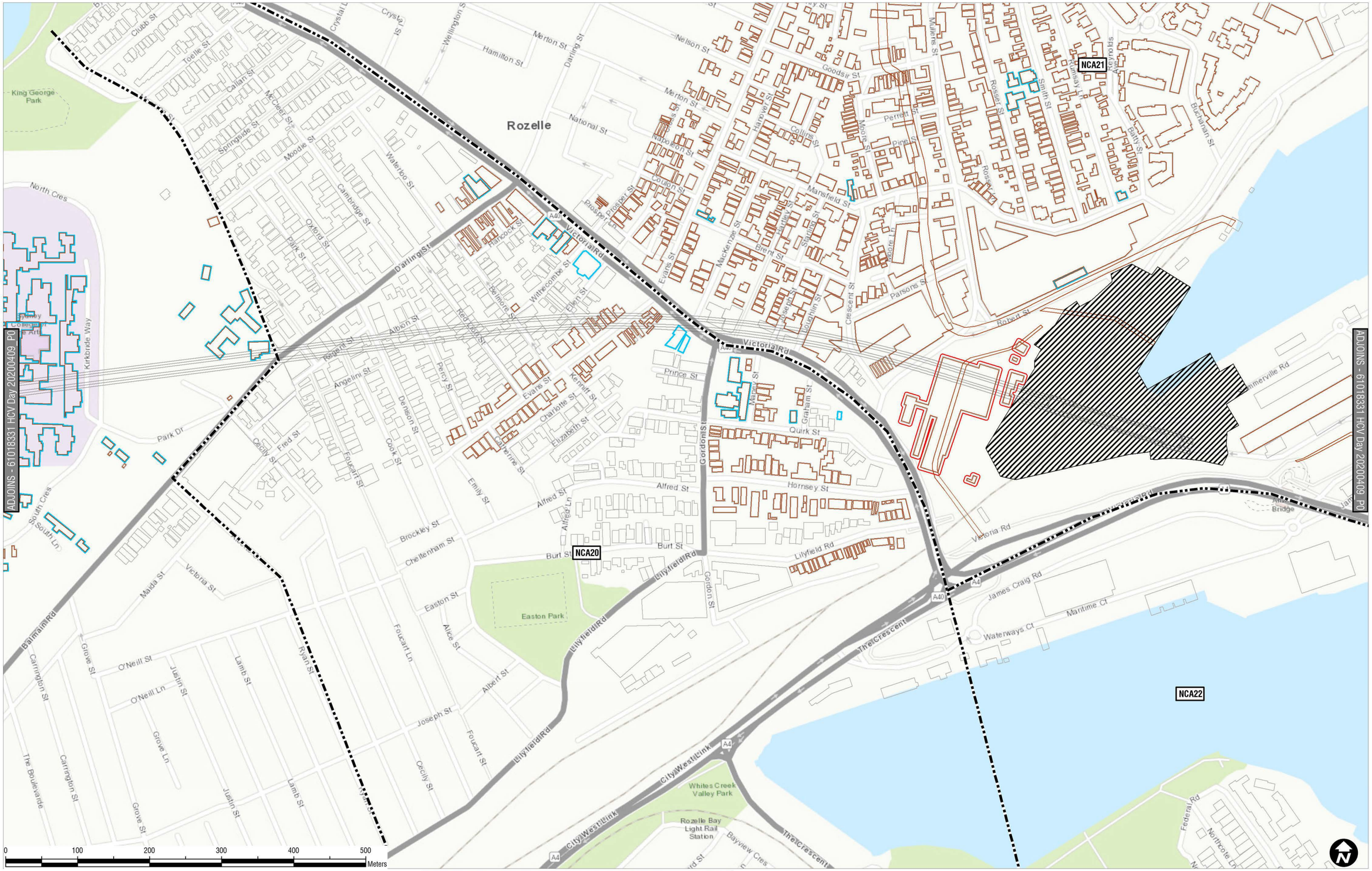
Worst-case Vibration Impacts from TBM Tunnelling
Day Time

61018331 HCV Day 20200409_P012



ADJOINS - 61018331 HCV Day 20200409_P012

ADJOINS - 61018331 HCV Day 20200409_P014

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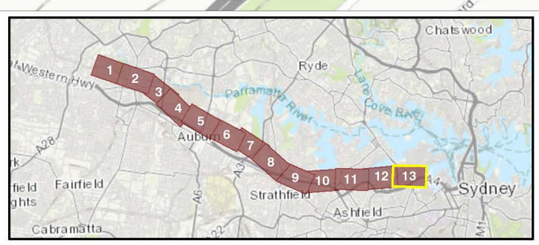

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Sydney Metro Authority

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Stage 1

Worst-case Vibration Impacts from TBM Tunnelling Day Time

61018331 HCV Day 20200409_P013

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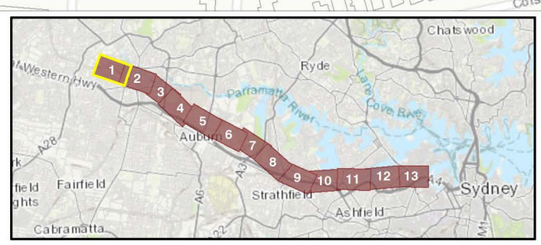
Sheet Size:	A4
Projection:	GDA 1994 MGA Zone 56



LEGEND

- Project Alignment
- NCA Boundary
- Construction Sites
- Other Sensitive Receivers
- Outdoor Areas
- Vibration Sensitive Equipment
- Heritage/Conservation Listed
- Vibration Sensitive Heritage
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- Cosmetic Damage Screening Criteria Exceedance
- Sensitive Equipment Screening Criteria Exceedance

Sydney Metro Authority

Sydney Metro West
Stage 1

Worst-case Vibration Impacts from TBM Tunnelling Night-Time

61018331 HCV Night 20200409_P01

ADJOINS - 61018331 HCV Night 20200409_P0

ADJOINS - 61018331 HCV Night 20200409_P0

NCA03

0 100 200 300 400 500 Meters

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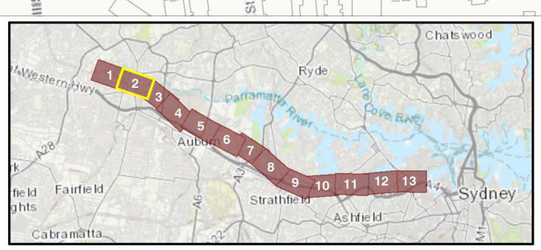

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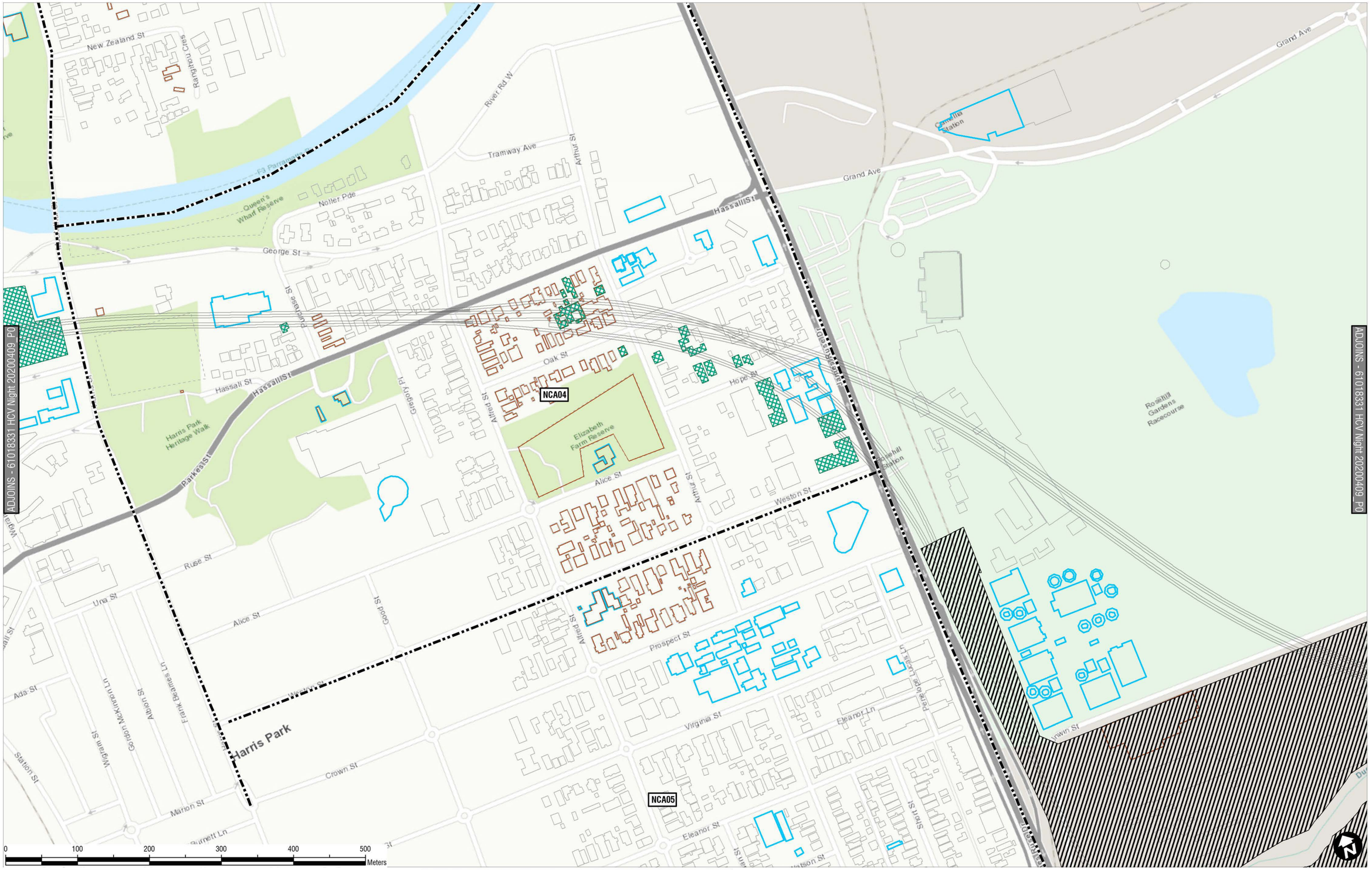
Sydney Metro Authority

Sydney Metro West
Stage 1

Worst-case Vibration Impacts from TBM Tunnelling Night-Time

61018331 HCV Night 20200409_P02



ADJOINS - 61018331 HCV Night 20200409_P02

ADJOINS - 61018331 HCV Night 20200409_P03

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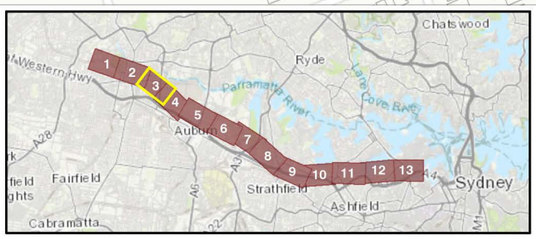

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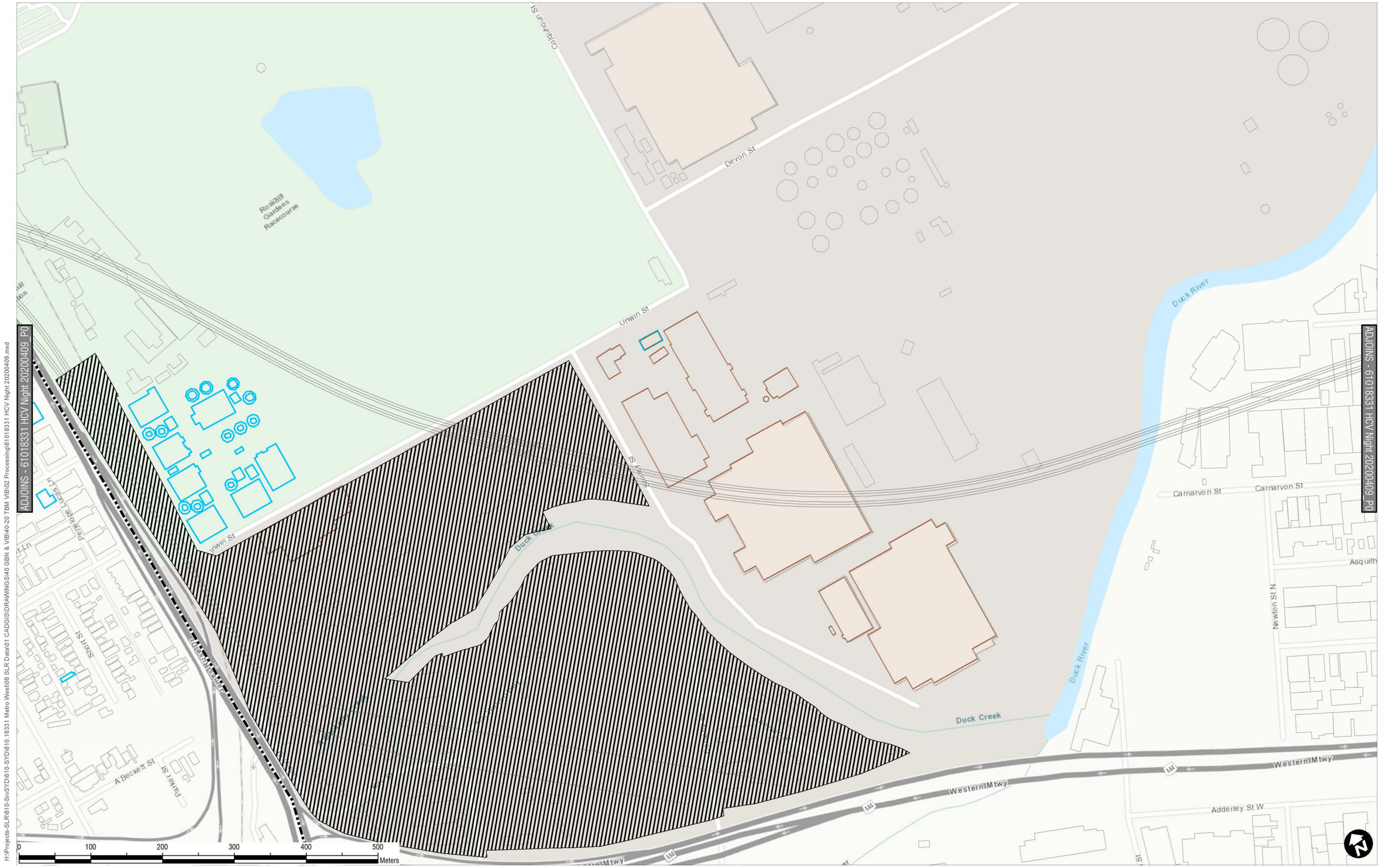
Sydney Metro Authority

Sydney Metro West
Stage 1

Worst-case Vibration Impacts from TBM Tunnelling Night-Time

61018331 HCV Night 20200409_P03



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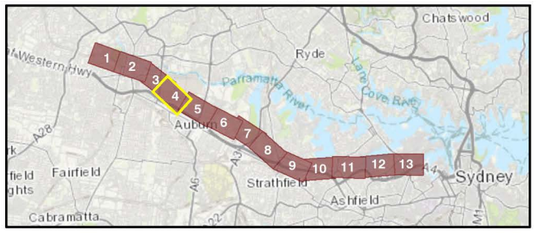

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Sydney Metro Authority

Sydney Metro West
Stage 1

Worst-case Vibration Impacts from TBM Tunnelling Night-Time

61018331 HCV Night 20200409_P04

ADJOINS - 61018331 HCV Night 20200409_P04

ADJOINS - 61018331 HCV Night 20200409_P06

Duck River
Millennium Ct
Derby St
Fisher St
Carnarvon St
Asquith St
Beaconsfield St
Deakin St
Western Mtwy
M4
Adderley St W
Stubbs St
Sutton St
Salisbury St
Newton St N
Skarratt St N
Stubbs St N
Mellon St N
Grey St
Bligh St
Churchill St
Stanley St
Carolyn St
Vore St
Egerton St
Wiblen St
Silverwater
Silverwater Rd
A6
Fariola St
Wetherill St N
Day St N
Watt Ave
Avenue of the Americas
Popov Ave
Barker Ave
Henricks Ave
Didriksen Ave
Cuthbert
Thompson Ave
Spitz Ave
Tooth Ave
Fanny Blankers-Koen Park
Kato Ave
Northam Ave
Perkins Ave
Carnarvon St
Ottey Ave
Thorpe Pl
Lane Ave
Pereira St
Oerter Ave
Theile Ave
Roycroft Ave
Charlton Ave
Beaconsfield St
Egerszegi Ave

0 100 200 300 400 500 Meters

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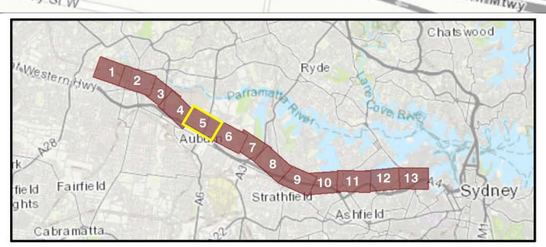

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Worst-case Vibration Impacts from TBM Tunnelling Night-Time

61018331 HCV Night 20200409_P05

ADJOINS - 61018331 HCV Night 20200409_P05

ADJOINS - 61018331 HCV Night 20200409_P07

NCA08

Newington

Sydney Olympic Park

Qudos Bank Arena

Anz Stadium

Spotless Stadium

The Dome

Sydney Olympic Park Aquatic Centre

Fanny Blankers-Koen Park

Nurmi Ave

Wenden Ave

Louis Ave

Wattle Walk

Eucalypts Walk

Grey Gum Walk

Kuts Ave

Zatopek Ave

Blue Gum Pl

Heidelberg Ave

Cedar Pl

O'Neill Ave

Ottey Ave

Jordan Ave

Perkins Ave

Kato Ave

Elvstrom Ave

Wing Pde

Baker Ave

Lane Ave

Theile Ave

Healy Ave

Joyner Ave

Owens Ave

Pondage Ln

Old Hill Link

Edwin Flack Ave

Dawn Fraser Ave

Olympic Blvd

Showground Rd

Murray Rose Ave

Herb Elliott Ave

Macquarie St

Newell St

Clarence Ave

Gwydir St

Hawkesbury St

Manning St

Hunter St

Illawarra St

Shoalhaven St

Moore St

Riverina Ave

Kevin Coombs Ave

Northern Rivers Ave

Darling St

Barwon Ave

New England Ave

MacArthur St

Bathurst St

Grand Pde

Orara Pde

Newington Blvd

Clarke St

Watt Ave

Kosmala Clos

Marathon Ave

Ali Pde

Lewis Way

Pearce Ave

Poppy Ave

Stevenson Ave

Bikila St

Egerszegi Ave

Konrads Ave

Cooper Ave

Devitt Ave

Tooth Ave

Spitz Ave

Pereira St

Oerter Ave

Lukin Pl

Beaurepaire Ave

Janet Ave

Diamond Ct

Herb Elliott Ave

Olympic Park Station

0 100 200 300 400 500 Meters

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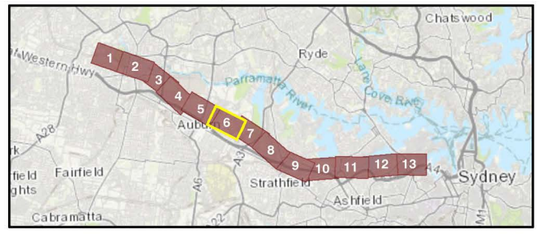

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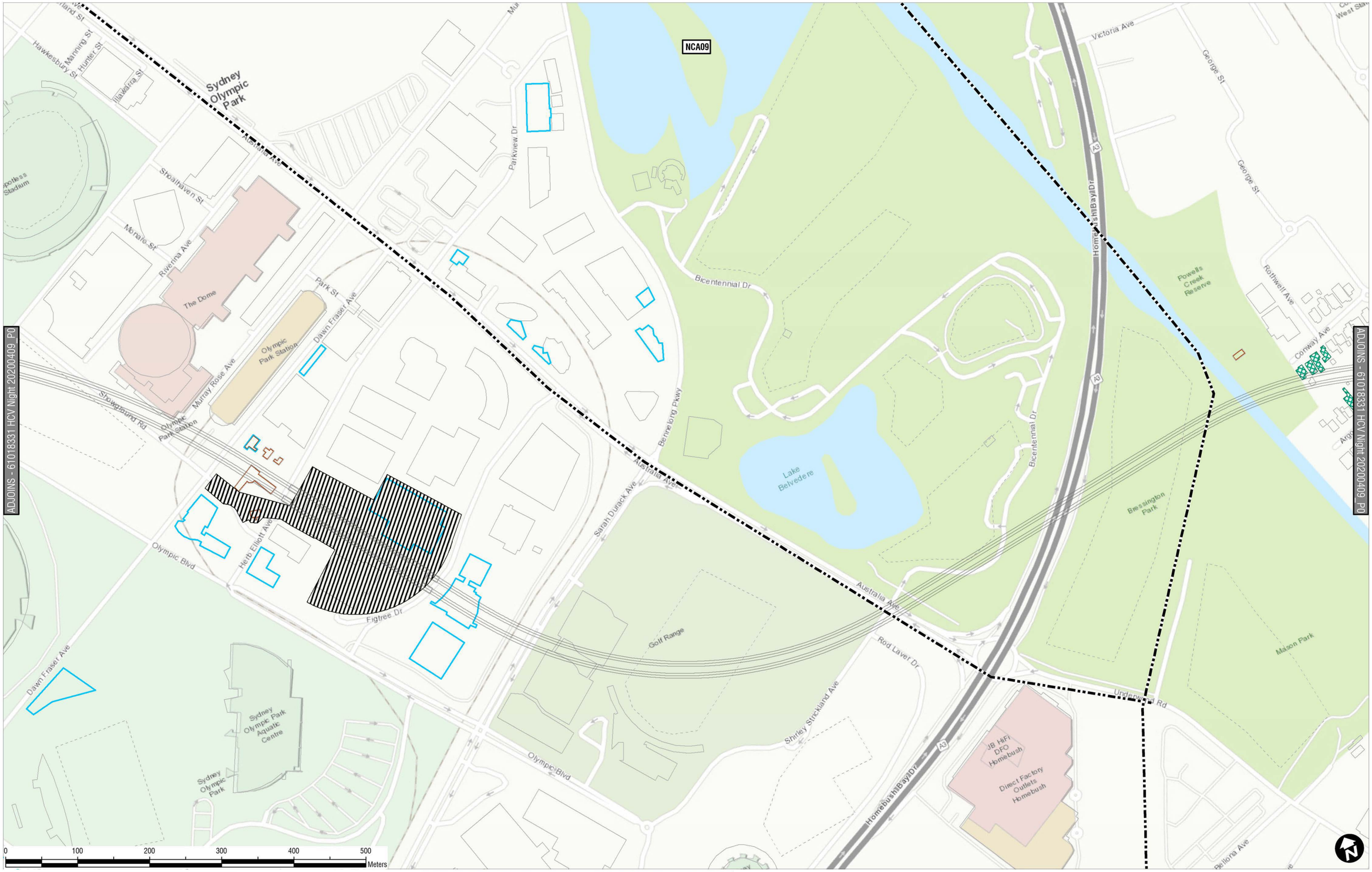
Sydney Metro Authority

Sydney Metro West
Stage 1

Worst-case Vibration Impacts from TBM Tunnelling Night-Time

61018331 HCV Night 20200409_P06



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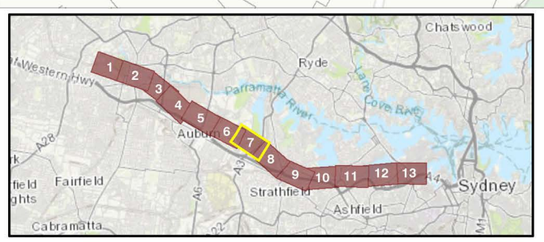

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Sydney Metro Authority

Sydney Metro West
Stage 1

Worst-case Vibration Impacts from TBM Tunnelling Night-Time

61018331 HCV Night 20200409_P07

ADJOINS - 61018331 HCV Night 20200409_P0

ADJOINS - 61018331 HCV Night 20200409_P0

NCA10

NCA11

George St
Rothwell Ave
Conway Ave
Powells Creek Reserve
Argonne St
Mena St
Brussels St
Lorraine St
Warsaw St
Pomeroy St
Hiller St
Corsett St
Gracemere St
Tenterfield St
Berorgia St
Waratah St
Queen St
Concord Rd
Davidson Ave
Clermont Ave
Clermont Ln
Wellbank St
Cross St
Station St
Homedale Ave
Alton Ave
Kentwell Ave
Castlereagh St
MacNamara Ave
Creewood St
Lewis Ln
Shipley Ave
North Strathfield Station
Addy Ln
Naper St
Princess Ave
Carrington St
Queen Ln
Thornleigh
Hamilton St E
Malta St
Hamilton St
Lemnos St
Elliott St
Allen St
North Strathfield
Ismay Ave
Underwood Rd
Short St E
Bessington Park
Mason Park
Bellona Ave
Coleman Ave
Cartwright Ave
Wentworth Rd N
Wentworth Rd S
Railway St
George Ln
Great Western Hwy
Western Mtwy
M4
A44
Powell St
Clarence St
Nipper St
Columbia Ln

0 100 200 300 400 500 Meters

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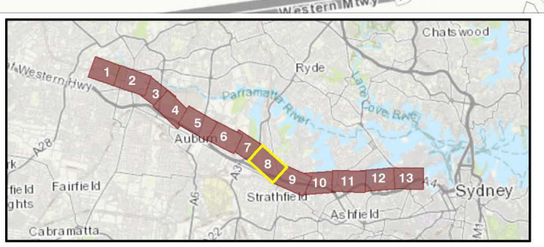

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Sydney Metro Authority

Sydney Metro West
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Worst-case Vibration Impacts from TBM Tunnelling Night-Time

61018331 HCV Night 20200409_P08

ADJOINS - 61018331 HCV Night 20200409_P08

ADJOINS - 61018331 HCV Night 20200409_P10

NCA12

NCA13

Gippsl St

Parramatta Rd

Great Western Hwy

M4

A44

Henley Park

Queen Elizabeth Park

Goddard Park

Concord Oval

Cintra Park

Stanley St

Burwood Rd

Broughton St

David St

Salisbury St

Addison Ave

Wordsworth Ave

Meadow St

MacNamara Ave

Pitt St

Patterson Ln

Patterson St

Kentwell Ave

Alton Ave

Flavelle St

Cleewood St

Bell St

Leigh Ave

Keppel Ave

Thorneloe Ave

Sydney St

Inverell St

Edward St

Edward Ln

Alexandra St

Daly Ave

Lloyd George Ave

Coles St

Franklin St

Ada St

Ada Ln

Young St

Clarence St

Hills Rd

Chapman St

Manson Rd

Swan Ave

Mosely St

Roberts St

Phillip St

Wentworth Rd

Moore St

White St

Nixon Ln

Rowley St

Grantham St

Park Rd

Britannia Ave

Neich Pde

Riley Ln

Nicoll Ln

Comer St

Meryla St

New St

Milton St

Milton Ln

Esther St

Archer St

Shaftesbury Rd

Arthursleigh St

Lake Ave

Bennett St

Selborne

Wilga St

Kmart

Park Ave

John St

Melbourne St

Foster St

Burton St

Moreton St

Loftus St

Larkcombe St

Burnood Bus

Neich Pde

Burwood Rd

Nelhis Ln

Milton St

Parramatta Rd

Great Western Hwy

0 100 200 300 400 500 Meters

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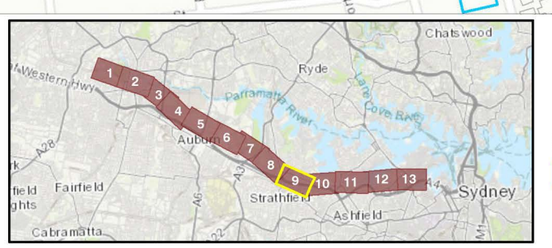

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Sydney Metro Authority

Sydney Metro West
Stage 1

Worst-case Vibration Impacts from TBM Tunnelling Night-Time

61018331 HCV Night 20200409_P09

ADJOINS - 61018331 HCV Night 20200409_P0

ADJOINS - 61018331 HCV Night 20200409_P0

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Cintra Park
Concord Oval
Bamwell Golf Course
Stanley St
Lyons Rd W
Cook Ave
Walker St
Bellbird Clos
Renown St
Thornton St
Watts St
Coonara Clos
Bayview Rd
Regatta Rd
Louden St
Loftus St
Gipps St
Queens Rd
Parramatta Rd
Great Western Hwy
A4
Burwood Bus
Taylor St
Walker St
Spencer St
Wychbury Ln
Wychbury Ave
Stuart St
Arthursleigh St
NCA13
Shaftesbury Rd
Luke Ave
Bennett St
Lucas Rd
King Edward St
Royce Ave
Alexandra Ave
Alfred St
Short St
Grogan St
Dalmar St
Monash Pde
Selborne St
Princes St
Dawson St
Lang St
Hammond Ave
Byron St
Scott St
Friend Ave
Corden Ave
James St
Preston Ave
Udall Ave
McGrath Av
Marda St
Elizabeth St
Newcastle St
Henry St
Bevin Ave
Barker Ave
Myler St
Lancelot St
Rowe St
Kings Park Cirt
Kings Park Rd
Hycraft Walk
Garfield St
William St
Scott St
School Ln
Kings Rd
Cross St
NCA14
Coulland St
Lavender St
York Ave
Arlington St
Longview St
Que

0 100 200 300 400 500 Meters

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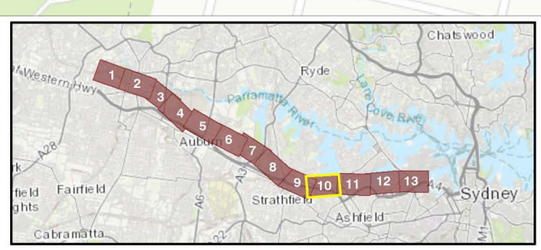

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Sydney Metro Authority

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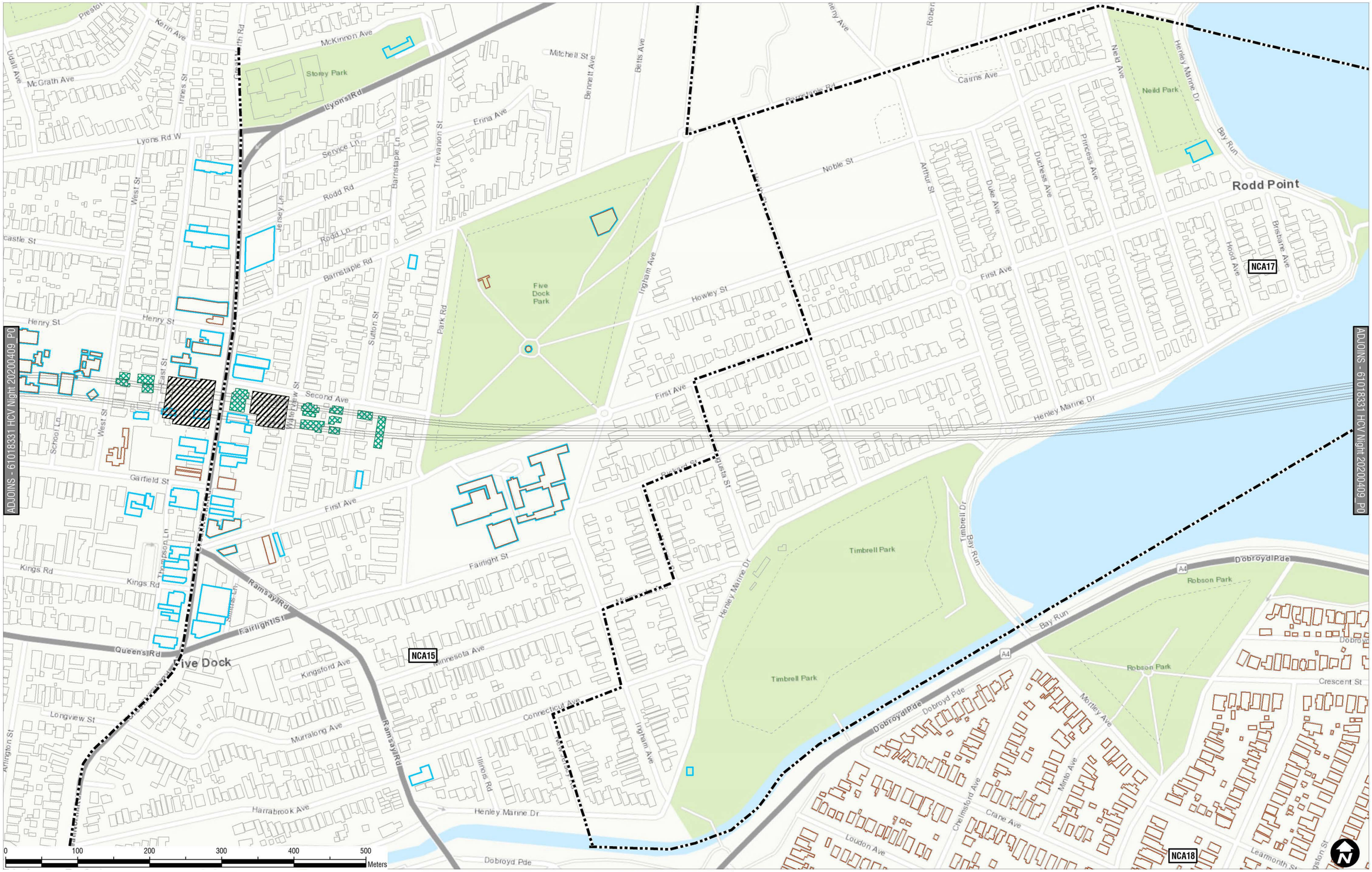
Stage 1

Worst-case Vibration Impacts from TBM Tunnelling Night-Time

61018331 HCV Night 20200409_P010



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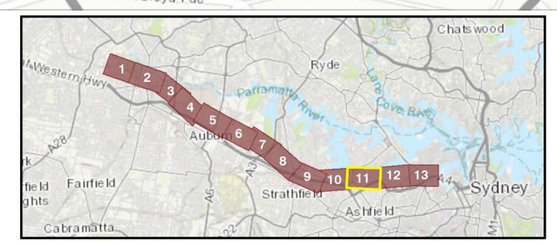

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Worst-case Vibration Impacts from TBM Tunnelling Night-Time

61018331 HCV Night 20200409_P011

ADJOINS - 61018331 HCV Night 20200409_P0

ADJOINS - 61018331 HCV Night 20200409_P0

Neild Park
Henley Marine Dr
Bay Run
Rodd Point
Hood Ave
Brisbane Ave
NCA17
Rodd Park
Rodd Island
Sydney Harbour NP-Rodd Island
Bay Run
King George Park
Byrnes
Waterfront Dr
North Cres
Bay Run
Waterfront Dr
Military Dr
Wharf Rd
Supply Rd
Sydney Secondary College Leichhardt Campus
Kirkbride Way
Bay Run
Leichhardt Oval
Leichhardt Park
Glover St
Central Ave
South Cres
South Ln
Mary St
Chapel St
Fraser St
Morton St
Church St
Callan St
Cottage Way
Garden Way
Balmain Rd
Marda St
Dobroyd Pde
Bay Run
Park
Dobroyd Pde
Kingston St
Crescent St
Parramatta River
Dobroyd Pde
Trillock St
Bay Run
Maiyawul St
Bayside St
Fraser St
Commercial Rd
Mary St
Campbell Ave
Glover St
Frederick St
Wharf Rd
Glendale Dr
Carrington St
Grove St
O'Neill St
O'Neill Ln
Justin St
Grove Ln
The Boulevarde
May St
Perry St
Carrington St
Carrington St
Grove St
Perry St
Point St
Canal Rd
Lilyfield Rd

0 100 200 300 400 500 Meters

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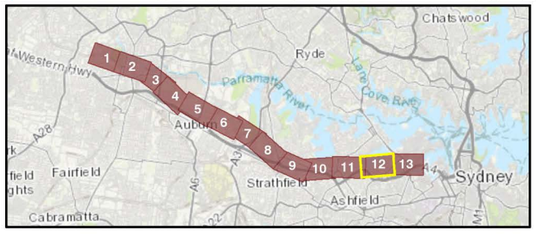


LEGEND

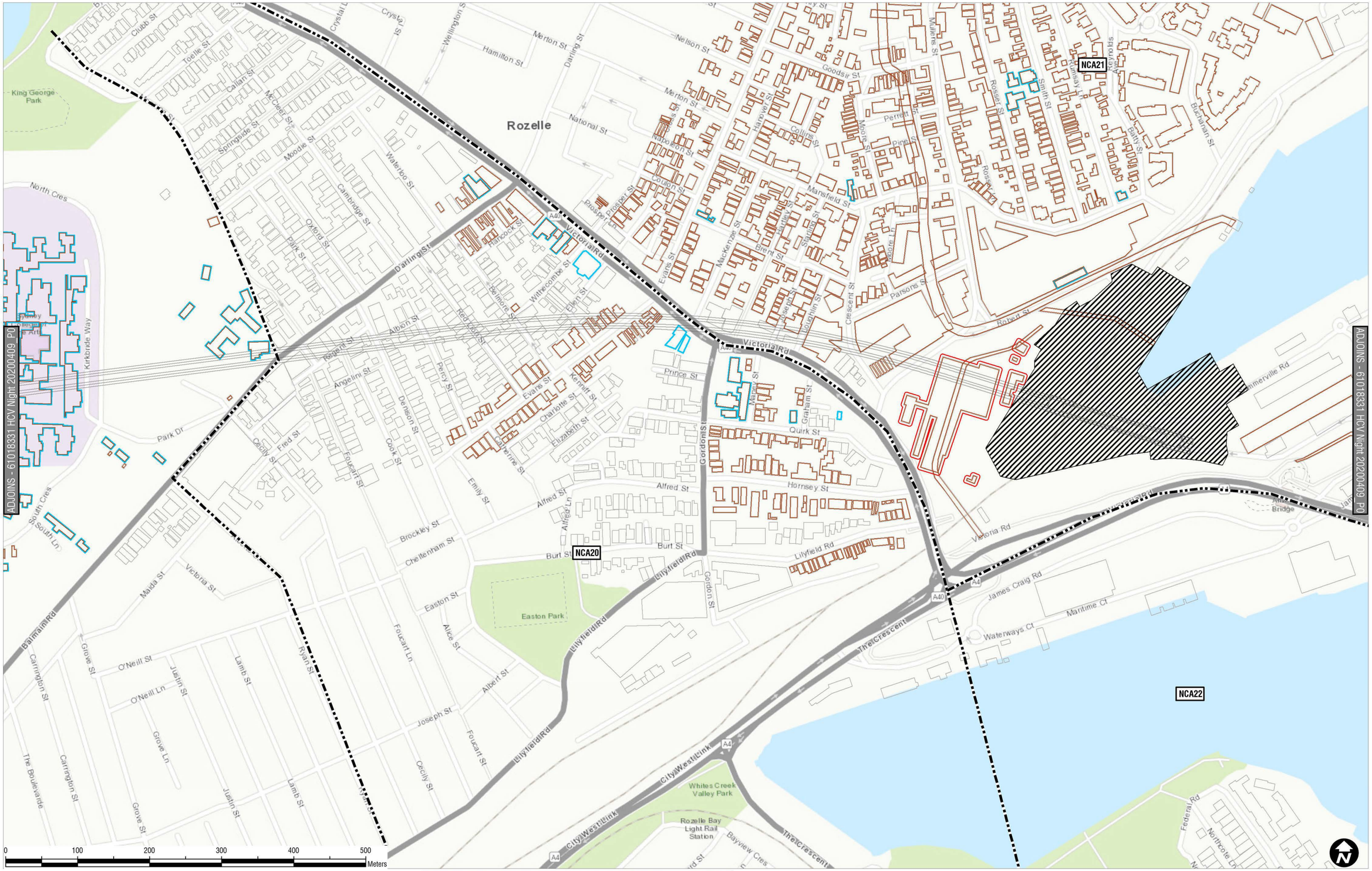
- Project Alignment
- NCA Boundary
- Construction Sites
- Other Sensitive Receivers
- Outdoor Areas
- Vibration Sensitive Equipment
- Heritage/Conservation Listed
- Vibration Sensitive Heritage
- Human Comfort Criteria Exceedance
- Cosmetic Damage Screening Criteria Exceedance
- Sensitive Equipment Screening Criteria Exceedance

Sydney Metro Authority

Sydney Metro West
Stage 1

Worst-case Vibration Impacts from TBM Tunnelling Night-Time

61018331 HCV Night 20200409_P012



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ADJOINS - 61018331 HCV Night 20200409_P014

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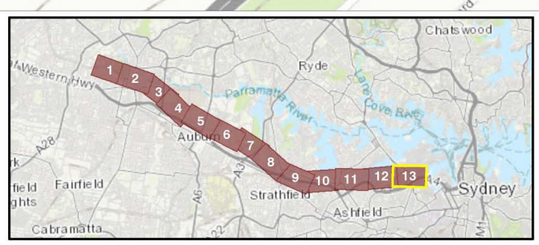

LEGEND

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Sydney Metro Authority

Sydney Metro West
Stage 1

Worst-case Vibration Impacts from TBM Tunnelling Night-Time

61018331 HCV Night 20200409_P013

APPENDIX H

Standard Mitigation and Management Measures

The actions set out in the summary of the standard mitigation measures below must be implemented on all Sydney Metro construction projects.

Table 1 CNVS Summary of the Standard Mitigation and Management Measures

Action Required	Applies To	Details
Management measures		
Implementation of any project specific mitigation measures required	Airborne noise Ground-borne noise and vibration	In addition to the measures set out in this table, any project specific mitigation measures identified in the environmental assessment documentation (e.g. EA, REF, submissions or representations report) or approval or licence conditions must be implemented.
Implement community consultation measures	Airborne noise Ground-borne noise and vibration	Periodic Notification (monthly letterbox drop)[1] Website Project information and construction response telephone line Email distribution list Place Managers
Register of Noise Sensitive Receivers	Airborne noise Ground-borne noise and vibration	A register of all noise and vibration sensitive receivers (NSRs) would be kept on site. The register would include the following details for • Address of receiver • Category of receiver (e.g. Residential, Commercial etc.) • Contact name and phone number
Site inductions	Airborne noise Ground-borne noise and vibration	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: • All relevant project specific and standard noise and vibration mitigation measures • Relevant licence and approval conditions • Permissible hours of work • Any limitations on high noise generating activities • Location of nearest sensitive receivers • Construction employee parking areas • Designated loading/unloading areas and procedures • Site opening/closing times (including deliveries) • Environmental incident procedures
Behavioural practices	Airborne noise	No swearing or unnecessary shouting or loud stereos/radios; on site. No dropping of materials from height; throwing of metal items; and slamming of doors. No excessive revving of plant and vehicle engines Controlled release of compressed air.
Monitoring	Airborne noise Ground-borne noise and vibration	A noise monitoring program is to be carried out for the duration of the works in accordance with the Construction Noise and Vibration Management Plan and any approval and licence conditions.

[1] Detailing all upcoming construction activities at least 14 days prior to commencement of relevant works

Action Required	Applies To	Details
Attended vibration measurements	Ground-borne vibration	Attended vibration measurements are required at the commencement of vibration generating activities to confirm that vibration levels satisfy the criteria for that vibration generating activity. Where there is potential for exceedances of the criteria further vibration site law investigations would be undertaken to determine the site-specific safe working distances for that vibration generating activity. Continuous vibration monitoring with audible and visible alarms would be conducted at the nearest sensitive receivers whenever vibration generating activities need to take place inside the applicable safe-working distances.
Source controls		
Construction hours and scheduling	Airborne noise Ground-borne noise and vibration	Where feasible and reasonable, construction would be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels would be scheduled during less sensitive time periods.
Construction respite period	Ground-borne noise and vibration Airborne noise	High noise and vibration generating activities[2] may only be carried out in continuous blocks, not exceeding 3 hours each, with a minimum respite period of one hour between each block[3].
Equipment selection	Airborne noise Ground-borne noise and vibration	Use quieter and less vibration emitting construction methods where feasible and reasonable. For example, when piling is required, bored piles rather than impact-driven piles will minimise noise and vibration impacts. Similarly, diaphragm wall construction techniques, in lieu of sheet piling, will have significant noise and vibration benefits.
Maximum noise levels	Airborne-noise	The noise levels of plant and equipment must have operating Sound Power Levels compliant with the criteria in Table 11 of the CNVS.
Rental plant and equipment	Airborne-noise	The noise levels of plant and equipment items are to be considered in rental decisions and in any case cannot be used on site unless compliant with the criteria in Table 11 of the CNVS.
Plan worksites and activities to minimise noise and vibration	Airborne noise Ground-borne vibration	Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.
Non-tonal reversing alarms	Airborne noise	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.
Minimise disturbance arising from delivery of goods to construction sites	Airborne noise	Loading and unloading of materials/deliveries is to occur as far as possible from NSRs Select site access points and roads as far as possible away from NSRs Dedicated loading/unloading areas to be shielded if close to NSRs Delivery vehicles to be fitted with straps rather than chains for unloading, wherever feasible and reasonable

[2] Includes jack and rock hammering, sheet and pile driving, rock breaking and vibratory rolling.

[3] "Continuous" includes any period during which there is less than a 60 minutes respite between ceasing and recommencing any of the work.

Action Required	Applies To	Details
Path controls		
Shield stationary noise sources such as pumps, compressors, fans etc.	Airborne noise	Stationary noise sources should be enclosed or shielded where feasible and reasonable whilst ensuring that the occupational health and safety of workers is maintained. Appendix D of AS 2436:2010 lists materials suitable for shielding.
Shield sensitive receivers from noisy activities.	Airborne noise	Use structures to shield residential receivers from noise such as site shed placement; earth bunds; fencing; erection of operational stage noise barriers (where practicable) and consideration of site topography when situating plant.

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