

# NEW SYDNEY FISH MARKETS

## Construction Noise and Vibration Management Plan Bridge Road Works

**Prepared for:**

Multiplex Constructions Pty Ltd  
Level 22, 135 King Street  
SYDNEY NSW 2000

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## BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Multiplex Constructions Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

## DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.30264.00000-R06-v3.1	6 February 2024	Mark Irish	Martin Davenport	Mark Irish
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# 1 Introduction

## 1.1 Background

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Multiplex Constructions Pty Ltd (Multiplex) to prepare a Construction Noise and Vibration Management Plan (CNVMP) for works associated with the redevelopment of Bridge Road, which are occurring as part of the wider new Sydney Fish Market (nSFM) project. The CNVMP addresses the potential noise and vibration impacts associated with the construction of Bridge Road upgrade, and outlines mitigation and management measures that are to be employed. The plan is supplementary CNVMP to the Main Works CNVMP SLR Report 610.30264.00000-R01 (hereafter referred to as 'the main works CNVMP'), and specifically addressed SSD-MOD-9 Condition of Consent (CoC) B79A.

This CNVMP addresses the potential noise and vibration impacts associated with works along Bridge Road, including those that require a Road Occupancy Licence (ROL) and may therefore require to be undertaken outside of standard construction hours to satisfy the requirements of Transport for NSW (TfNSW) and City of Sydney Council (CoSC). These works include:

- Utility trenching and civil components of the road pavement works
- Road profiling
- Placement of concrete pavement
- Asphalt compacting
- Deliveries that may occur to support these works

It is noted that this CNVMP has been updated subsequent to the approval of MOD 11 by the Department of Planning and Environment (DPE). MOD 11 is a planning modification to SSD 8925, which captures a revised design for Bridge Road and the nSFM development frontage whereby the existing Bridge Road levels are retained in lieu of being raised per the previous scheme. This amendment brings a range of construction and operational improvements to the development and stakeholders - not least of which are a significant reduction in noise and vibration impacts associated with the roadworks.

The location within the CNVMP where each component of CoC B79A has been addressed is detailed in **Table 1**.

SLR is suitably qualified to produce this CNVMP and SLR staff are members of the Australian Acoustical Society (AAS). SLR is also a member firm of the Association of Australasian Acoustical Consultants (AAAC).

**Table 1 Locations within CNVMP where CoC B79A is addressed**

Condition	Where Addressed
B79A. Prior to the commencement of any works associated with a Road Occupancy Licence (ROL), a supplementary Construction Noise and Vibration Management Plan must be submitted to and approved by the Planning Secretary addressing the following:	This CNVMP supplements the main works CNVMP (SLR report 610.30264.00000-R01)
a) description of the works	An overview of the construction activities and the locations at which these will occur are described in <b>Section 2.1</b>
b) construction program and hours	The construction program is provided in <b>Section 2.2</b> and includes the anticipated construction hours.
c) respite periods	Respite periods during the day are in accordance with CoC C6 and are described in <b>Section 3.1</b> . Respite periods between intrusive evening and night works have been determined in accordance with the TfNSW <i>Construction Noise and Vibration Strategy</i> (CNVS) and are detailed in <b>Section 5.2.2</b>
d) construction methodology and equipment to be used and the key sources of noise and vibration	Worst-case scenarios describing the items of plant that will be used and their respective noise source levels are provided in <b>Section 2.4</b> . The key sources of vibration are detailed in <b>Section 4.2</b>
e) consultation strategy for liaison with surrounding stakeholders	The community consultation strategy is based on guidance from the CNVS and is provided in <b>Section 5.2.2</b> .
f) noise monitoring locations, including but not limited to the nearest sensitive residential receivers	Noise verification monitoring locations at the nearest sensitive residential receivers are detailed in <b>Section 5.3.1.1</b> . Continuous unattended monitoring locations are detailed in <b>Section 5.3.1.2</b> and the main works CNVMP.
g) details of management and mitigation measures to be implemented to minimise construction noise and vibration	Management and mitigation measures are detailed in <b>Section 5</b> .
h) details of a complaint management process consistent with the approved Community Communications Strategy, including but not limited to reactive noise and/or vibration monitoring at the complaint location, stop works procedure in the event of construction noise and vibration criteria exceedances and the implementation of appropriate additional mitigation measures as recommended by an acoustic consultant.	The complaint management process is detailed in <b>Section 6</b> and the 'stop works' procedures in the event of identified exceedances or incidents is detailed in <b>Section 7</b> . The complaint management process and 'stop works' procedures specify when reactive noise and/or vibration monitoring should occur in response to attended or unattended monitoring non-compliances and when additional mitigation measures should be implemented.
The approved supplementary Construction Noise and Vibration Management Plan must be implemented for any works associated with an ROL for the duration of construction.	This CNVMP may be updated from time-to-time to accommodate additional works and scenarios that are unforeseen at the time of writing.

## 1.2 Relevant Documentation and Guidelines

The CNVMP references the following documents and guidelines:

- The main works CNVMP (SLR report 610.30264.00000-R01).
- 11kV Feeder Works CNVMP (SLR report 610.30264.00500-R01-v1.0-20220516 dated 16 May 2022).
- State Significant Development Application (SSDA) Noise Impact Assessment (SLR report 610.17565-R01-v1.7 dated 1 April 2019)
- Consolidated Development Consent SSD-8925-MOD-9 (23 December 2022).
- *Interim Construction Noise Guideline* (ICNG), Department of Environment and Climate Change, 2009
- *Noise Policy for Industry* (NPfI), NSW Environment Protection Authority, 2017
- *Assessing Vibration: a Technical Guideline* (DEC), Department of Environment and Conservation, 2006
- German Standard DIN 4150: Part 3 *Structural Vibration in Buildings – Effects on Structures*, 2016
- British Standard BS 7385: Part 2 *Evaluation and Measurement of Vibration in Buildings*, 1993
- *Construction Noise and Vibration Strategy* (CNVS), Transport for NSW, 2018
- *Construction Noise and Vibration Guideline* (CNVG), Transport for NSW, 2016

## 1.3 Terminology

Specific acoustic terminology is used in this report. An explanation of common terms is included in **Appendix A**.

# 2 Works Description

## 2.1 Works Activities and Locations

The works covered in this CNVMP are those occurring in the Bridge Road corridor and adjacent area/road corridors, as part of the Bridge Road upgrade, including those that require an ROL in accordance with TfNSW requirements to minimise disruption to the local road network. Consequently some works in this CNVMP will occur during the more sensitive night-time periods, which is permitted in accordance with CoC 4c) (detailed in **Section 3.1**).

The work will be a combination of day works, night works and weekend works, using respite periods and duration reduction measures to help mitigate impacts - refer **Section 5** for details. The works are occurring in stages, within the “Roadwork Extents” shown in red in **Figure 1**.

### 2.1.1 Stage 1 – Preparatory Works

### 2.1.1.1 Stage 1 – Preparatory Works – Within Site

Stage 1 involves a range of preparatory works within the site boundary, including earthworks, footing construction, and new utilities infrastructure installation. These works will generally be undertaken within standard construction hours, and will have minimal impacts on traffic and stakeholders.

### 2.1.1.2 Stage 1A – Preparatory Works – Within Road Corridor

Stage 1A involves a series of preparatory works along the Bridge Road corridor between Wattle Street and Wentworth Park Road, predominantly at the intersections (shown in **Figure 1**). The preparatory works generally comprise inground service works including relocation of existing assets and provision of new utilities infrastructure.

The work will be a combination of day works, night works and weekend works.

## 2.1.2 Stage 2 – Roadworks

### 2.1.2.1 Stage 2A – Road Works – Wentworth Park Rd Intersection

This stage will include localised pavement construction at the Wentworth Park Road intersection, as well as some associated kerb and stormwater works (shown in **Figure 2**).

Stage 2A will be generally undertaken over a series of weekends, subject to authority and stakeholder consultation.

### 2.1.2.2 Pedestrian Diversion

Upon completion of certain Stage 2A works, pedestrians and cyclists from the northern side of Bridge Road will be temporarily diverted to the southern side via a signalised crossing at Wentworth Park Road. This will enable road construction works to the northern side of Bridge Road.

### 2.1.2.3 Stage 2B – Road Works – New Bus Lane and Northern Kerb

Following the temporary diversion of pedestrians and cyclists, roadworks will commence on the northern side of Bridge Road, adjacent to the development. This will centre around construction of the new bus lane, along with associated stormwater, kerb and pavement works (shown in **Figure 3**).

Stage 2B works will be undertaken during day shifts and some night shifts, subject to authority consultation and requirements.

## 2.1.3 Stage 3 – Roadworks

### 2.1.3.1 Stage 3 – Finishing Works

Stage 3 will comprise the finishing works including surface treatments, signage, linemarking and permanent traffic signals. The finishing works will be a combination of day works, night works and weekend works, subject to authority consultation and approval.

The end of Stage 3 will mark the completion of the road works to suit the final design configuration, with the works to be progressively opened to the public as appropriate.

Construction staging diagrams showing where the works will occur are attached as **Appendix B**.

Stage 1 of the works involves relocating the existing utilities under Bridge Road into the combined service trench (CSR) which is located within the nSFM promenade. These works are assessed within the Main Works CNVMP.

This CNVMP does not cover any activities associated with the 11kV feeder works. These were addressed in a separate CNVMP (SLR report 610.30264.00500-R01-v1.0-20220516 dated 16 May 2022, hereafter referred to as 'the 11kV feeder works CNVMP') which was approved under an alternative approval mechanism.

Figure 1 Stage 1A Works



Figure 2 Stage 2A Works



Figure 3 Stage 2B Works



Figure 4 Stage 3 Works



## 2.2 Construction Program

Multiplex has provided SLR with an ROL forecast, which is reproduced below. The works that are assessed in this CNVMP are shown in **bold**.

**Table 2 ROL Forecast**

Scope	Description of Works	Program	Duration (shifts)	Construction Hours		Out of Hours Works Anticipated as per C4(c)?
				Period	Specific <sup>1</sup>	
Preparatory Works	Miscellaneous investigations, survey, testing, repairs etc outside site boundary	Q2 2023 to Q4 2024	1-5 shifts periodically	Day & Night	Day: SSD Approved Hours Night: 7pm-5am <sup>1</sup>	Yes
<b>Bridge Road – Stage 1A</b>	<b>Preparatory Works</b>	<b>Q2 2023 to Q1 2024</b>	<b>8 months</b>	<b>Day / Night / Weekends</b>	<b>Day: SSD Approved Hours Night: 7pm-5am <sup>1</sup></b>	<b>Yes</b>
<b>Bridge Road – Stage 2A</b>	<b>Roadworks – Wentworth Park Rd intersection</b>	<b>Q1 2024 to Q2 2024</b>	<b>4 months</b>	<b>Day / Night / Weekends</b>	<b>Day: SSD Approved Hours Night: 7pm-5am <sup>1</sup></b>	<b>Yes</b>
<b>Bridge Road – Stage 2B</b>	<b>Roadworks – New Bus Lane and Northern Kerb</b>	<b>Q2 2024 to Q3 2024</b>	<b>4 months</b>	<b>Day &amp; Night</b>	<b>Day: SSD Approved Hours Night: 7pm-5am <sup>1</sup></b>	<b>Yes</b>
<b>Bridge Road – Stage 3</b>	<b>Roadworks – Finishing Works</b>	<b>Q2 2024 to Q3 2024</b>	<b>2 months</b>	<b>Day / Night / Weekends</b>	<b>Day: SSD Approved Hours Night: 7pm-5am <sup>1</sup></b>	<b>Yes</b>
Main Works	Tower Crane 1 Dismantle	Q2 2024 to Q3 2024	3-4 days	Day	SSD Approved hours <sup>2</sup>	No
	Tower Crane 2 Dismantle	Q2 2024 to Q3 2024	3-4 days			No
	Tower Crane 3 Dismantle	Q2 2024 to Q3 2024	3-4 days			No
<b>All</b>	<b>Miscellaneous deliveries</b>	<b>Throughout project</b>	<b>2 hours each</b>	<b>Evening Night</b>	<b>6 pm to 8 pm 4 am to 6 am</b>	<b>Yes</b>

Note 1: Note all works outside of SSD Approved Hours are forecast based on previous authority advice, and will be subject to final determination by the relevant authority (e.g. TfNSW).

Note 2: The SSD Approved hours are detailed in **Section 3.1**.

The 11kV feeder works have been assessed in the 11kV feeder works CNVMP and are not re-assessed in this CNVMP. Similarly, the dismantling of the tower cranes and the materials handling works have been assessed in the main works CNVMP and are only limited to daytime periods within the SSD approved hours and are therefore not re-assessed in this CNVMP.

## 2.3 Nearest Sensitive Receivers

The nearest sensitive receivers to the works are shown in **Figure 1** and detailed below in **Table 3**. The Noise Catchment Areas (NCAs) are detailed in **Section 3.2.5**. As the night-time period is controlling, receivers that are strictly commercial (e.g the existing Fish Market building) have not been identified as sensitive receivers.

**Table 3 Nearest Sensitive Receivers**

NCA	ID#	Address	Property Type	Approx. Distance to Works Boundary (m)
3	1	84 Wentworth Park Road, Glebe	Residential	1
	2	2 Bridge Road, Glebe	Kauri Foreshore Hotel	4
	3	4-8 Bridge Road, Glebe	Residential	6
	4			45
	5	14-18 Bridge Road, Glebe	Residential	90
	6	108 Darghan Street, Glebe	Residential	100
	7	83 Darghan Street, Glebe	Residential	80
	8	76 Bellevue Street, Glebe	Residential	75
	9	82 Wentworth Park Road, Glebe	Residential	25
	10			50
	11	78 Wentworth Park Road, Glebe	Residential	80
4	12	3 Burton Street, Glebe	Residential	190
	13	40 Ferry Road, Glebe	Residential	230
	14	Sydney Secondary College	Educational	140
5	15	19 Griffin Place, Glebe	Residential	410
1	16	120 Saunders Street, Pyrmont	Residential	380
2	17	1 Wattle Crescent, Pyrmont	Residential	4
	18	103 Pyrmont Bridge Road, Pyrmont	Commercial	4
	19	6-10 Wattle Street, Pyrmont	Residential	7
	20			4
	21	2-26 Wattle Crescent, Pyrmont	Residential	10
	22			50
	23			60
	24			50
	25	1 Wattle Crescent, Pyrmont	Residential	40

## 2.4 Construction Scenarios

A number of separate construction scenarios have been assessed in this CNVMP:

- Utility trenching and civil work

- Profiling work
- Asphalt/pavement work

The locations of the utility trenching and civil work, profiling work and asphalt pavement work for the various stages are shown in **Figure 1** to **Figure 4**.

The equipment that will be used and the corresponding sound power levels for each scenario are provided in **Table 4** to **Table 7**; sound power levels have been taken from the CNVS or other databases referenced in the ICNG (eg AS 2436, DEFRA etc.). The scenarios include the possibility of miscellaneous deliveries to support the works.

It should be noted that some works are required to be undertaken in close proximity to Receiver R01 (84 Wentworth Park Road), with offset distances of between 1 m to 10 m from the building façade. In order to minimise noise and vibration impacts during these works, different construction equipment and methodologies have been developed as indicated in **Table 7**.

**Table 4 Construction Scenarios and Equipment Sound Power Levels – Stage 1A Preparatory Works**

Equipment	LAeq Sound Power Level (dBA) <sup>1</sup>	Estimated utilisation in assessment period (%)	Quantities Per Scenario									
			W.001	W.002	W.003	W.005	W.006	W.007	W.008	W.009	W.010	W.011
			Utility Trenching and Civil Work	Profiling Work	Asphalt/Pavement Work	Utility Trenching and Civil Work						
<b>Total LAeq Sound Power Level<sup>2</sup> (dBA)</b>			<b>118<sup>4</sup></b>	<b>117</b>	<b>115</b>	<b>118</b>	<b>118</b>	<b>109</b>	<b>100</b>	<b>121</b>	<b>121</b>	<b>121</b>
Excavator 14T + hydraulic Hammer	123 <sup>3</sup>	30	1	-	-	-	-	-	-	-	-	-
Excavator 14T + no Hammer	100	30	-	-	-	-	1	-	1	-	-	1
Concrete Saw	123 <sup>3</sup>	30	1	-	-	1	1	-	-	2	2	2
Lighting Tower	80	100	2	2	2	-	-	-	-	-	-	-
Light Vehicle - 4WD	103	25	4	4	4	-	-	-	-	-	-	-
Pavement Laying Machine	114	50	-	-	1	-	-	-	-	-	-	-
Pavement Profiler	117	100	-	1	-	-	-	-	-	-	-	-
Truck - Medium Rigid (20 t)	103	25	2	2	2	-	-	-	-	-	-	-
Concrete Agitator Truck	109	100	-	-	2	-	-	-	-	-	-	-
Roller 18 t	102	100	-	-	1	-	-	-	-	-	-	-
Vacuum Truck	109	100	1	-	-	-	1	1	-	-	1	-

Note 1: LAmax sound power levels can be assumed to be 8 dB louder than the LAeq sound power levels.

Note 2: Total sound power levels consider the LAeq sound power levels of individual items, quantities of each of each item, the estimated utilisation of each item in the assessment period and any other penalties that may apply to individual items.

Note 3: Includes a +5 dB penalty for annoyance in accordance with the *Interim Construction Noise Guideline (ICNG)*, as detailed in **Section 3.2.4**.

Note 4: The total LAeq sound power level for the Utility Trenching and Civil Work scenario (W.001) assumes that either the excavator + hydraulic hammer or the concrete saw will operate in any 15-minute period, but not both.

**Table 5 Construction Scenarios and Equipment Sound Power Levels – Stage 2A and Stage 2B Roadworks**

Equipment	LAeq Sound Power Level (dBA) <sup>1</sup>	Estimated utilisation in assessment period (%)	Quantities Per Scenario							
			W.001	W.002	W.003	W.012	W.013	W.014	W.015	W.016
			Utility Trenching and Civil Work	Profiling Work	Asphalt/Pavement Work	Utility Trenching and Civil Work				
<b>Total LAeq Sound Power Level<sup>2</sup> (dBA)</b>			<b>118<sup>4</sup></b>	<b>117</b>	<b>115</b>	<b>118</b>	<b>121</b>	<b>118</b>	<b>110</b>	<b>122</b>
Excavator 14T + hydraulic Hammer	123 <sup>3</sup>	30	1	-	-	1	2	1	-	-
Excavator 14T + no Hammer	100	30	-	-	-	-	-	-	1	-
Excavator 23T + hydraulic Hammer	122	30	-	-	-	-	-	-	-	1
Concrete Saw	123 <sup>3</sup>	30	1	-	-	-	-	-	-	-
Lighting Tower	80	100	2	2	2	-	-	-	-	-
Light Vehicle - 4WD	103	25	4	4	4	-	-	-	-	-
Pavement Laying Machine	114	50	-	-	1	-	-	-	-	-
Pavement Profiler	117	100	-	1	-	-	-	-	-	-
Truck - Medium Rigid (20 t)	103	25	2	2	2	-	-	-	-	-
Concrete Agitator Truck	109	100	-	-	2	-	-	-	-	-
Roller 18 t	102	100	-	-	1	-	-	-	-	-
Vacuum Truck	109	100	1	-	-	-	-	1	1	-

Note 1: LAmax sound power levels can be assumed to be 8 dB louder than the LAeq sound power levels.

Note 2: Total sound power levels consider the LAeq sound power levels of individual items, quantities of each of each item, the estimated utilisation of each item in the assessment period and any other penalties that may apply to individual items.

Note 3: Includes a +5 dB penalty for annoyance in accordance with the *Interim Construction Noise Guideline* (ICNG), as detailed in **Section 3.2.4**.

Note 4: The total LAeq sound power level for the Utility Trenching and Civil Work scenario (W.001) assumes that either the excavator + hydraulic hammer or the concrete saw will operate in any 15-minute period, but not both.

**Table 6 Construction Scenarios and Equipment Sound Power Levels – Stage 3 Finishing Works**

Equipment	LAeq Sound Power Level (dBA) <sup>1</sup>	Estimated utilisation in assessment period (%)	Quantities Per Scenario	
			W.002	W.003
			Profiling Work	Asphalt/Pavement Work
Total LAeq Sound Power Level <sup>2</sup> (dBA)			117	115
Lighting Tower	80	100	2	2
Light Vehicle - 4WD	103	25	4	4
Pavement Laying Machine	114	50	-	1
Pavement Profiler	117	100	1	-
Truck - Medium Rigid (20 t)	103	25	2	2
Concrete Agitator Truck	109	100	-	2
Roller 18 t	102	100	-	1
Vacuum Truck	109	100	-	-

Note 1: L<sub>max</sub> sound power levels can be assumed to be 8 dB louder than the LAeq sound power levels.

Note 2: Total sound power levels consider the LAeq sound power levels of individual items, quantities of each of each item, the estimated utilisation of each item in the assessment period and any other penalties that may apply to individual items.

Note 3: Includes a +5 dB penalty for annoyance in accordance with the *Interim Construction Noise Guideline* (ICNG), as detailed in **Section 3.2.4**.

**Table 7 Construction Scenarios and Equipment Sound Power Levels – Close Proximity Works (1m to 10m distance to receiver facade)**

Equipment	LAeq Sound Power Level (dBA) <sup>1</sup>	Estimated utilisation in assessment period (%)	Quantities Per Scenario			
			W.017	W.018	W.019	W.020
			1m to 5m distance, approved hours	6m to 10m distance, approved hours	1m to 5m distance, OOHW	6m to 10m distance, OOHW
Total LAeq Sound Power Level <sup>2</sup> (dBA)			118 <sup>4</sup>	118 <sup>4</sup>	100 <sup>5</sup>	118
Plate compactor	104	50	-	-	1	1
Excavator 14T + no Hammer	100	100	-	-	1	-
Excavator 5T + Hydraulic Hammer	120 <sup>3</sup>	30	1	-	-	-
Excavator 14T + Hydraulic Hammer	123 <sup>3</sup>	30	-	1	-	1
Concrete Saw	123 <sup>3</sup>	30	1	1	-	-
Handheld Jackhammer	118 <sup>3</sup>	50	-	-	-	1
Vacuum Truck	109	100	1	1	-	1

Note 1: L<sub>max</sub> sound power levels can be assumed to be 8 dB louder than the LAeq sound power levels.

Note 2: Total sound power levels consider the LAeq sound power levels of individual items, quantities of each of each item, the estimated utilisation of each item in the assessment period and any other penalties that may apply to individual items.

Note 3: Includes a +5 dB penalty for annoyance in accordance with the *Interim Construction Noise Guideline* (ICNG), as detailed in **Section 3.2.4**.

Note 4: The total LAeq sound power level for W.018 and W.019 assumes that either the excavator + hydraulic hammer or the concrete saw will operate in any 15-minute period, but not both.

Note 5: The total LAeq sound power level for the OOHW at 1m to 5m offset scenario (W.018) assumes that either the excavator or the plate compactor will operate, but not both simultaneously.

### 3 Noise and Vibration Criteria

#### 3.1 Permitted Hours of Construction and Respite Periods

The permitted construction hours as detailed within CoC C2, C2A, C3 and C6 of SSD-8925-MOD-9 are summarised within **Table 8**. Respite periods for rock breaking, rock hammering, sheet piling, pile driving, and similar activities are also shown in **Table 8**.

**Table 8 Permitted Construction Hours**

Day	Activity Type	Approved Construction Hours	Scheduled Respite Periods <sup>2</sup>
Monday to Friday	Standard Construction Activities	7 am to 5:30 pm	-
	Rock breaking, rock hammering, sheet piling, pile driving, and similar activities	9 am to 12 pm 1 pm to 5 pm	7:00 am to 9:00 am 12:00 pm to 1:00 pm 5:00 pm to 5:30 pm
	Slab finishing works	5:30 pm to 8 pm <sup>1</sup>	-
Saturdays	Standard Construction Activities	7:30 am to 3:30 pm	-
	Rock breaking, rock hammering, sheet piling, pile driving, and similar activities	9 am to 1 pm	7:30 am to 9:00 am 1:00 pm to 3:30 pm
Sundays or Public Holidays	All activities	No construction	-

Note 1: On no more than 35 days.

Note 2: Respite periods for rock breaking, rock hammering, sheet piling, pile driving, and similar activities in accordance with CoC C6.

CoC C4 of SSD-8925-MOD-9 however states that activities may be undertaken outside of the hours shown in **Table 8** if required:

- “(a) by the Police or a public authority for the delivery of vehicles, plant or materials;*
- “(b) in an emergency to avoid the loss of life, damage to property or to prevent environmental harm;*
- “(c) at the direction of a public authority (other than the Applicant) or Council when required by a Road Occupancy Licence (ROL) to prevent significant disruption to public transport, access to public transport, the local road network, cyclist and pedestrian movement or public safety; and*
- “(d) for the maintenance and monitoring of the dewatering of the temporary cofferdam.*

*Should noise complaints be received in relation to any works undertaken in accordance with C4 (c) they must be managed in accordance with the approved supplementary Construction Noise and Vibration Management Plan under Condition B79A.”*

CoC C6 states that:

*“Rock breaking, rock hammering, sheet piling, pile driving, and similar activities may only be carried out between the following hours:*

*(a) 9.00 am to 12.00 pm, Monday to Friday;*

*(b) 1.00 pm to 5.00 pm Monday to Friday; and*

*(c) 9.00 am to 1.00 pm, Saturday.”*

CoC C7 also states that:

*“Notwithstanding Condition C6 above, rock breaking, rock hammering, sheet piling, pile driving, and similar activities may be carried out only if these activities do not exceed the noise management levels identified in the Noise Impact Assessment prepared by SLR dated April 2019.”*

These works also require additional mitigation measures in accordance with CoC C5, this is discussed further in **Section 5.2**.

### 3.1.1 Out of Hours Works as per Condition C4(c)

It is anticipated that various works beyond the site boundary will be required by authorities to be undertaken outside of SSD Approved Hours.

In particular, it is understood that TfNSW will require risk and disruption to the Bridge Road corridor to be mitigated by undertaking works during non-peak periods and/or at night-time, dependent on the activity. This requirement has been consistent throughout the project to date, specifically during the 11kV Feeder works undertaken along Bridge Road and through consultation during development of the approved Construction Pedestrian Traffic Management Plan (CPTMP) for the Bridge Road works. Whilst each portion of works is assessed progressively by TfNSW via the Road Occupancy License (ROL) process, planning has been based around these same principles being applied by TfNSW.

## 3.2 Noise Criteria - Interim Construction Noise Guideline

CoC C8 states that:

*“The development must be constructed with the aim of achieving the construction noise management levels detailed in the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009).”*

### 3.2.1 Airborne Noise Management Levels

The *Interim Construction Noise Guideline* (ICNG) recommends that the  $L_{Aeq(15\text{minute})}$  noise levels arising from a construction project measured within the curtilage of an occupied noise-sensitive premises (i.e. at boundary or within 30 m of the residence, whichever is the lesser) should not exceed the levels indicated in **Table 9**.

**Table 9 Recommended EPA General Noise Management levels affected by Construction works**

Period of Noise Exposure	$L_{Aeq(15\text{minute})}$ Construction Noise Management Levels
Recommended Standard Hours	Noise affected <sup>1</sup> $RBL^2 + 10$ dBA

Period of Noise Exposure	LAeq(15minute) Construction Noise Management Levels
	Highly noise affected <sup>3</sup> 75 dBA
Outside Recommended Standard Hours	Noise affected <sup>1</sup> RBL <sup>2</sup> + 5 dBA

Note 1: The noise affected level represents the point above which there may be some community reaction to noise.

Note 2: The RBL noise level is representative of the “average minimum background sound level” (in the absence of the sources under consideration), or simply the background level.

Note 3: The highly noise affected level represents the point above which there may be strong community reaction to noise.

Where noise from construction works is above the ‘noise affected’ levels in **Table 9**, all reasonable and feasible mitigation measures should be implemented to minimise noise; these measures are detailed further in **Section 5**. The proponent should also inform potentially affected parties of the activities to be carried out, the expected noise impacts, and their duration. A flow chart showing how noise impacts are assessed is reproduced from the ICNG in **Figure 5**.

**Figure 5** demonstrates that the outcomes of exceedances of the ‘noise affected’ levels are:

- Examine work practices and mitigation measures that are reasonable and feasible and can be applied to minimise noise.
- Predicted levels, corresponding impacts and the applied work practices and mitigation measures to minimise noise.

The work practices and mitigation measures that will be applied to minimise noise are further detailed in **Section 5.2** in accordance with ICNG.

The ICNG notes regarding the recommended standard hours that:

*“The relevant authority (consent, determining or regulatory) may impose more or less stringent construction hours.”*

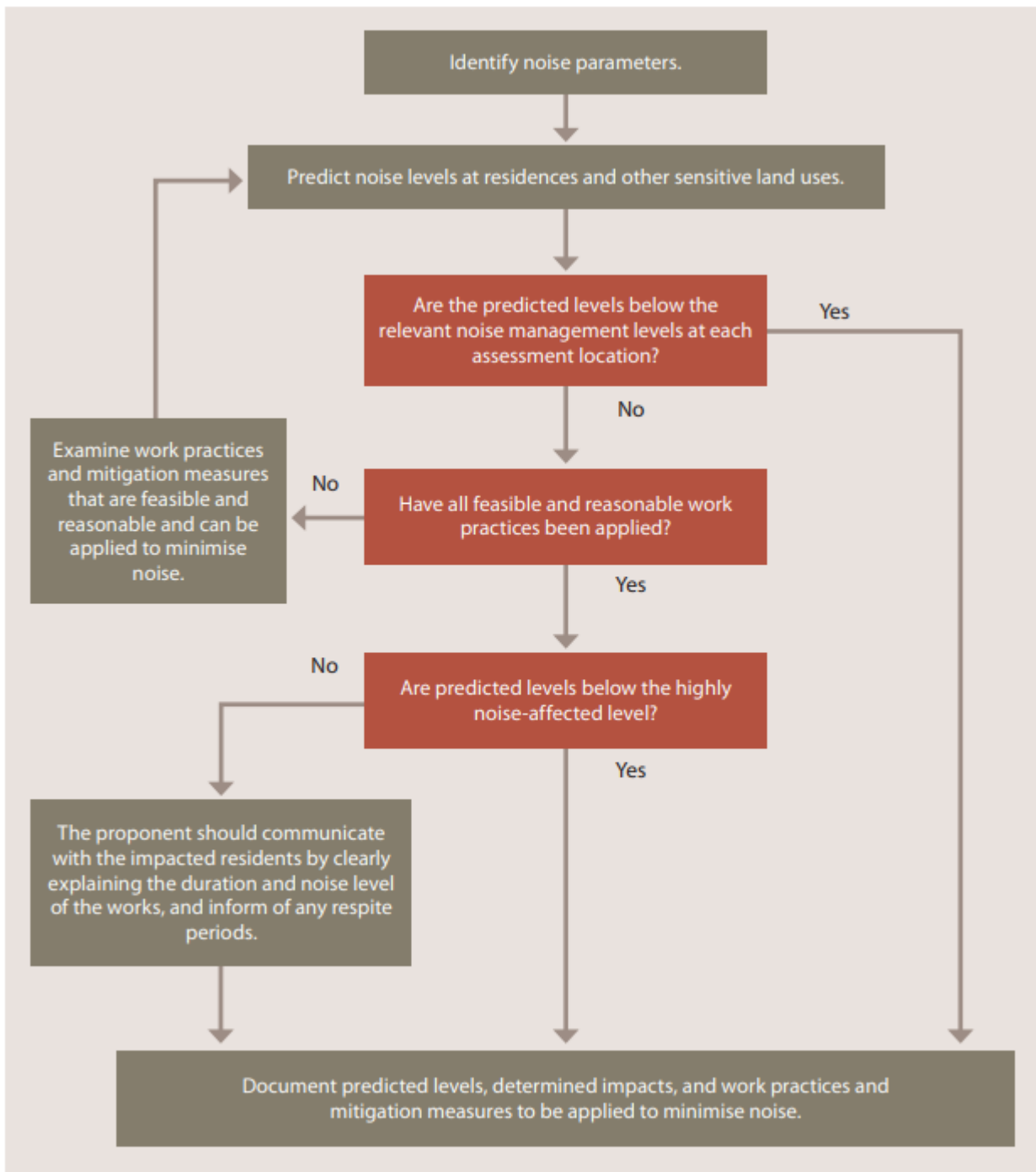
Therefore, based on the permitted construction hours presented in **Table 8**, the recommended standard hours are considered to be:

- 7:00 am to 5:30 pm on Monday to Friday
- 7:30 am to 3:30 pm on Saturday

These hours are slightly more stringent than the ICNG recommended standard hours on Monday to Friday (which recommends the conclusion of the standard hours to be at 6:00 pm) and slightly less stringent than the ICNG recommended standard hours for Saturday (which are 8:00 am to 1:00 pm).

The slab finishing works listed in **Table 8** are therefore considered to occur outside of the standard hours.

Figure 5 ICNG NML Exceedance Flow Chart



### 3.2.2 Sleep Disturbance

The ICNG states that where works are planned to extend over more than two consecutive nights, the potential for sleep disturbance should be considered. Guidance regarding the potential for sleep disturbance at sensitive receivers is provided within the NSW Environment Protection Authority's *Noise Policy for Industry* (NPfI).

The NPfI provides guidance in relation to the assessment of sleep disturbance. Specifically, the NPfI states:

*Where the subject development/premises night-time noise levels at a residential location exceed:*

- *L<sub>Aeq(15minute)</sub> 40 dBA or the prevailing RBL plus 5 dB, whichever is the greater, and/or*
- *L<sub>Afmax</sub> 52 dBA or the prevailing RBL plus 15 dB, whichever is the greater,*

*a detailed maximum noise level assessment should be undertaken.*

Where those trigger levels are not met, it is appropriate to consider any effect of the noise with regard to:

- The extent to which the maximum noise level exceeds the rating background noise level.
- How often high noise events will occur.
- The distribution of likely events across the night-time period and the existing ambient maximum events in the absence of the subject development or activity.
- Whether there are times of day when there is a clear change in the noise environment (such as during early-morning shoulder periods).
- Current scientific literature available at the time of the assessment regarding the impact of maximum noise level events at night.

It may also be appropriate to consider other published research including the *NSW Road Noise Policy (RNP)* which contains additional guidance relating to potential sleep disturbance impacts.

A review of research on sleep disturbance in the RNP indicates that in some circumstances, higher noise levels may occur without significant sleep disturbance. Based on studies into sleep disturbance, the RNP concludes that:

- Maximum internal noise levels below 50 dBA to 55 dBA are unlikely to cause awakening reactions; and that
- One or two noise events per night, with maximum internal noise levels of 65 dBA to 70 dBA, are not likely to affect health and wellbeing significantly.

Internal noise levels in a dwelling, with the windows open, are commonly 10 dB lower than external noise levels. Therefore, the first conclusion above suggests that short-term external noises of 60 dBA to 65 dBA are unlikely to cause awakening reactions. The second conclusion suggests that one or two noise events per night with maximum external noise levels of 75 dBA to 80 dBA are not likely to affect health and wellbeing significantly.

As noted in **Table 4**, it is assumed that the L<sub>Amax</sub> sound power levels are generally 8 dB higher than the L<sub>Aeq</sub> sound power levels. In this urban environment, the L<sub>Amax</sub> sleep disturbance screening criterion will be 10 dB higher than the corresponding L<sub>Aeq</sub> criterion. Therefore, sleep disturbance will be controlled by L<sub>Aeq</sub> noise levels; consequently L<sub>Aeq</sub> noise levels are the focus of this assessment.

### 3.2.3 Ground-borne Noise Criteria

The ICNG also specifies criteria for ground-borne noise emissions, which are applicable only to residences and only during the evening and night-time periods. These are reproduced in **Table 10**.

**Table 10 ICNG Ground-borne Noise Criteria**

Time Period	L <sub>Aeq</sub> (15minute) Criterion (dBA)
Evening (6:00 pm to 10:00 pm)	40
Night-time (10:00 pm to 7:00 am)	35

The ground-borne noise criteria are only applicable in circumstances where ground-borne noise levels are higher than internal airborne noise levels: for example, during underground works such as tunnelling. As the construction works are occurring at the surface, it is expected that airborne noise will be controlling, and consequently ground-borne noise is not considered further within this CNVMP.

### 3.2.4 Noise Level Penalties

CoC C9 states that:

*“If the noise from a construction activity is substantially tonal or impulsive in nature (as described in Chapter 4 of the NSW Industrial Noise Policy), 5 dB(A) must be added to the measured construction noise level when comparing the measured noise with the construction noise management levels”*

CoC C10 also states that:

*“The Applicant must schedule intra-day ‘respite periods’ for construction activities predicted to result in noise levels in excess of the “highly noise affected” levels, including the addition of 5 dB to the predicted levels for those activities identified in the Interim Construction Noise Guideline as being particularly annoying to noise sensitive receivers.”*

A penalty has therefore been applied to the predicted sound power levels in **Table 4** for all items that are considered ‘annoying’ in accordance with the ICNG or that are expected to be considered tonal or impulsive in accordance with the NPfI<sup>2</sup>.

### 3.2.5 Airborne Noise Management Levels Summary

The general noise management levels described in **Section 3.2.1** and the sleep disturbance criteria presented in **Section 3.2.2** are dependent on the RBLs.

Noise logging was undertaken as part of the State Significant Development Application (SSDA) noise impact assessment for the new Sydney Fish Market (SLR report 610.17565-R01-v1.7 dated 1 April 2019). The RBLs that were calculated as part of this assessment and the corresponding NCAs have been applied in the main works CNVMP and will continue to be applied for these works: the NCAs are shown in **Figure 1** and the project-specific Noise Management Levels (NMLs) based on the measured RBLs are provided in **Table 11**.

The NMLs applied in NCA3 are contentious and the community has indicated their objections to the use of these NMLs for receivers in NCA3, particularly during the night-time. More recent noise monitoring data suggests a night-time RBL of 46 dBA in NCA3; this would correspond to a night-time NML of 51 dBA. It is SLR’s opinion that the RBLs approved as part of the original SSD consent remain applicable to subsequent modifications.

<sup>2</sup> In accordance with clause 8 of the Implementation and transitional arrangements for the Noise Policy for Industry.

**Table 11 Receiver NMLs for Construction**

NCA	Receiver Category	LAeq(15minute) Noise Level (dBA)						LAmx Noise Level (dBA)	
		Standard Construction <sup>1</sup> (RBL+10dB)	Highly Noise Affected	Out of Hours / Sleep Disturbance Screening (RBL+5dB)				Sleep Disturbance Screening (RBL+15dB)	
				Daytime	Daytime	Daytime	Evening	Night-time	Morning
NCA1	Commercial	70	n/a	70 <sup>2</sup>	70 <sup>2</sup>	70 <sup>2</sup>	70 <sup>2</sup>	n/a <sup>3</sup>	n/a <sup>3</sup>
NCA2	Residential	72	75	67	62	55	57	65	67
	Commercial	70	n/a	70 <sup>2</sup>	70 <sup>2</sup>	70 <sup>2</sup>	70 <sup>2</sup>	n/a <sup>3</sup>	n/a <sup>3</sup>
NCA3	Residential	72	75	67	62	55	57	65	67
NCA4	Residential	64	75	59	55	47	49	57	59
	Educational	72 <sup>4</sup>	n/a	65 <sup>2,4</sup>	65 <sup>2,4</sup>	65 <sup>2,4</sup>	65 <sup>2,4</sup>	n/a <sup>3</sup>	n/a <sup>3</sup>
NCA5	Residential	60	75	55	55 <sup>5</sup>	51	53	61	63

Note 1: The standard construction hours are as per SSD-8925 consent condition C7 (See **Section 3.1**).

Note 2: Criteria is only applicable when receiver is in use.

Note 3: Sleep disturbance criteria does not apply to this receiver type.

Note 4: An external criterion of 72 dBA has been set for Sydney Secondary College. The ICNG sets an internal level of 45 dBA and 27 dB external to internal transmission loss was measured (refer Main Works CNVMP).

Note 5: These values have been lowered to be no greater than the applicable OOH daytime NML, based on the approach for determining RBLs in the NPfl.

### 3.3 Vibration Criteria

CoC C12 states that:

*“Vibration caused by construction at any residence or structure outside the subject site must be limited to:*

*(a) for structural damage vibration to buildings (excluding heritage buildings), British Standard BS 7385 Part 2- 1993 Evaluation and Measurement for Vibration in Buildings;*

*(b) for structural damage vibration to heritage buildings, German Standard DIN 4150 Part 3 Structural Vibration in Buildings Effects on Structure;*

*(c) for human exposure to vibration, the evaluation criteria presented in British Standard BS 6472- Guide to Evaluate Human Exposure to Vibration in Buildings (1Hz to 80 Hz) for low probability of adverse comment.”*

These criteria are reproduced within this section.

### 3.3.1 Structural Damage to Buildings – BS 7385 Part 2-1993

BS 7385 sets guide values for building vibration based on the lowest vibration levels above which damage has been credibly demonstrated. These levels are judged to give a minimum risk of vibration-induced damage, where minimal risk for a named effect is usually taken as a 95% probability of no effect.

Sources of vibration that are considered in the Standard include demolition, piling, ground treatments (e.g. compaction), construction equipment, tunnelling, road and rail traffic and industrial machinery.

The recommended limits (guide values) for transient vibration to ensure minimal risk of cosmetic damage to residential and industrial buildings are presented numerically in **Table 12** and graphically in **Figure 6**.

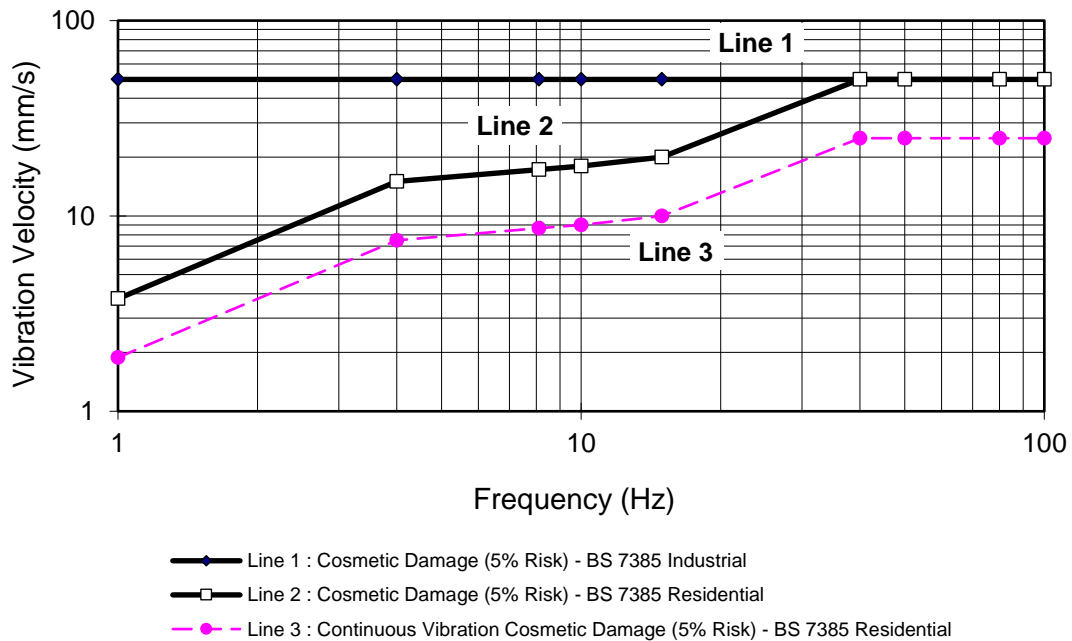
**Table 12 Transient Vibration Guide Values - Minimal Risk of Cosmetic Damage**

Line	Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
		4 Hz to 15 Hz	15 Hz and Above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light framed structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

The standard states that the guide values in **Table 12** relate predominantly to transient vibration which does not give rise to resonant responses in structures and low-rise buildings.

Where the dynamic loading caused by continuous vibration is such as to give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values in **Table 12** may need to be reduced by up to 50%.

**Figure 6 Graph of Transient Vibration Guide Values for Cosmetic Damage**



In the lower frequency region where strains associated with a given vibration velocity magnitude are higher, the guide values for building types corresponding to Line 2 are reduced. Below a frequency of 4 Hz where a high displacement is associated with the relatively low peak component particle velocity value, a maximum displacement of 0.6 mm (zero to peak) is recommended. This displacement is equivalent to a vibration velocity of 3.7 mm/s at 1 Hz.

The standard goes on to state that minor damage is possible at vibration magnitudes which are greater than twice those given in **Table 12**, and major damage to a building structure may occur at values greater than four (4) times the tabulated values.

Fatigue considerations are also addressed in the standard and it is concluded that unless calculation indicates that the magnitude and number of load reversals is significant (in respect of the fatigue life of building materials) then the guide values in **Table 12** should not be reduced for fatigue considerations.

In order to assess the likelihood of cosmetic damage due to vibration, AS 2187 specifies that vibration measured should be undertaken at the base of the building and the highest of the orthogonal vibration components (transverse, longitudinal and vertical directions) should be compared with the criteria curves presented in **Table 12**.

It is noteworthy that extra to the guide values nominated in **Table 12**, the standard states that:

*“Some data suggests that the probability of damage tends towards zero at 12.5 mm/s peak component particle velocity. This is not inconsistent with an extensive review of the case history information available in the UK.”*

Also that:

*“A building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive.”*

### 3.3.2 General Vibration Screening Criteria

The Transport for NSW *Construction Noise and Vibration Strategy* (CNVS) specifies general vibration screening criteria based on BS 7385: Part 2 – 1993. It notes that for most construction activities involving intermittent vibration such as rock breakers, piling rigs, vibratory rollers, excavators and the like, vibration predominantly occurs at frequencies greater than 4 Hz and therefore specifies the following conservative vibration damage screening levels:

- Reinforced or heavy frame structures: 25 mm/s
- Unreinforced or light frame structures: 7.5 mm/s

At locations where the predicted and/or measured vibration levels are greater than shown above, a more detailed analysis of the building structure, vibration source, dominant frequency and dynamic characteristics of the structure would be required to determine the applicable safe vibration levels.

### 3.3.3 German Standard DIN 4150: Part 3-2016

For continuous long-term vibration or repetitive vibration with the potential to cause fatigue effects, DIN 4150 provides the following Peak Particle Velocity (PPV) values as safe limits, below which even superficial cosmetic damage is not to be expected:

- 2.5 mm/s for buildings of great intrinsic value (e.g. heritage listed buildings).

### 3.3.4 Human Comfort Vibration

The Department of Environment and Conservation’s (DEC) *Assessing Vibration: a technical guideline* (AVaTG, 2006) provides guideline values for intermittent events that are based on a Vibration Dose Value (VDV) rather than a continuous vibration level. AVaTG is based on BS 6472 (referenced in CoC C12(c)) and better aligns with the ICNG time periods, and has therefore been adopted for this assessment. The application of AVaTG also aligns with other CoC’s such as CoC B79(c), which references AVaTG specifically.

The VDV is dependent upon the level and duration of the vibration event, as well as the number of events occurring during the daytime or night-time period.

The VDV’s recommended in the guideline for vibration that is intermittent nature are presented in **Table 13**.

**Table 13 Preferred and Maximum Vibration Dose Values for Intermittent Vibration**

Building Type	Vibration Dose Value (m/s <sup>1.75</sup> )	
	Preferred	Maximum
Residential Daytime	0.20	0.40
Residential Night-time	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80

Note: Daytime is 7:00 am to 10:00 pm and night-time is 10:00 pm to 7:00 am.

## 4 Construction Noise and Vibration Assessment

### 4.1 Construction Noise Predictions

Noise impacts for the construction scenarios presented in **Table 4** that will occur at night-time have been predicted at the nearby sensitive receivers listed in **Table 3** using the ISO-9613 algorithm. The results are representative of the worst-case noise levels that are likely to occur during construction. The predicted  $L_{Aeq}$  noise levels for each scenario at each sensitive receiver are presented in **Table 15** to **Table 19**; where a receiver is multi-storey, predictions have been made for each level with the highest presented.

Contour plots showing the noise impacts at 1.5 m above ground for representative scenarios during each Stage are presented in **Appendix C**.

The predictions in **Table 15** to **Table 19** are colour coded based on the extent of the predicted exceedance of the night-time NMLs, as per the categories in **Table 14**. These align with the Additional Mitigation Measures Matrix (AMMM) detailed in **Section 5.2**.

**Table 14 Exceedance Bands and Impact Colouring**

Exceedance of NML	Subjective Classification	Impact Colouring
No exceedance	None	
1 to 5 dB	Noticeable	
6 dB to 15 dB	Clearly Audible	
16 dB to 25 dB	Moderately Intrusive	
>25 dB	Highly Intrusive	

**Table 15 Predicted Noise Impacts for Stage 1A Preparatory Works**

NCA	ID	Night-time NML (dBA)	Predicted LAeq(15minute) Noise Level (dBA)									
			W.001	W.002	W.003	W.005	W.006	W.007	W.008	W.009	W.010	W.011
3	1	55	85	84	82	85	85	76	67	88	88	88
	2	70	83	82	80	83	83	74	65	86	86	86
	3	55	79.3	78	76	79.3	79	70	61	82	82	82
	4	55	70.9	70	68	70.9	71	62	53	74	74	74
	5	55	64.2	63	61	64.2	64	55	46	67	67	67
	6	55	52.8	52	50	52.8	53	44	35	56	56	56
	7	55	59.3	58	56	59.3	59	50	41	62	62	62
	8	55	64.7	64	62	64.7	65	56	47	68	68	68
	9	55	71.4	70	68	71.4	71	62	53	74	74	74
	10	55	69.3	68	66	69.3	69	60	51	72	72	72
	11	55	63.7	63	61	63.7	64	55	46	67	67	67
4	12	47	61.6	61	59	61.6	62	53	44	65	65	65
	13	47	62	61	59	62	62	53	44	65	65	65
	14	65	62	61	59	62	62	53	44	65	65	65
5	15	51	49	48	46	49	49	40	31	52	52	52
1	16	55	51	50	48	51	51	42	33	54	54	54
2	17	55	80	79	77	80	80	71	62	83	83	83
	18	70	87	86	84	87	87	78	69	90	90	90
	19	55	80	79	77	80	80	71	62	83	83	83
	20	55	74	73	71	74	74	65	56	77	77	77
	21	55	69	68	66	69	69	60	51	72	72	72
	22	55	66	65	63	66	66	57	48	69	69	69
	23	55	67	66	64	67	67	58	49	70	70	70
	24	55	67	66	64	67	67	58	49	70	70	70
	25	55	70	69	67	70	70	61	52	73	73	73

**Table 16 Predicted Noise Impacts for Stage 2A Preparatory Works**

NCA	ID	Night-time NML (dBA)	Predicted LAeq(15minute) Noise Level (dBA)							
			W.001	W.002	W.003	W.012	W.013	W.014	W.015	W.016
3	1	55	83	82	80	83	86	83	75	87
	2	70	78	77	75	78	81	78	70	82
	3	55	72	71	69	72	75	72	64	76
	4	55	66	65	63	66	69	66	58	70
	5	55	58	57	55	58	61	58	50	62
	6	55	50	49	47	50	53	50	42	54

NCA	ID	Night-time NML (dBA)	Predicted LAeq(15minute) Noise Level (dBA)							
			W.001	W.002	W.003	W.012	W.013	W.014	W.015	W.016
	7	55	55	54	52	55	58	55	47	59
	8	55	63	62	60	63	66	63	55	67
	9	55	70	69	67	70	73	70	62	74
	10	55	68	67	65	68	71	68	60	72
	11	55	63	62	60	63	66	63	55	67
4	12	47	60	59	57	60	63	60	52	64
	13	47	61	60	58	61	64	61	53	65
	14	65	60	59	57	60	63	60	52	64
5	15	51	39	38	36	39	42	39	31	43
1	16	55	51	50	48	51	54	51	43	55
2	17	55	57	56	54	57	60	57	49	61
	18	70	56	55	53	56	59	56	48	60
	19	55	58	57	55	58	61	58	50	62
	20	55	57	56	54	57	60	57	49	61
	21	55	58	57	55	58	61	58	50	62
	22	55	55	54	52	55	58	55	47	59
	23	55	57	56	54	57	60	57	49	61
	24	55	56	55	53	56	59	56	48	60
25	55	54	53	51	54	57	54	46	58	

**Table 17 Predicted Noise Impacts for Stage 2B Preparatory Works**

NCA	ID	Night-time NML (dBA)	Predicted LAeq(15minute) Noise Level (dBA)							
			W.001	W.002	W.003	W.012	W.013	W.014	W.015	W.016
3	1	55	70	69	67	70	73	70	62	74
	2	70	66	65	63	66	69	66	58	70
	3	55	64	63	61	64	67	64	56	68
	4	55	61	60	58	61	64	61	53	65
	5	55	59	58	56	59	62	59	51	63
	6	55	51	50	48	51	54	51	43	55
	7	55	59	58	56	59	62	59	51	63
	8	55	61	60	58	61	64	61	53	65
	9	55	66	65	63	66	69	66	58	70
	10	55	65	64	62	65	68	65	57	69
	11	55	62	61	59	62	65	62	54	66
4	12	47	57	56	54	57	60	57	49	61
	13	47	52	51	49	52	55	52	44	56
	14	65	58	57	55	58	61	58	50	62

NCA	ID	Night-time NML (dBA)	Predicted LAeq(15minute) Noise Level (dBA)							
			W.001	W.002	W.003	W.012	W.013	W.014	W.015	W.016
5	15	51	40	39	37	40	43	40	32	44
1	16	55	48	47	45	48	51	48	40	52
2	17	55	63	62	60	63	66	63	55	67
	18	70	61	60	58	61	64	61	53	65
	19	55	64	63	61	64	67	64	56	68
	20	55	62	61	59	62	65	62	54	66
	21	55	63	62	60	63	66	63	55	67
	22	55	59	58	56	59	62	59	51	63
	23	55	58	57	55	58	61	58	50	62
	24	55	58	57	55	58	61	58	50	62
	25	55	60	59	57	60	63	60	52	64

**Table 18 Predicted Noise Impacts for Stage 3 Preparatory Works**

NCA	ID	Night-time NML (dBA)	Predicted LAeq(15minute) Noise Level (dBA)	
			W.002	W.003
3	1	55	84	82
	2	70	82	80
	3	55	78	76
	4	55	70	68
	5	55	63	61
	6	55	52	50
	7	55	58	56
	8	55	64	62
	9	55	70	68
	10	55	68	66
	11	55	63	61
4	12	47	61	59
	13	47	61	59
	14	65	61	59
5	15	51	48	46
1	16	55	50	48
2	17	55	79	77
	18	70	86	84
	19	55	79	77
	20	55	73	71
	21	55	68	66

NCA	ID	Night-time NML (dBA)	Predicted LAeq(15minute) Noise Level (dBA)	
			W.002	W.003
	22	55	65	63
	23	55	66	64
	24	55	66	64
	25	55	69	67

**Table 19 Predicted Noise Impacts for Close Proximity Works (1m to 10m from Receiver R01 façade)**

Receiver Facade Distance to Works Boundary (m)	NML (dBA)	Predicted LAeq(15minute) Noise Level (dBA)		NML (dBA)	Predicted LAeq(15minute) Noise Level (dBA)	
		W.017	W.018		W.019	W.020
		1m to 5m distance, approved hours	6m to 10m distance, approved hours		1m to 5m distance, OOHW	6m to 10m distance, OOHW
1	72	102	-	55	89	-
2		97	-		84	-
4		92	-		79	-
6		-	89		-	89
8		-	87		-	87
10		-	85		-	85

The assessment of construction noise levels presented in **Table 15** to **Table 19** indicates the following:

- The night-time NMLs are exceeded at numerous locations for each works scenario. All reasonable and feasible noise mitigation measures need to be implemented for the works. Mitigation measures are detailed in **Section 5.2**.
- Highly intrusive worst-case noise levels of up to 89 dBA are predicted for close proximity works (W.019 and W.020) at R01: 84 Wentworth Park Road, Glebe.
- Individual receivers would be subject to a large range of worst-case impacts, depending on how far from the works they are. The highest impacts are seen when works occur in the zone closest to the receiver: for example, at receiver R01, which is close to the Stage 1A night-works, the predicted levels are higher in comparison to more distant receivers in NCA2.

## 4.2 Construction Vibration Assessment

Minimum working distances for vibration intensive construction equipment proposed for these works are provided in the CNVS and are shown in **Table 20**. The minimum working distances are for both cosmetic damage (from BS 7385 and DIN 4150) and human comfort (from AVaTG). They are based on empirical data which suggests that where works are further from receivers than the quoted minimum distances then impacts are not considered likely.

The minimum working distances for human comfort relate to continuous vibration. For most construction activities, vibration emissions are intermittent and for this reason, higher vibration levels occurring over shorter periods are allowed.

**Table 20 Recommended Minimum Working Distances from Vibration Intensive Equipment**

Plant Item	Rating/Description	Minimum Distance			
		Cosmetic Damage			Human Response (Assessing Vibration: a Technical Guideline)
		Industrial and Heavy Commercial (BS 7385)	Residential and Light Commercial (BS 7385)	Heritage Items (DIN 4150, Group 3)	
Plate Compactor	870 kg (60 kN centrifugal force) <sup>1</sup>	2 m	3 m	7 m	10 m
Vibratory Roller	Static Roller (12 tonne) <sup>1</sup>	<1 m	<1 m	2 m	4 m
	< 50 kN (1-2 tonne)	3 m	5 m	10 m	15 m to 20 m
	<100 kN (2-4 tonne)	3 m	6 m	12 m	20 m
	< 200 kN (4-6 tonne)	6 m	12 m	24 m	40 m
	< 300 kN (7-13 tonne)	8 m	15 m	30 m	100 m
	>300 kN (13–18 tonne)	10 m	20 m	40 m	100 m
	>300 kN (>18 tonne)	12 m	25 m	50 m	100 m
Small Hydraulic Hammer	300 kg (5 to 12 t excavator)	1 m	2 m	5 m	7 m
Medium Hydraulic Hammer	900 kg (12 to 18 t excavator)	3 m	7 m	15 m	23 m
Large Hydraulic Hammer	1,600 kg (18 to 34 t excavator)	11 m	22 m	44 m	73 m

The receivers that are within the minimum working distances for Residential and Light Commercial buildings using the 18 t Roller or the 14 t excavator with hydraulic hammer are shown below in **Table 21**.

**Table 21 Comparison of Receiver Distances to Minimum Working Distances**

NCA	ID#	Approx. Distance to Works Boundary (m)	Within Minimum Working Distance			
			18 t Roller (W.003)		14 t Excavator + Hydraulic Hammer (W.001)	
			Cosmetic Damage <sup>1</sup>	Human Response	Cosmetic Damage <sup>1</sup>	Human Response
3	1	5	Yes	Yes	Yes	Yes
	2	4	Yes	Yes	Yes	Yes
	3	6	Yes	Yes	Yes	Yes
	4	45	No	Yes	No	No
	5	90	No	Yes	No	No
	6	100	No	Yes	No	No
	7	80	No	Yes	No	No
	8	75	No	Yes	No	No

NCA	ID#	Approx. Distance to Works Boundary (m)	Within Minimum Working Distance			
			18 t Roller (W.003)		14 t Excavator + Hydraulic Hammer (W.001)	
			Cosmetic Damage <sup>1</sup>	Human Response	Cosmetic Damage <sup>1</sup>	Human Response
	9	25	Yes	Yes	No	No
	10	50	No	Yes	No	No
	11	80	No	Yes	No	No
4	12	190	No	No	No	No
	13	230	No	No	No	No
	14	140	No	No	No	No
5	15	410	No	No	No	No
1	16	380	No	No	No	No
2	17	4	Yes	Yes	Yes	Yes
	18	4	Yes	Yes	Yes	Yes
	19	7	Yes	Yes	Yes	Yes
	20	4	Yes	Yes	Yes	Yes
	21	10	Yes	Yes	No	Yes
	22	50	No	Yes	No	No
	23	60	No	Yes	No	No
	24	50	No	Yes	No	No
	25	40	No	Yes	No	No

Note 1: The criteria for residential and light commercial buildings from BS 7385.

For the equipment used for close proximity works near Receiver R01 (84 Wentworth Park Road), the minimum working distances are shown in **Table 22**.

**Table 22 Comparison of Receiver Distances to Minimum Working Distances for Close Proximity Works**

Receiver Facade Distance to Works Boundary (m)	Within Minimum Working Distance					
	Plate Compactor (W.003)		5 t Excavator + Hydraulic Hammer (W.001)		14 t Excavator + Hydraulic Hammer (W.001)	
	Cosmetic Damage <sup>1</sup>	Human Response	Cosmetic Damage <sup>1</sup>	Human Response	Cosmetic Damage <sup>1</sup>	Human Response
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	No	Yes	Yes	Yes
4	No	Yes	No	Yes	Yes	Yes
5	No	Yes	No	Yes	Yes	Yes
6	No	Yes	No	Yes	Yes	Yes
7	No	Yes	No	Yes	Yes	Yes

Receiver Facade Distance to Works Boundary (m)	Within Minimum Working Distance					
	Plate Compactor (W.003)		5 t Excavator + Hydraulic Hammer (W.001)		14 t Excavator + Hydraulic Hammer (W.001)	
	Cosmetic Damage <sup>1</sup>	Human Response	Cosmetic Damage <sup>1</sup>	Human Response	Cosmetic Damage <sup>1</sup>	Human Response
8	No	Yes	No	No	No	Yes
9	No	Yes	No	No	No	Yes
10	No	Yes	No	No	No	Yes

The assessment of construction vibration levels shown in **Table 21** and **Table 22** indicates that some receivers are within the minimum working distance, when either the 18 t vibratory roller, plate compactor or the 5 t / 14 t excavator with hydraulic hammer are used, and are therefore at risk of exceeding the cosmetic damage criteria detailed in **Section 3.3**. SLR recommends that where works are proposed to occur within the minimum working distances, that an alternative construction methodology is implemented, such that the works are no longer within the minimum working distances. For vibratory rolling works, this could include using a smaller roller or using alternative compaction techniques such as plate compacting or static rolling. Similarly, for rockbreaking works, this could also include using less vibration intensive methods.

Where works within the minimum working distances cannot be avoided, a more detailed analysis of the building structure, vibration source, dominant frequency and dynamic characteristics of the structure should be undertaken to determine appropriate criteria. Vibration monitoring should be undertaken at all receivers within the minimum working distances, this is described further in **Section 5.1** and **Section 5.3.2**.

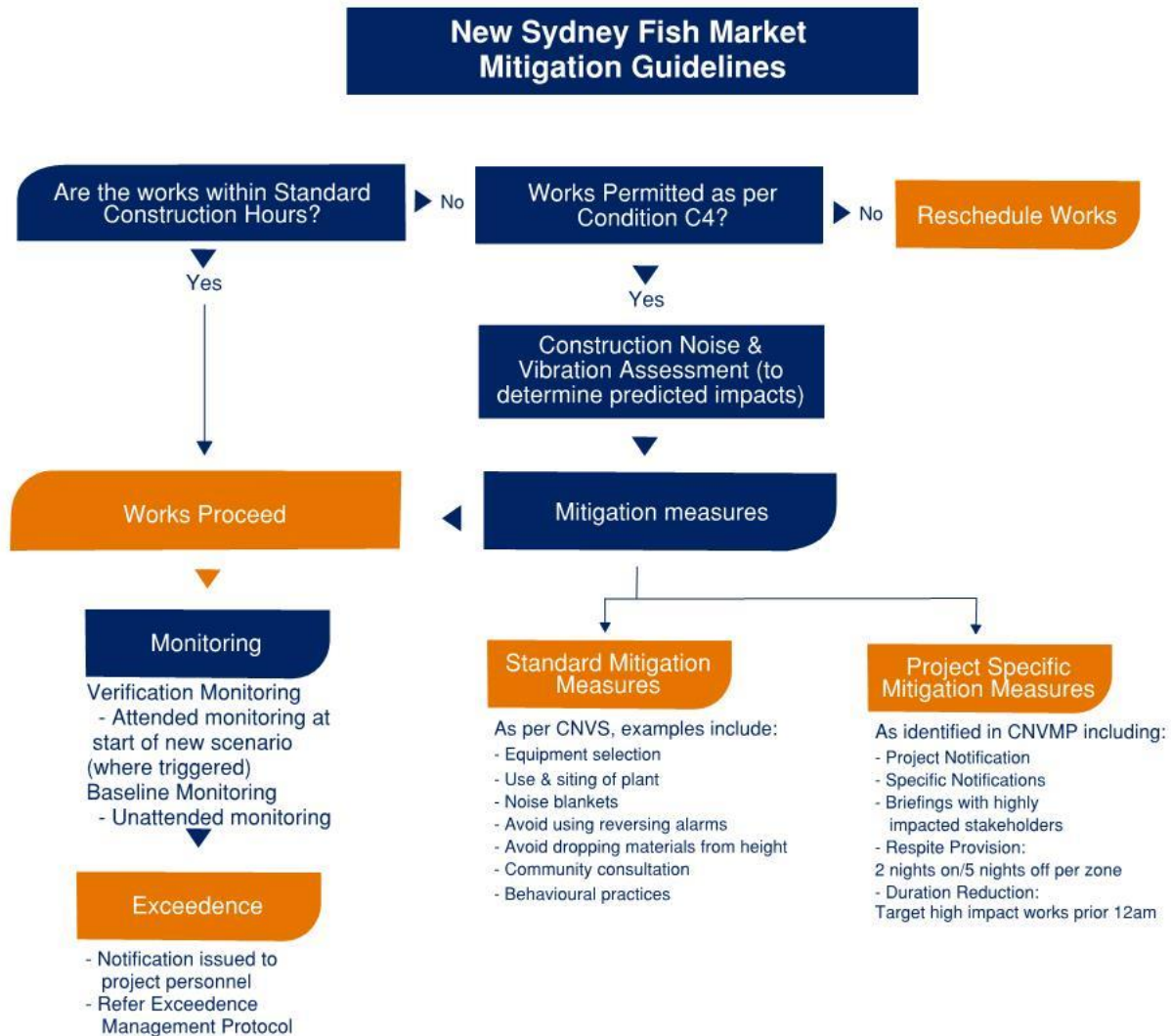
Occupants of the residential buildings identified as within the Human Response minimum working distances in **Table 21** and **Table 22** may be able to perceive vibration impacts at times when vibration intensive equipment is in use. Where impacts are perceptible, they would likely only be apparent for relatively short durations when vibration intensive equipment is nearby.

## 5 Mitigation

The ICNG acknowledges that due to the nature of construction works it is inevitable that there will be impacts where construction is near to sensitive receivers; this section details the work practices and mitigation measures that will be applied to minimise noise in accordance with the ICNG assessment flow chart in **Figure 5**.

The general procedure for implementing mitigation measures, including works permitted under Condition C4(c), is provided in the form of a flow chart in **Figure 7**.

**Figure 7 Implementation of Mitigation Measures**



## 5.1 Standard Mitigation

The CNVG contains a number of standard measures for mitigating and managing construction impacts on transport infrastructure projects.

The standard measures are reproduced from Appendix C of the CNVG in **Table 23** and should be applied where feasible and reasonable to minimise the impacts from the works as far as practicable.

**Table 23 Recommended Standard Mitigation and Management Measures**

Action Required	Applies To	Details
<b>Management Measures</b>		
Implementation of any project specific mitigation measures required.	Airborne noise	Implementation of any project specific mitigation measures required.
Implement community consultation or notification measures.	Airborne noise Ground-borne noise & vibration	Notification detailing work activities, dates and hours, impacts and mitigation measures, indication of work schedule over the night time period, any operational noise benefits from the works (where applicable) and contact telephone number.  Where possible, notifications should be given well in advance of works (3 to 6 months) and should be a minimum of 7 calendar days prior to the start of works. For projects other than maintenance works more advanced consultation or notification may be required.  Website (If required) Contact telephone number for community Email distribution list (if required) Community drop in session (if required by approval conditions).
Site inductions	Airborne noise Ground-borne noise & vibration	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: <ul style="list-style-type: none"> <li>• all project specific and relevant standard noise and vibration mitigation measures</li> <li>• relevant licence and approval conditions</li> <li>• permissible hours of work</li> <li>• any limitations on high noise generating activities</li> <li>• location of nearest sensitive receivers</li> <li>• construction employee parking areas</li> <li>• designated loading/unloading areas and procedures</li> <li>• site opening/closing times (including deliveries)</li> <li>• environmental incident procedures.</li> </ul>
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.
Verification	Airborne noise Ground-borne noise & vibration	A noise monitoring program should be carried out for the duration of works in accordance with the Construction Noise and Vibration Management Plan and any approval and licence conditions.
Attended vibration measurements	Ground-borne vibration	Where required attended vibration measurements should be undertaken at the commencement of vibration generating activities to confirm that vibration levels are within the acceptable range to prevent cosmetic building damage.
Update Construction Environmental Management Plans	Airborne noise Ground-borne noise & vibration	The CEMP must be regularly updated to account for changes in noise and vibration management issues and strategies.
Building condition surveys	Vibration Blasting	Undertake building dilapidation surveys on all buildings located within the buffer zone prior to commencement of activities with the potential to cause property damage
<b>Source Controls</b>		
Construction hours and scheduling.	Airborne noise Ground-borne noise & vibration	Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods.

Action Required	Applies To	Details
Construction respite period during normal hours and out-of-hours work	Ground-borne noise & vibration Airborne noise	Respite Offers should be considered made where there are high noise and vibration generating activities near receivers. As a guide work should be carried out in continuous blocks that do not exceed 3 hours each, with a minimum respite period of one hour between each block. The actual duration of each block of work and respite should be flexible to accommodate the usage of and amenity at nearby receivers.
Equipment selection.	Airborne noise Ground-borne noise & 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.  Ensure plant including the silencer is well maintained.
Plant noise levels.	Airborne-noise	Noise generating equipment will be regularly checked and effectively maintained, including checking of hatches/enclosures regularly to ensure that seals are in good condition and doors close properly against seals
Use and siting of plant.	Airborne-noise	The offset distance between noisy plant and adjacent sensitive receivers is to be maximised.  Plant used intermittently to be throttled down or shut down.  Noise-emitting plant to be directed away from sensitive receivers.  Only have necessary equipment on site.
Plan worksites and activities to minimise noise and vibration.	Airborne noise Ground-borne vibration	Locate compounds away from sensitive receivers and discourage access from local roads.  Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.  Where additional activities or plant may only result in a marginal noise increase and speed up works, consider limiting duration of impact by concentrating noisy activities at one location and move to another as quickly as possible.  Very noisy activities should be scheduled for normal working hours. If the work cannot be undertaken during the day, it should be completed before 11:00 pm, where possible.  Where practicable, work should be scheduled to avoid major student examination periods when students are studying for examinations such as before or during Higher School Certificate and at the end of higher education semesters.  If programmed night work is postponed the work should be re-programmed and the approaches in this guideline apply again.
Reduced equipment power	Airborne noise Ground-borne vibration	Use only the necessary size and power
Non-tonal and ambient sensitive 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.  Consider the use of ambient sensitive alarms that adjust output relative to the ambient noise level.

Action Required	Applies To	Details
Minimise disturbance arising from delivery of goods to construction sites.	Airborne noise	Compounds and worksites will be designed to promote one-way traffic and minimise the need for vehicle reversing. Where practicable, work compounds, parking areas, and equipment and material stockpiles will be positioned away from noise-sensitive locations and take advantage of existing screening from local topography. Select site access points and roads as far as possible away from sensitive receivers. Dedicated loading/unloading areas to be shielded if close to sensitive receivers. Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible. Avoid or minimise these out of hours movements where possible.
Engine compression brakes	Construction vehicles	Limit the use of engine compression brakes at night and in residential areas. Ensure vehicles are fitted with a maintained Original Equipment Manufacturer exhaust silencer or a silencer that complies with the National Transport Commission's 'In-service test procedure' and standard.
<b>Path Controls</b>		
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	Where practicable, work compounds, parking areas, and equipment and material stockpiles will be positioned away from noise-sensitive locations and take advantage of existing screening from local topography.
<b>Receptor Control</b>		
Structural surveys and vibration monitoring	Ground-borne vibration	If vibration generating works are required within the minimum cosmetic damage working distances and considered likely to exceed the criteria: Different construction methods with lower source vibration levels will be investigated and implemented, where feasible. Attended vibration measurements will be undertaken at the start of the works to determine actual vibration levels at the item. Works will cease if the monitoring indicates vibration levels are likely to, or do, exceed the relevant criteria. Where works are required within the cosmetic damage minimum working distances, building condition surveys in accordance with CoC B100 will be completed before and after the works to ensure no cosmetic damage has occurred.

## 5.2 Additional Mitigation

### 5.2.1 Additional Mitigation Measures Matrix

Where the 'mitigated' construction noise levels remain above the noise management levels (NMLs), the Additional Mitigation Measures Matrix (AMMM) identified in Section 8.2.2 (Table 9) of the CNVS is to be implemented. The use of the CNVS aligns with the mitigation measures stipulated in the main works CNVMP. It is acknowledged that the Roads and Maritime Services (RMS, now TfNSW) *Construction Noise and Vibration Guideline* (CNVG) is usually applied on road upgrade projects, and additional commentary from the CNVG is included in the discussion of the implementation of the mitigation (noting that the CNVG is only subtly different from the CNVS). The AMMM is reproduced in **Table 24**.

**Table 24 Recommended Triggers for Additional Mitigation Measures – Airborne Noise**

Time Period	dB(A) above RBL	dB(A) above NML	Addition Mitigation Measures Type <sup>1</sup>
<b>Standard Hours: Mon - Fri (7am – 5:30pm), Sat (8am – 1pm), Sun/Pub Holiday (Nil)</b>			
Noticeable	5 to 10	0	-
Clearly Audible	10 to 20	< 10	-
Moderately Intrusive	20 to 30	10 to 20	PN, V
Highly Intrusive	> 30	> 20	PN, V
75dB(A) or greater	-	-	PN, V, SN
<b>OOHW Period 1: Mon – Fri (5:30pm – 10pm), Sat (7am – 8am &amp; 1pm – 10pm), Sun/Pub Holiday (8am – 6pm)<sup>2</sup></b>			
Noticeable	5 to 10	< 5	-
Clearly Audible	10 to 20	5 to 15	PN
Moderately Intrusive	20 to 30	15 to 25	PN, V, SN, RO
Highly Intrusive	> 30	> 25	PN, V, SN, RO, RP, DR
<b>OOHW Period 2: Mon – Saturday (10pm – 12am &amp; 12am – 7am), Sun/Pub Holiday (12am – 7am &amp; 6pm – 12am)</b>			
Noticeable	5 to 10	< 5	PN
Clearly Audible	10 to 20	5 to 15	PN, V
Moderately Intrusive	20 to 30	15 to 25	PN, V, SN, RP, DR
Highly Intrusive	> 30	> 25	PN, V, SN, AA, RP, DR

Note 1: PN = Project notification  
 V = Verification monitoring  
 RP = Respite period  
 AA = Alternative accommodation  
 SN = Specific notification, individual briefings, or phone call  
 DR = Duration reduction  
 RO = Project specific respite offer

Note 2 Respite periods and duration reduction are not applicable when works are carried out during OOHW Period 1 Day only (i.e Saturday 6:00 am – 7:00 am & 1:00 pm – 6:00 pm, Sundays / Public Holidays 8:00 am – 6:00 pm).

### 5.2.2 Required Additional Mitigation Measures

On the basis of the AMMM shown in **Table 24** and the LAeq noise level predictions shown in **Table 15** to **Table 19**, the following additional noise mitigation measures are triggered:

- Respite Period (RP) is triggered for all scenarios. On this basis, night works will be limited to 2 consecutive nights at each intersection, followed by a respite period of at least 5 nights. With consideration for the distance between the two groups of impacted receivers in the east and the west, those being receivers in NCA02 (Wattle Street end) and NCA03 (Wentworth Park Road end), works may be undertaken at one intersection during the respite period of the other. That is to say that works may be undertaken for two nights at Wentworth Park Road intersection and then two nights at Wattle Street intersection or similar, so long as the five nights consecutive respite is provided to each receiver: provided that the applicable NMLs (detailed in **Table 11**) are not exceeded during the respite period, in accordance with the requirements of the ICNG and CoC C8 (detailed in **Section 3.2**). Additionally, high noise generating activities (e.g. hydraulic hammer and saw cutting) will be undertaken early in the shift such that they are completed by midnight.

- Duration Reduction (DR) is triggered for all scenarios. Duration Reduction is typically considered where Respite Periods are considered to be counterproductive to reducing noise and vibration impacts to the community, and where it may therefore be beneficial to increase the number of consecutive evenings and/or nights to minimise the overall duration of the activity. This measure is determined on a case-by-case basis. For the Bridge Road works, Respite Periods are generally considered the most effective means of mitigation, and the implementation of Duration Reduction would be limited. However, there are instances in which Duration Reduction could prove beneficial in mitigating impacts, particularly when the authority restrictions on road occupancy are considered (eg utility infrastructure installation and Wentworth Park Road intersection works). In such instances Duration Reduction may be implemented, but only following the appropriate consultation with impacted receivers, the community and relevant authorities.
- Specific Notifications have been triggered at multiple locations for all scenarios. The receivers identified as being subject to Moderately Intrusive impacts in **Table 15** to **Table 19** and the contour plots in **Appendix C** shall receive:
  - A detailed notification delivered by letterbox at least seven days prior to the works occurring.
  - An individual briefing at least 48 hours prior to the works occurring, that provides personalised contact and tailored advice, with an opportunity to comment on the proposed works and mention any specific needs. For multi-level receivers and strata developments, briefings could be provided to individual buildings.
  - As an alternative to individual briefings, a phone call within seven days of the works, with an opportunity to comment on the proposed works and mention any specific needs.
- Verification monitoring shall be undertaken at the commencement of each scenario and in response to any complaints received that indicate likely exceedance of noise or vibration levels. Details regarding the required monitoring are provided in **Section 5.3**.
- Project notifications shall be delivered to all receivers within NCAs 2, 3 and 4.
- Based on the predicted noise levels, consideration of Alternative Accommodation (AA) is triggered for some receivers for various scenarios. Further commentary on Alternative Accommodation is outlined in **Section 5.2.4**.

### 5.2.3 Task-Specific Mitigation Measures

Further mitigation measures shall be implemented for specific activities to help reduce their respective impacts as described below.

#### 5.2.3.1 Saw-Cutting

- All saw-cutting works to be undertaken prior to midnight.
- Opportunities to undertake some portions of saw-cutting during daytime hours will be explored with authorities, to further mitigate impacts to receivers.

#### 5.2.3.2 Tree-Trimming

Previous requirements for bulk tree trimming have been effectively eliminated in the revised Bridge Road design introduced via MOD 11. There is now no requirement for bulk tree trimming along the Bridge Road frontage. Any localised tree trimming will be undertaken during daytime hours (unless otherwise required by an authority) and following prior consultation with Council and DPE.

### 5.2.3.3 Roadworks

- Hydraulic hammer works will be undertaken prior to midnight.
- Pavement demolition to target segmental removal of pavement materials via saw-cutting, reducing the need for on-site processing. It is noted however that this will not be possible in all scenarios, and that the hydraulic hammer will still be required for pavement demolition and ground excavation works.
- Pavement profiling works near sensitive receivers will be undertaken prior to midnight.
- Plate Compactors or Vibratory Rollers in static mode (no vibrate) will be used for road compaction adjacent to sensitive receivers. Minimum offset distances to be confirmed via verification monitoring.

### 5.2.4 Alternative Accommodation

The Alternative Accommodation (AA) mitigation description from Section 8.2.1 of the CNVS is reproduced below:

*“Alternative accommodation options may be provided for residents living in close proximity to construction works that are likely to incur unreasonably high impacts. Alternative accommodation will be determined on a case-by-case basis and should provide a like-for-like replacement for permanent residents, including provisions for pets, where reasonable and feasible.”*

Regarding AA, Section 8.2.3 of the CNVS also notes that:

*“Short term residual impacts where a specific phase of the construction work generates noise or vibration that exceeds the management levels inside the highly sensitive night period, consideration should be given to offering alternative accommodation for the duration of the noise or vibration impact”*

Section A.6 also notes regarding multi-level receivers that:

*“Individual occupancies should be considered and treated the same as 1-2 storey dwellings in terms of assessing, mitigating and managing noise and vibration. Note that it may not be reasonable (cost-effective) to offer respite or alternative accommodation to multiple receivers in multi-storey buildings.”*

Accordingly, due consideration has been given to the provision of Alternative Accommodation. The extent of impacted receivers and the construction durations (as outlined within **Table 2**) make the provision of Alternative Accommodation unreasonable on the basis of cost in line with Section A.6 of the CNVS. Alternative Accommodation is therefore not deemed a reasonable mitigation measure for these works and will not be offered.

### 5.2.5 Road Works in Close Proximity to Receivers (<10m)

As outlined in **Section 2.4**, some works are required to be undertaken in close proximity to receivers, with offset distances of between 1 m to 10 m from the building façade. In order to minimise noise and vibration impacts during these works, different construction equipment and methodologies have been developed. Such measures include the use of smaller equipment (eg Plate Compactors and hand held Jack Hammers), no vibrate on rollers, positioning of louder machinery away from these locations, and undertaking works during standard construction hours where practicable.

## 5.3 Monitoring

### 5.3.1 Construction Noise Monitoring

Construction noise monitoring is to be undertaken throughout the works and may comprise one or more of three types as indicated in the following sections, depending on the works scenario and any measured exceedances or complaints received.

#### 5.3.1.1 Verification Monitoring

Verification monitoring will be undertaken in the form of operator attended monitoring, to verify that construction noise and vibration from the project are consistent with the predictions in the noise assessment, and to ensure that mitigation and management of construction noise and vibration is appropriate for receivers affected by the works.

Verification monitoring will be undertaken at the commencement of each construction scenario where the Verification Monitoring (V) additional mitigation measure (detailed in **Section 5.2**) is triggered. This involves undertaking measurements of the equipment undertaking the works for a short period (during Standard Construction Hours, where possible) prior to full commencement of the works.

All monitoring will be completed by suitably qualified acoustic specialists. The locations and extent of attended monitoring will be determined in consultation with project staff and would be dependent on the activities taking place, but is expected to include, as a minimum measuring at or near the nearest property boundary to the noise-intensive activities. Likely attended measurement locations are:

- For any works being undertaken in the vicinity of Bridge Road and Wentworth Park Road, measurements in a publicly accessible location near the ground floor of R01: 84 Wentworth Park Road, Glebe.
- For any works being undertaken in the vicinity of the Bridge Road and Wattle Street, measurements in a publicly accessible location near the ground floor of:
  - R19: 6-10 Wattle Street, Pyrmont
  - R17: 1 Wattle Crescent, Pyrmont

Monitoring would be undertaken at locations that are publicly accessible or within the construction site; consequently monitoring would be limited to ground floor locations or at the nearest property boundaries. The monitoring will take place during the expected noisiest construction periods and be representative / indicative of the worst-case impacts at the potentially affected sensitive receivers. Immediate feedback would be provided to the construction contractor regarding the noise levels and whether there are any additional opportunities to implement reasonable and feasible mitigation measures; which may include reducing the “on-time” of various items of equipment within any 15-minute period.

A noise monitoring report will be prepared after each attended monitoring survey and will document any proposed corrective actions and the status of their implementation.

All items of acoustic instrumentation utilised will be designed to comply with IEC 61672.1-2019 *Electroacoustics – Sound level meters* (AS IEC 61672) and carry current calibration certificates.

### 5.3.1.2 Unattended Monitoring

Continuous unattended noise monitoring is being undertaken at three locations representative of the closest, potentially most affected residences using statistical noise loggers as indicated in the main works CNVMP. This equipment is real-time enabled with an online portal, with automated notifications to be sent to project personnel within 15 minutes following any exceedances in the predicted noise levels. Exceedance noise level thresholds for the unattended monitors will be set to suit the current construction scenario.

Where works required under Condition C4(c) are proposed to be undertaken closer to noise sensitive receivers than the nearest unattended monitoring location, attended verification monitoring is to be conducted prior to or at commencement of works to establish the difference in measured noise level between the nearest receiver and unattended monitor location. The exceedance noise level threshold shall be set at the unattended noise monitor to ensure notifications of exceedances to project personnel correlate with the predicted noise level at the nearest receiver location.

The procedure for investigating and taking corrective action on measured unattended monitoring exceedances is described in **Section 7.1**.

### 5.3.1.3 Response Monitoring

Attended noise monitoring will also be undertaken in response to formal complaints, where the complaints indicate likely exceedance of predicted noise levels. All monitoring will be completed by suitably qualified acoustic specialists.

The locations and extent of attended monitoring will be determined in consultation with project staff and would be dependent on the activities taking place, but is expected to include, as a minimum measuring at or near the nearest property boundary to the noise-intensive activities. Likely measurement locations are:

- For any works being undertaken in the vicinity of the Bridge Road and Wentworth Park Road, measurements in a publicly accessible location near the ground floor of R01: 84 Wentworth Park Road, Glebe.
- For any works being undertaken in the vicinity of the Bridge Road and Wattle Street, measurements in a publicly accessible location near the ground floor of:
  - R19: 6-10 Wattle Street, Pyrmont
  - R17: 1 Wattle Crescent, Pyrmont

Monitoring would be undertaken at locations that are publicly accessible or within the construction site; consequently monitoring would be limited to ground floor locations or at the nearest property boundaries. The monitoring will take place during the expected noisiest construction periods and be representative / indicative of the worst-case impacts at the potentially affected sensitive receivers. Immediate feedback would be provided to the construction contractor regarding the noise levels and whether there are any additional opportunities to implement reasonable and feasible mitigation measures; which may include reducing the “on-time” of various items of equipment within any 15-minute period.

A noise monitoring report will be prepared after each attended monitoring survey and will document any proposed corrective actions and the status of their implementation.

All items of acoustic instrumentation utilised will be designed to comply with IEC 61672.1-2019 *Electroacoustics – Sound level meters* (AS IEC 61672) and carry current calibration certificates.

The procedure for responding to complaints is described in **Section 6**.

### 5.3.2 Construction Vibration Monitoring

Where vibration intensive works (such as rockbreaking, vibratory rolling or plate compacting) are required within the minimum working distances of sensitive receivers or structures (refer to **Section 4.2**), vibration will be monitored continuously for the duration of the vibration intensive works within the minimum working distances.

Attended vibration measurements will be undertaken at the start of vibration intensive works within the minimum working distances to confirm the levels of vibration are below the applicable vibration limits (refer to **Section 3.3**).

Geophones will be installed by an acoustic consultant at the closest points of the sensitive structure to the vibration intensive works to continuously monitor vibration for the duration of the vibration intensive works in accordance with the appropriate guideline (BS 7385 or DIN 4150). Should the works location change, the geophones will be relocated to remain at the closest point of the structure to the works.

The vibration monitoring equipment will have SMS capability so as to alert the Multiplex and the construction contractor immediately of any/all criteria breaches:

- A warning vibration level of two-thirds (66%) of the applicable vibration limit will trigger a 'warning' alarm if exceeded.
- A 'halt work' alarm will trigger if vibration is measured equal to or exceeding the applicable vibration limit. Actions to be carried out if the exceedance alarms are triggered are detailed in **Section 7**.

Vibration monitoring data will be downloaded and reported at the following timeframes:

- Monthly during works (at a minimum)
- Within one week of an exceedance of the vibration limit alarm level
- Upon completion of vibration monitoring

All items of vibration instrumentation will be designed to comply with applicable guidelines and carry current calibration certificates.

### 5.3.3 Monitoring Reports

Noise and/or vibration monitoring reports will be provided to Multiplex and the construction contractor. Monitoring reports would include the following details, at a minimum:

- Noise/vibration monitoring/measurement locations
- Date, time and length of noise monitoring/measurements
- Weather conditions during the measurements (with the exception of unattended vibration monitoring)
- Name and position of personnel undertaking measurements
- Construction activities being undertaken during measurements
- Locations of construction equipment and distance from monitoring location

- Measured  $L_{Aeq}$  and  $L_{Amax}$  noise levels during construction works (for each activity) including the application of any penalties (as described in **Section 3.2.4**) along with a comparison to the predicted noise levels (noise monitoring only)
- Measured  $L_{A90}$  background noise level in absence of the construction works (noise monitoring only)
- Measured vibration levels during construction works (for each activity) along with a comparison to the relevant vibration criteria (vibration monitoring only)
- Measured vibration levels and relevant details of any of exceedance of the warning vibration level or vibration limits (vibration monitoring only)
- Measured background vibration level in absence of the construction works (vibration monitoring only)
- Operator observations noting any extraneous noise/vibration sources or other points of relevance.

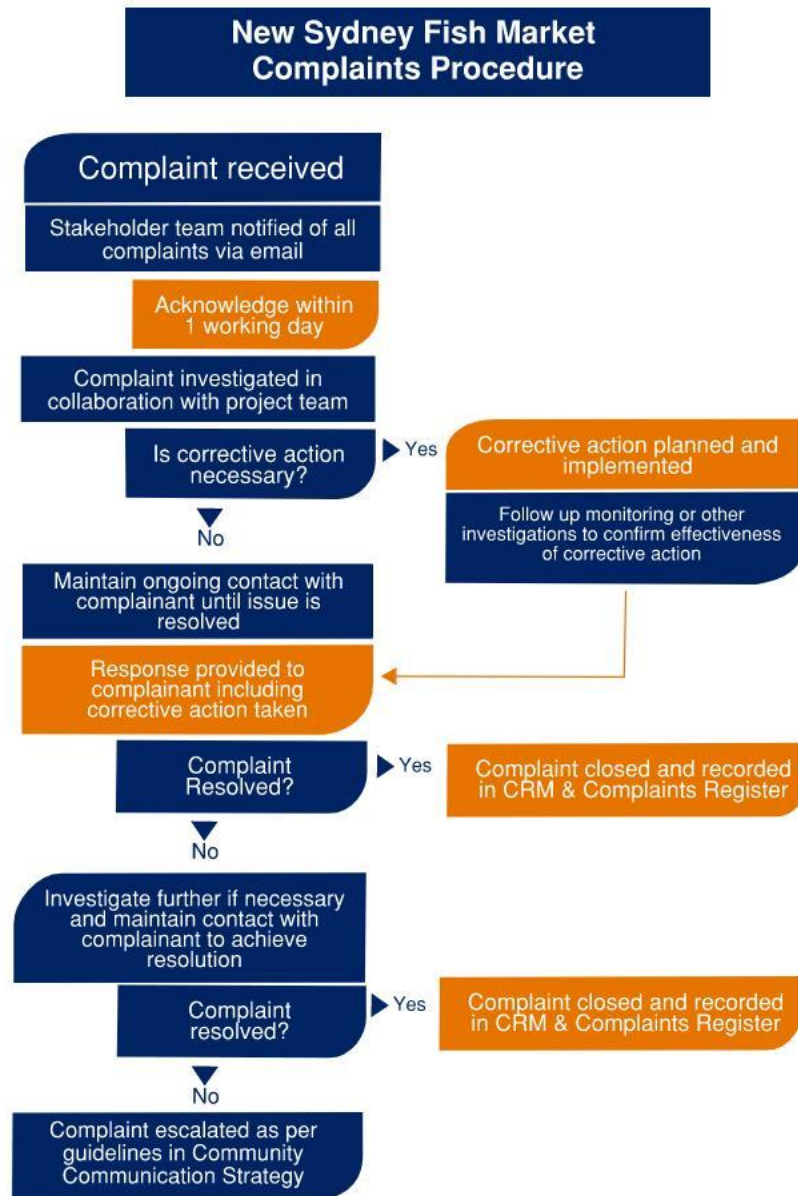
## 6 Complaints Management

The construction contractor will adopt the following protocol for handling complaints. This protocol is intended to ensure that the issues are addressed and that appropriate corrective action is identified and implemented as necessary.

Where follow up noise and/or vibration monitoring is required, this shall be conducted in accordance with the procedures in **Section 5.3**, where appropriate.

The complaints procedure is provided in the form of a flow chart in **Figure 8**.

**Figure 8 Complaints Procedure**



## 7 Stop Works Procedures

Any incident or non-compliance shall be handled and reported in accordance with the CEMP. An incident non-compliance would include:

- Vibration emissions exceeding the criteria for cosmetic damage or human comfort at nearby buildings (refer procedure in **Section 5.3.2**).
- Noise emissions exceeding those predicted in **Table 15** to **Table 19**.
- Any activities being undertaken outside of the permitted hours in **Section 3.1** that do not fulfill the requirements of Condition C4.

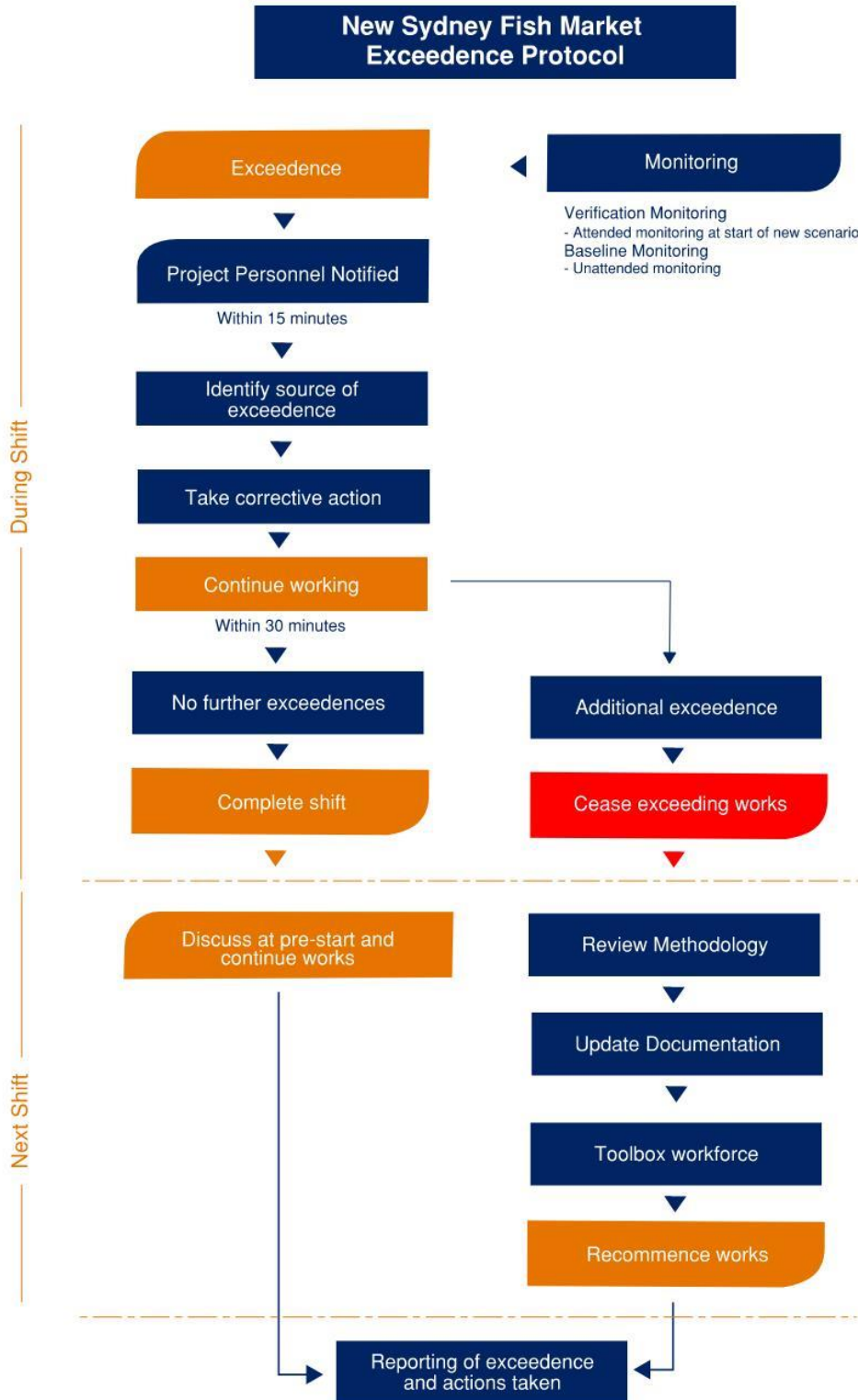
‘Stop works’ procedures in accordance with condition B79A h) are provided in the following subsections.

## 7.1 Exceedances of Noise Level Predictions

The ‘stop works’ procedure with respect to exceedances of the predicted noise levels is provided in the form of a flow chart in **Figure 9**.

The flow chart in **Figure 9** is based on exceedances of the predicted noise levels and not exceedances of the NMLs: community consultation will be undertaken that is commensurate with the predicted exceedances of the NMLs, in accordance with the AMMM from the CNVS (detailed in **Section 5.2.1**) and the ICNG assessment process described in **Section 3.2.1** and **Figure 5**. Where the predicted noise levels are exceeded, additional community consultation is required to bridge the gap between the community consultation provided based on the predicted exceedances of the NMLs, and the community consultation required to address the exceedances of the NMLs that are occurring.

Figure 9 Stop Works Procedure – Noise or Vibration Level Exceedances



## 7.2 Exceedances of Vibration Criteria

The 'stop works' procedure with respect to exceedances of the vibration criteria is provided in the form of a flow chart in **Figure 9** above.

Refer to the procedure in **Section 5.3.2** for implementing real-time vibration monitoring prior to the commencement of any vibration intensive works within the minimum working distances in **Table 20**.

# Appendix A:

## Acoustic Terminology

### 1. Sound Level or Noise Level

The terms ‘sound’ and ‘noise’ are almost interchangeable, except that ‘noise’ often refers to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure. The human ear responds to changes in sound pressure over a very wide range with the loudest sound pressure to which the human ear can respond being ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbols SPL, L or LP are commonly used to represent Sound Pressure Level. The symbol LA represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is  $2 \times 10^{-5}$  Pa.

### 2. ‘A’ Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an ‘A-weighting’ filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People’s hearing is most sensitive to sounds at mid frequencies (500 Hz to 4,000 Hz), and less sensitive at lower and higher frequencies. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dB or 2 dB in the level of a sound is difficult for most people to detect, whilst a 3 dB to 5 dB change corresponds to a small but noticeable change in loudness. A 10 dB change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels.

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120	Heavy rock concert	Extremely noisy
110	Grinding on steel	
100	Loud car horn at 3 m	Very noisy
90	Construction site with pneumatic hammering	Loud
80	Kerbside of busy street	
70	Loud radio or television	
60	Department store	Moderate to quiet
50	General Office	
40	Inside private office	Quiet to very quiet
30	Inside bedroom	
20	Recording studio	Almost silent

Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as ‘linear’, and the units are expressed as dB(lin) or dB.

### 3. Sound Power Level

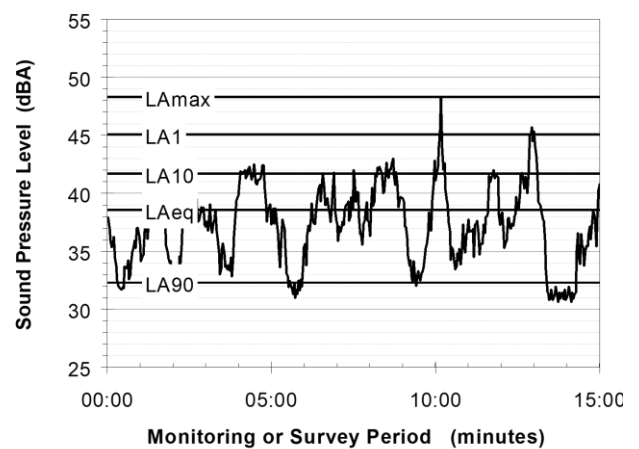
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, or by the reference unit  $10^{-12}$  W.

The relationship between Sound Power and Sound Pressure is similar to the effect of an electric radiator, which is characterised by a power rating but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

### 4. Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels LAN, where LAN is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the LA1 is the noise level exceeded for 1% of the time, LA10 the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

- LA1 The noise level exceeded for 1% of the 15 minute interval.
- LA10 The noise level exceeded for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.
- LA90 The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.
- LAeq The A-weighted equivalent noise level (basically, the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

### 5. Frequency Analysis

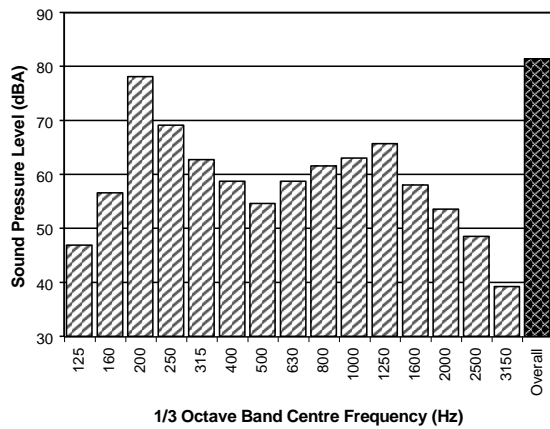
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal.

The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (three bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)

The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.



### 6. Annoying Noise (Special Audible Characteristics)

A louder noise will generally be more annoying to nearby receivers than a quieter one. However, noise is often also found to be more annoying and result in larger impacts where the following characteristics are apparent:

- **Tonality** - tonal noise contains one or more prominent tones (ie differences in distinct frequency components between adjoining octave or 1/3 octave bands), and is normally regarded as more annoying than 'broad band' noise.
- **Impulsiveness** - an impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.
- **Intermittency** - intermittent noise varies in level with the change in level being clearly audible. An example would include mechanical plant cycling on and off.
- **Low Frequency Noise** - low frequency noise contains significant energy in the lower frequency bands, which are typically taken to be in the 10 to 160 Hz region.

### 7. Vibration

Vibration may be defined as cyclic or transient motion. This motion can be measured in terms of its displacement, velocity or acceleration. Most assessments of human response to vibration or the risk of damage to buildings use measurements of vibration velocity. These may be expressed in terms of 'peak' velocity or 'rms' velocity.

The former is the maximum instantaneous velocity, without any averaging, and is sometimes referred to as 'peak particle velocity', or PPV. The latter incorporates 'root mean squared' averaging over some defined time period.

Vibration measurements may be carried out in a single axis or alternatively as triaxial measurements (ie vertical, longitudinal and transverse).

The common units for velocity are millimetres per second (mm/s). As with noise, decibel units can also be used, in which case the reference level should always be stated. A vibration level  $V$ , expressed in mm/s can be converted to decibels by the formula  $20 \log (V/V_0)$ , where  $V_0$  is the reference level (10<sup>-9</sup> m/s). Care is required in this regard, as other reference levels may be used.

### 8. Human Perception of Vibration

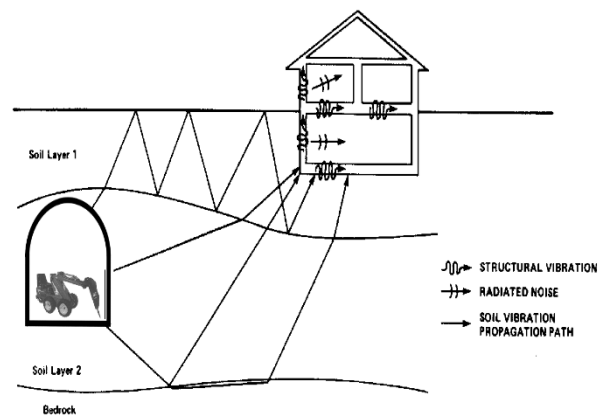
People are able to 'feel' vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of the vibration. For example, the vibration that a person responds to as 'normal' in a car, bus or train is considerably higher than what is perceived as 'normal' in a shop, office or dwelling.

### 9. Ground-borne Noise, Structure-borne Noise and Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed 'structure-borne noise', 'ground-borne noise' or 'regenerated noise'. This noise originates as vibration and propagates between the source and receiver through the ground and/or building structural elements, rather than through the air.

Typical sources of ground-borne or structure-borne noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

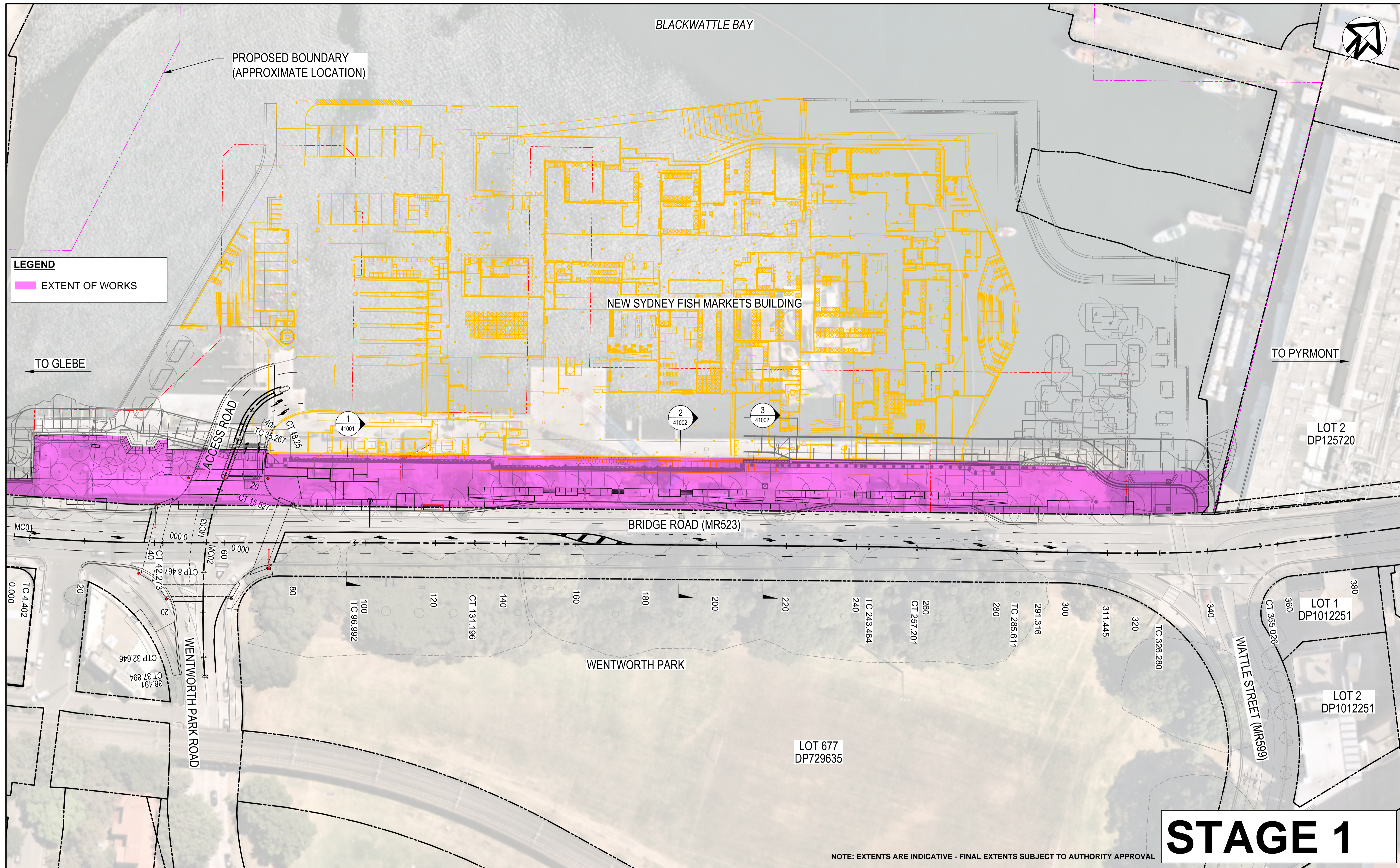
The following figure presents an example of the various paths by which vibration and ground-borne noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.



The term 'regenerated noise' is also used in other instances where energy is converted to noise away from the primary source. One example would be a fan blowing air through a discharge grill. The fan is the energy source and primary noise source. Additional noise may be created by the aerodynamic effect of the discharge grill in the airstream. This secondary noise is referred to as regenerated noise.

# Appendix B:

## Construction Staging Diagrams

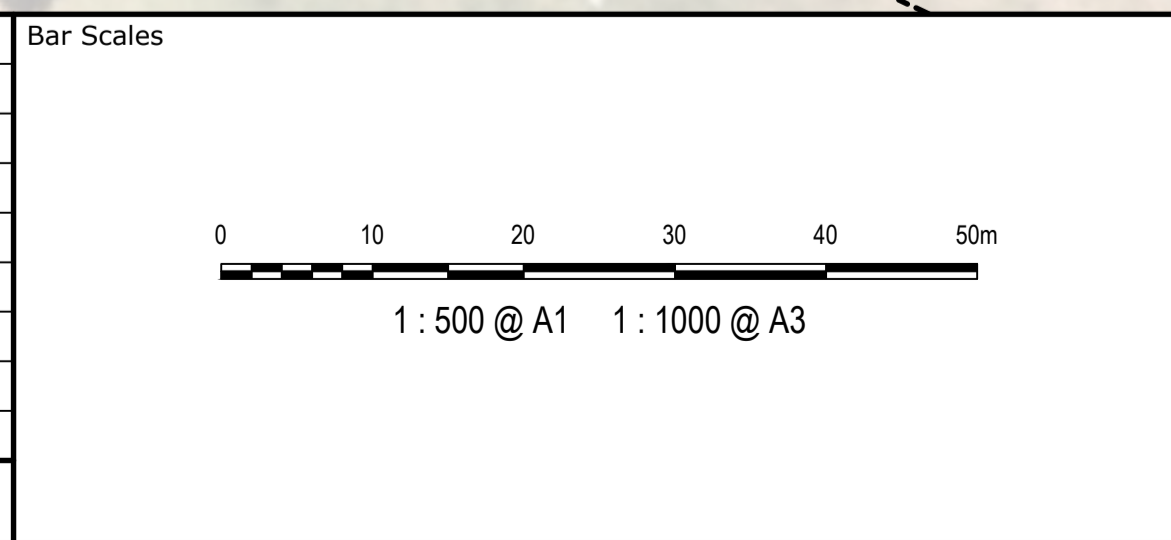


**LEGEND**  
 EXTENT OF WORKS

# STAGE 1

NOTE: EXTENTS ARE INDICATIVE - FINAL EXTENTS SUBJECT TO AUTHORITY APPROVAL

Issue	Description	Date
11	STAGE 5 90% DETAILED DESIGN ISSUE	22-08-23
10	STAGE 5 90% DETAILED DESIGN ISSUE	11-07-23
11	STAGE 3 100% DETAILED DESIGN ISSUE	03-03-23
10	100% DETAILED DESIGN ISSUE - TNSW REVIEW	27-10-22
9	ISSUED FOR INFORMATION	17-10-22
8	90% DETAILED DESIGN ISSUE - TNSW REVIEW	05-07-22
7	90% DETAILED DESIGN ISSUE - PVINSW REVIEW	10-06-22
6	ISSUED FOR COUNCIL APPROVAL	24-02-22
5	ISSUED FOR REVIEW	18-02-22



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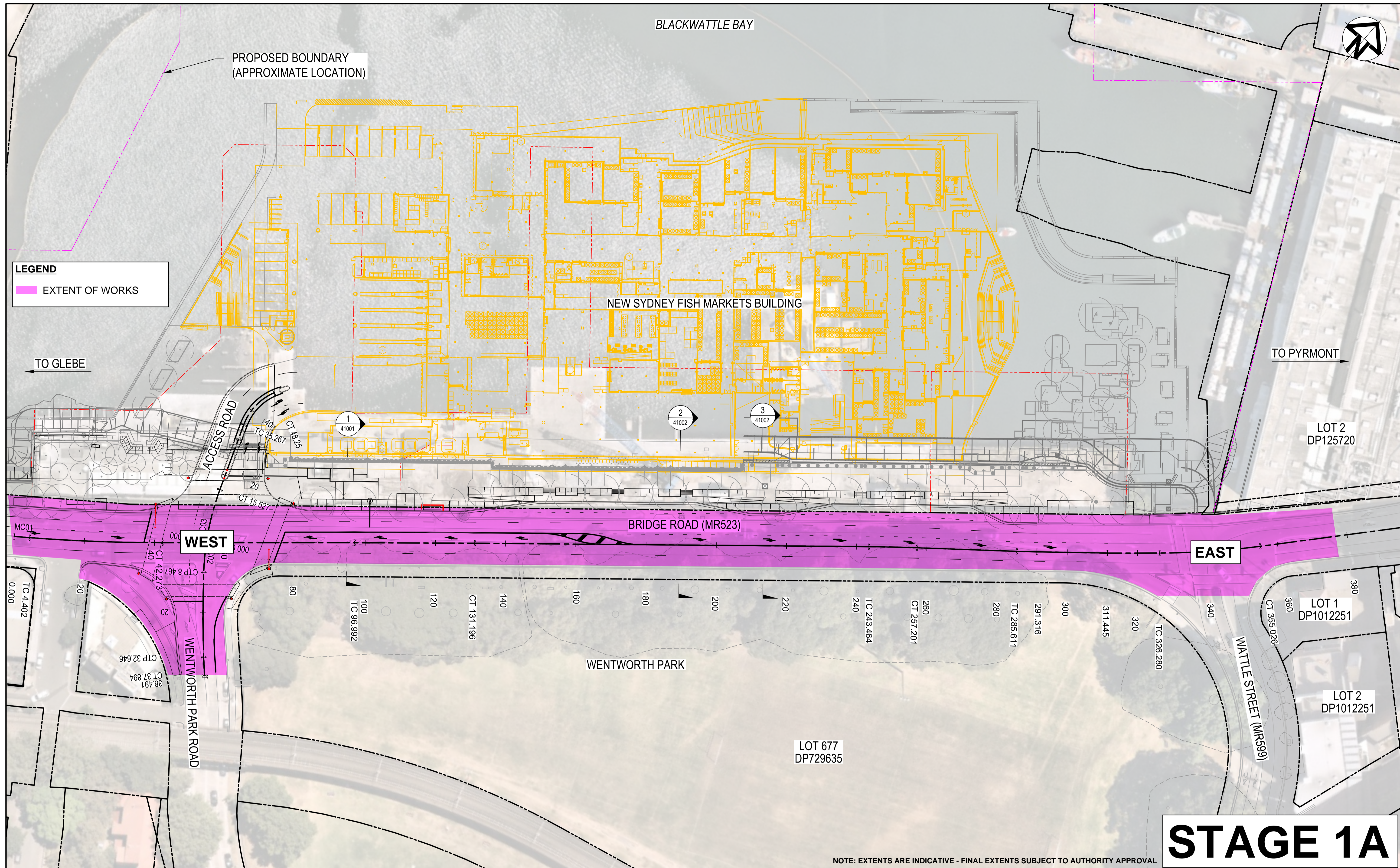
Project  
 SYDNEY FISH MARKETS  
 BRIDGE ROAD, GLEBE

Title  
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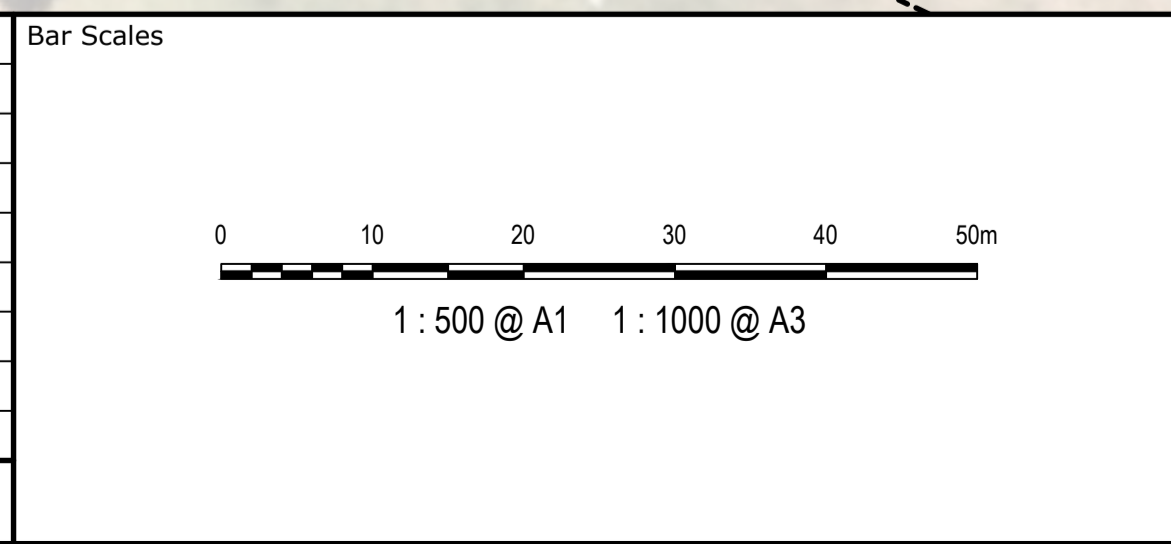


**LEGEND**  
 EXTENT OF WORKS

# STAGE 1A

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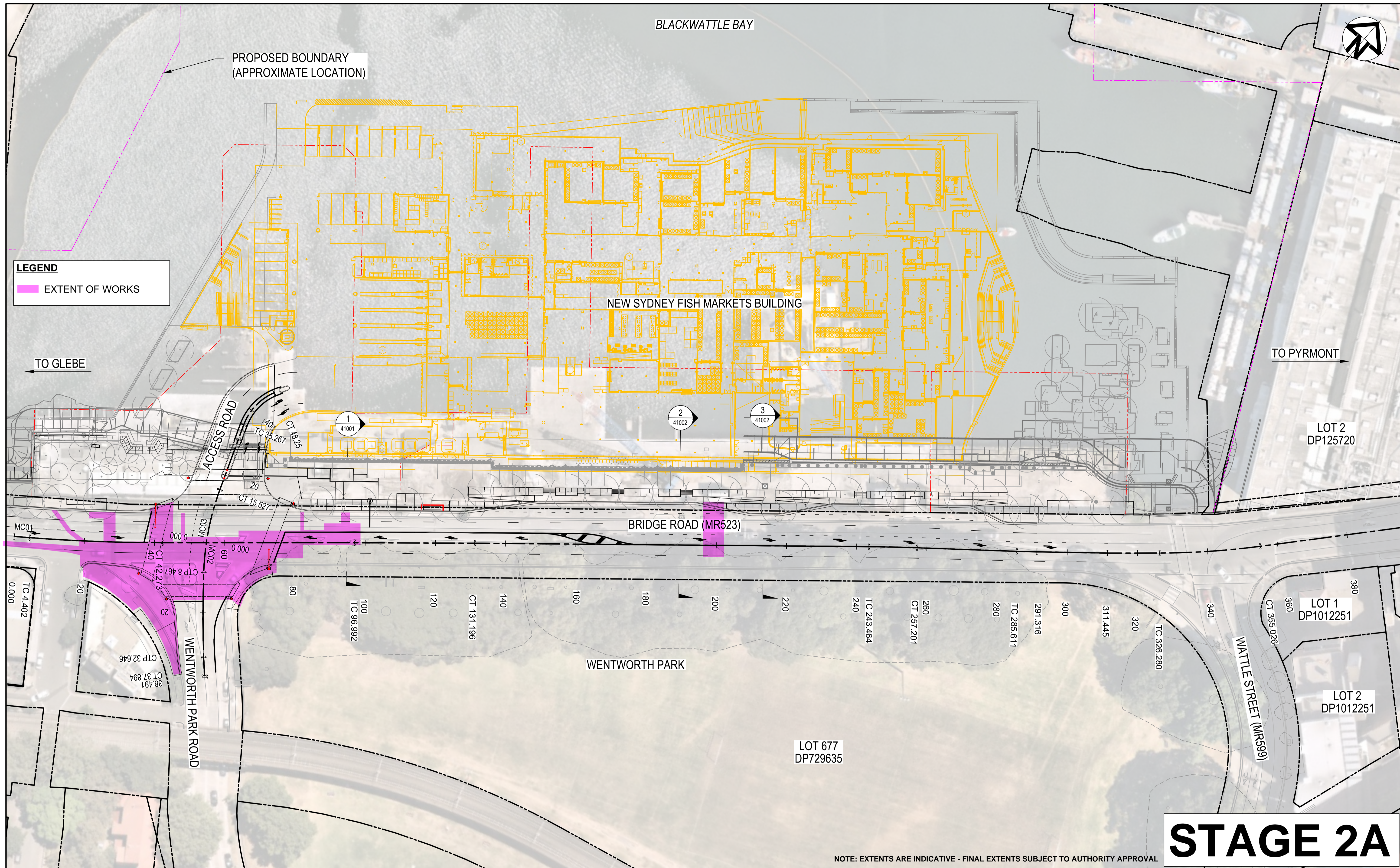
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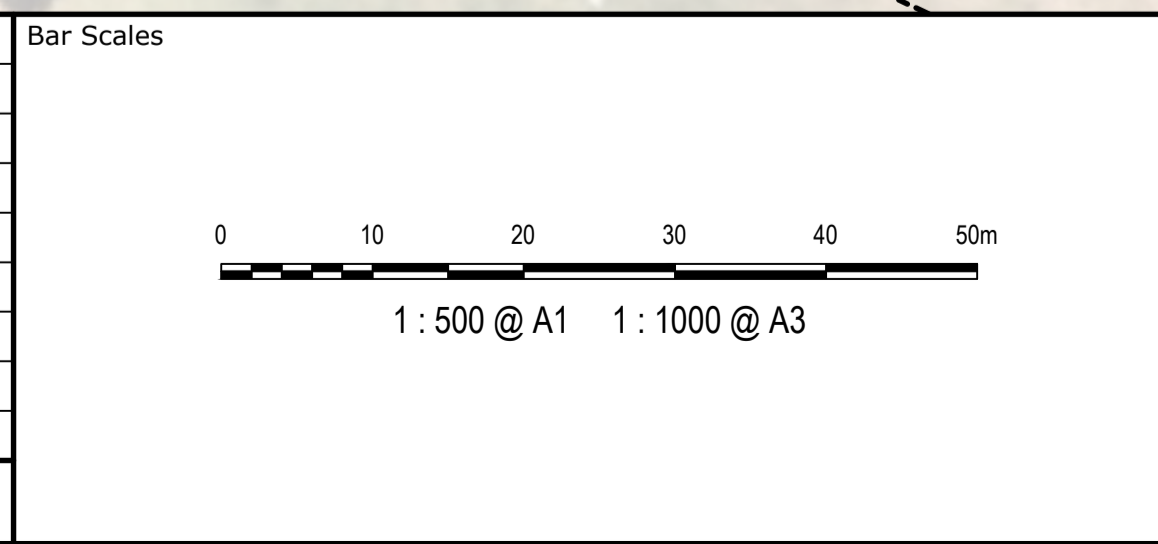
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# STAGE 2A

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10	STAGE 5 90% DETAILED DESIGN ISSUE	11-07-23
11	STAGE 3 100% DETAILED DESIGN ISSUE	03-03-23
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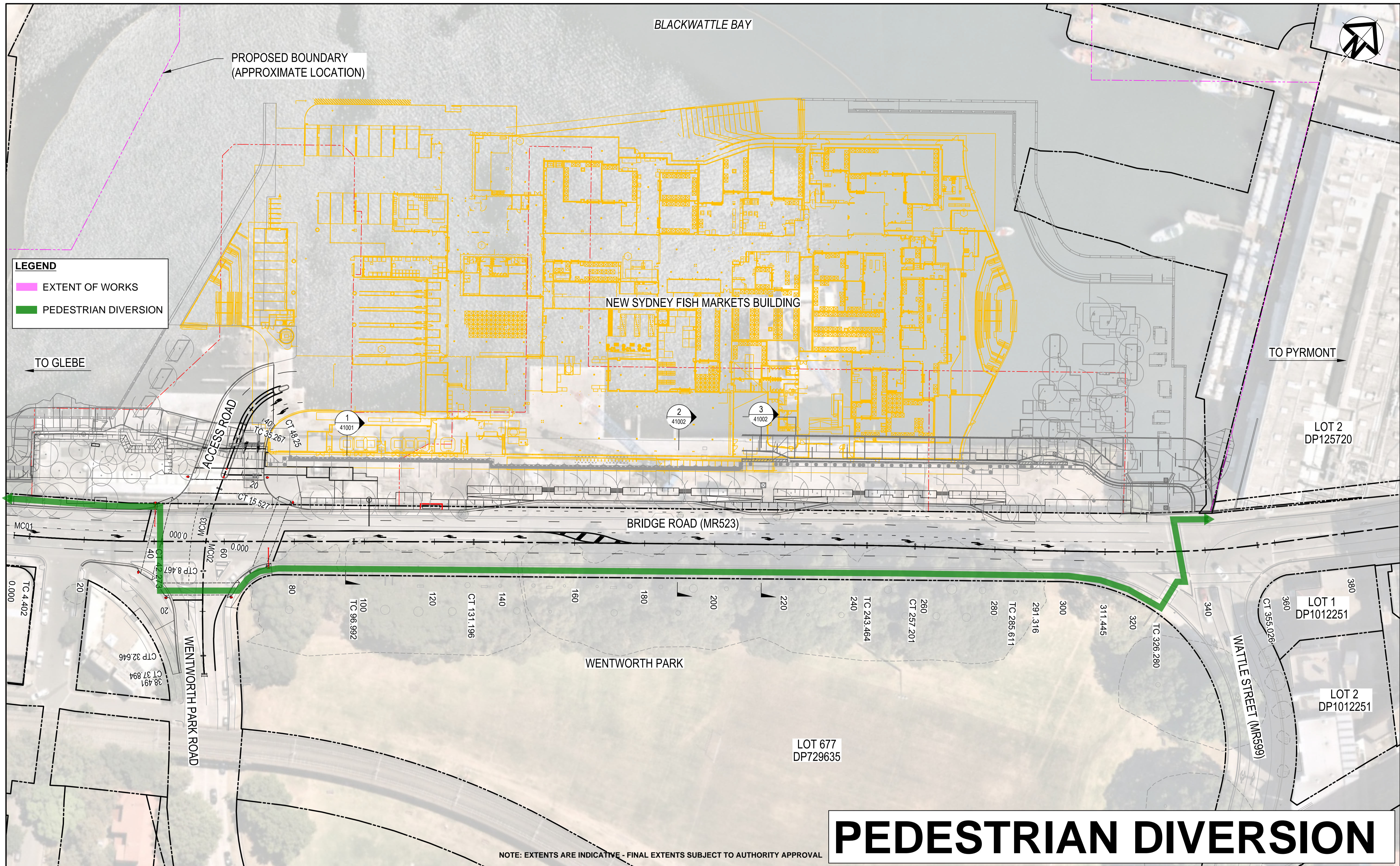
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Title	OVERALL PLAN

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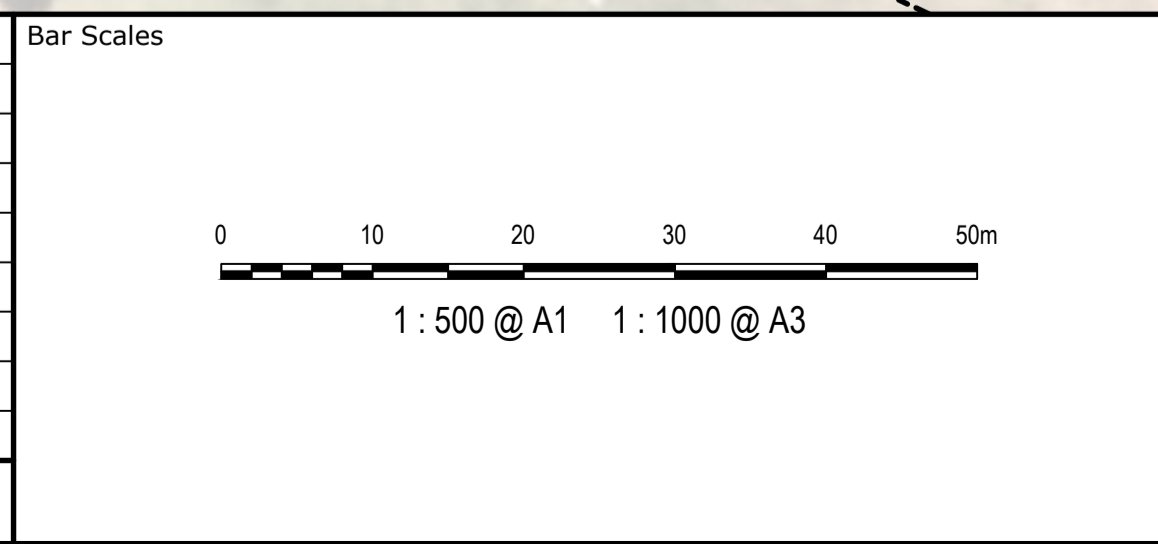
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# PEDESTRIAN DIVERSION

Issue	Description	Date
11	STAGE 5 90% DETAILED DESIGN ISSUE	22-08-23
10	STAGE 5 90% DETAILED DESIGN ISSUE	11-07-23
11	STAGE 3 100% DETAILED DESIGN ISSUE	03-03-23
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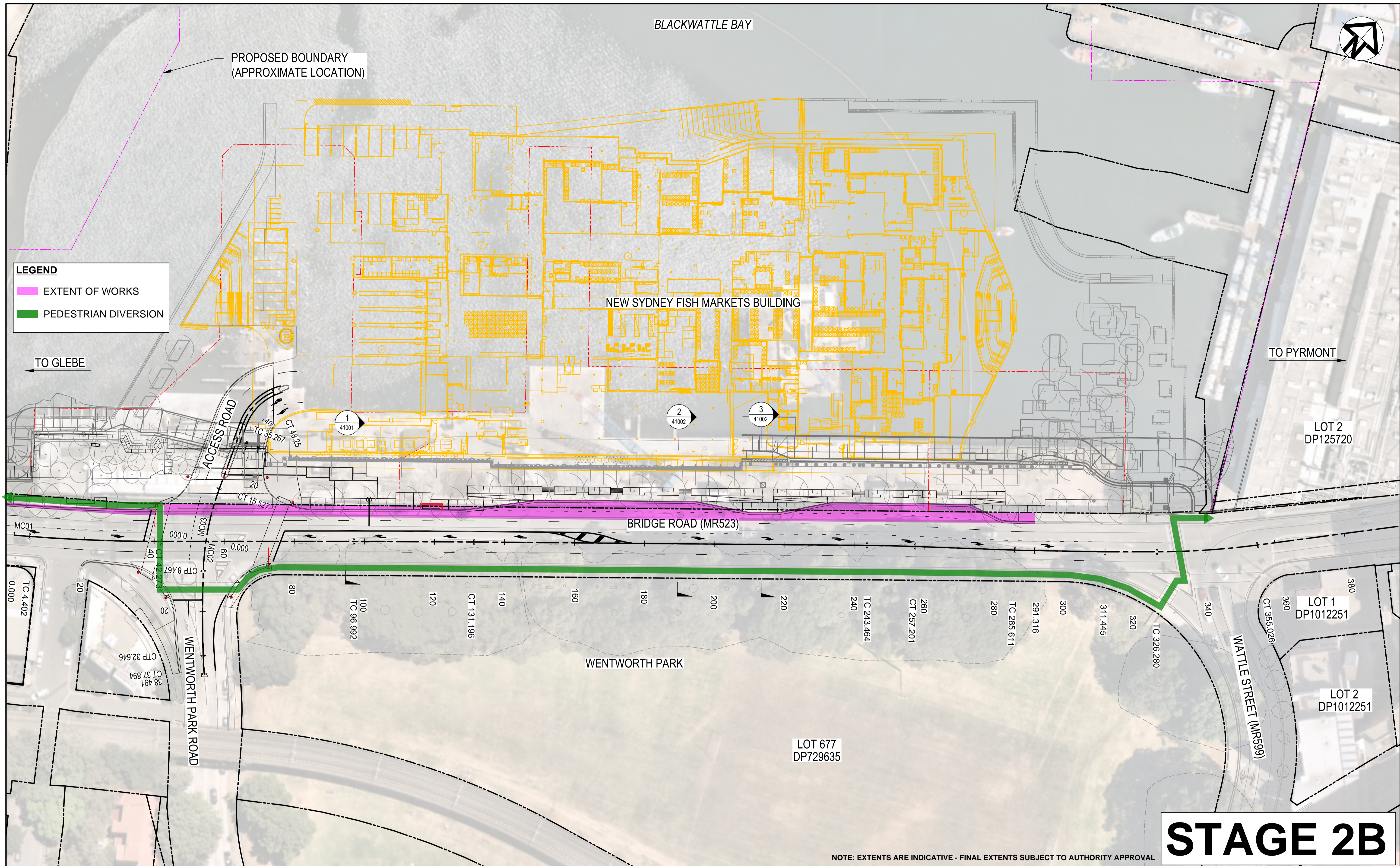
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Title	OVERALL PLAN

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		11



**LEGEND**

- EXTENT OF WORKS
- PEDESTRIAN DIVERSION

TO GLEBE

TO PYRMONT

LOT 2  
DP125720

BRIDGE ROAD (MR523)

WENTWORTH PARK

LOT 677  
DP729635

LOT 1  
DP1012251

LOT 2  
DP1012251

# STAGE 2B

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Issue	Description	Date
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11	STAGE 3 100% DETAILED DESIGN ISSUE	03-03-23
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Project

SYDNEY FISH MARKETS  
BRIDGE ROAD, GLEBE

Title

OVERALL PLAN

Civil Engineers and Project Managers

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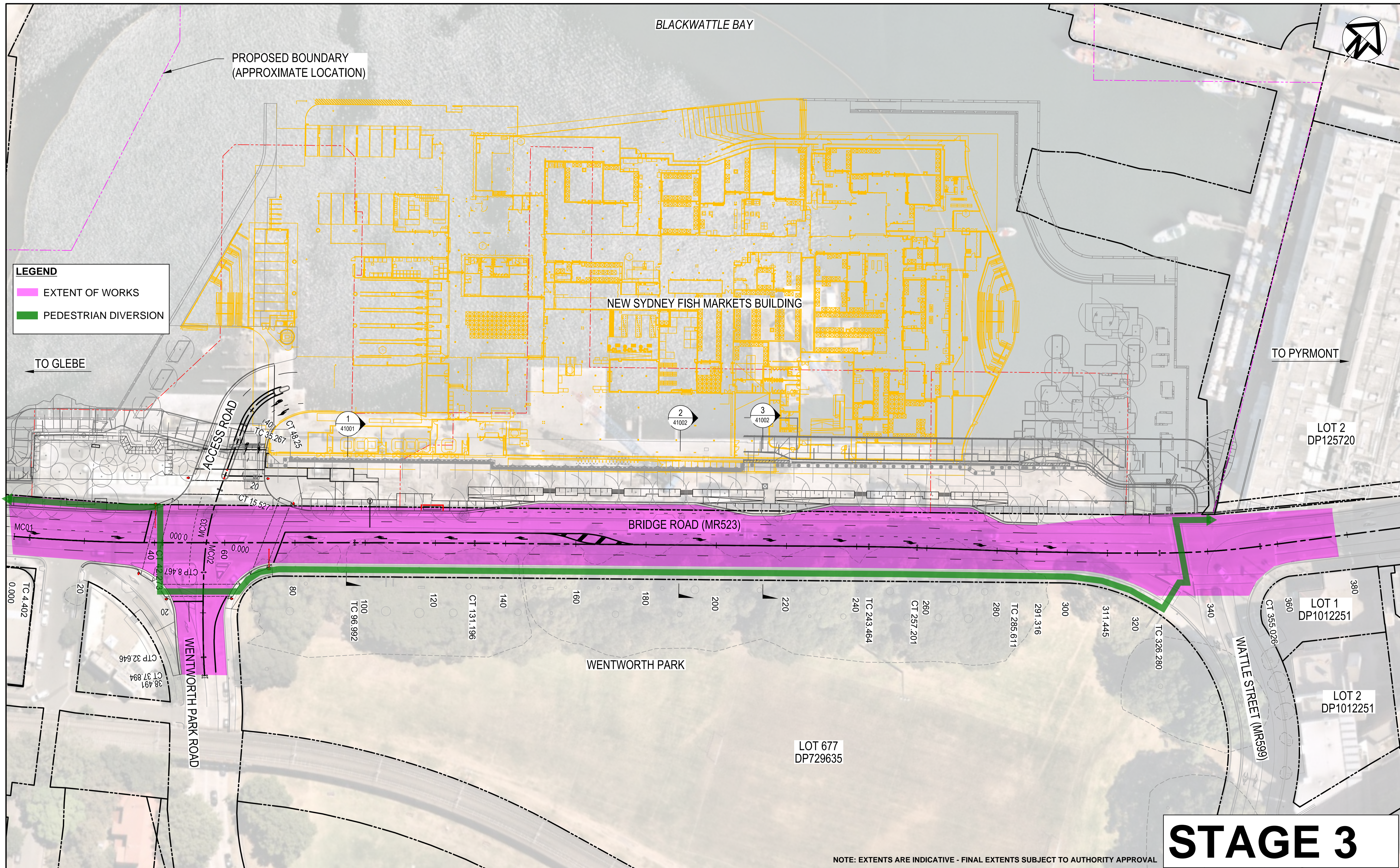
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Issue

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**LEGEND**

- EXTENT OF WORKS
- PEDESTRIAN DIVERSION

# STAGE 3

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11	STAGE 5 90% DETAILED DESIGN ISSUE	22-08-23
10	STAGE 5 90% DETAILED DESIGN ISSUE	11-07-23
11	STAGE 3 100% DETAILED DESIGN ISSUE	03-03-23
10	100% DETAILED DESIGN ISSUE - TNSW REVIEW	27-10-22
9	ISSUED FOR INFORMATION	17-10-22
8	90% DETAILED DESIGN ISSUE - TNSW REVIEW	05-07-22
7	90% DETAILED DESIGN ISSUE - PVINSW REVIEW	10-06-22
6	ISSUED FOR COUNCIL APPROVAL	24-02-22
5	ISSUED FOR REVIEW	18-02-22

Bar Scales

1 : 500 @ A1    1 : 1000 @ A3

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Client

## MULTIPLEX

Scales	1:500	Drawn	GB
Grid	MGA (GDA94)	Designed	GB
Height Datum	AHD	Checked	PW
RMS Registration Number	DS2021/000232	Approved	

Project

**SYDNEY FISH MARKETS  
BRIDGE ROAD, GLEBE**

Title

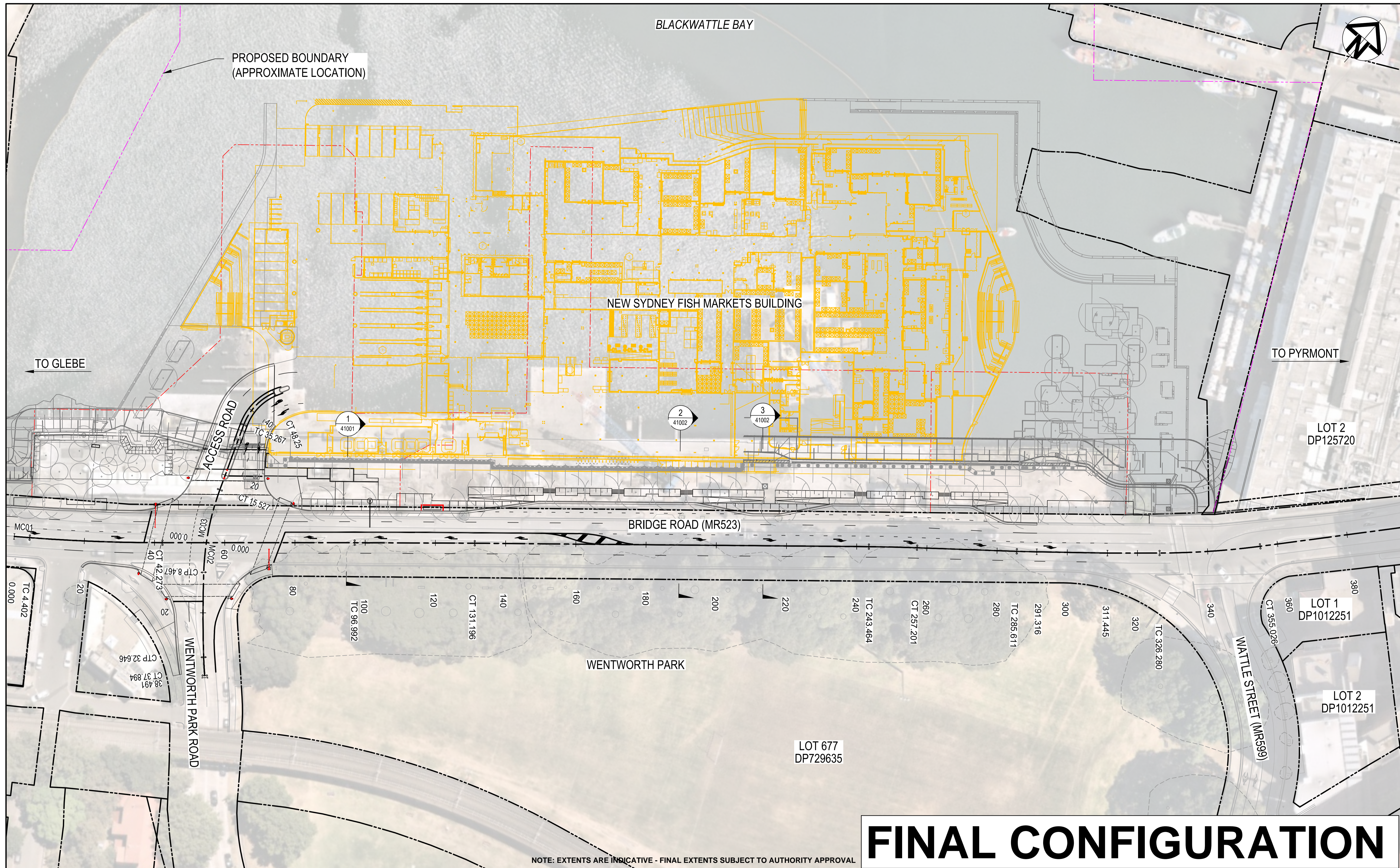
**OVERALL PLAN**

Civil Engineers and Project Managers

## at&l

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North Sydney NSW 2060  
ABN 96 130 882 405  
Tel: 02 9439 1777  
Fax: 02 9923 1055  
www.atl.net.au  
info@atl.net.au

Status	90% DETAILED DESIGN NOT FOR CONSTRUCTION	A1
Project - Drawing No.	ATL-CV-40011	Issue
		11



NOTE: EXTENTS ARE INDICATIVE - FINAL EXTENTS SUBJECT TO AUTHORITY APPROVAL

# FINAL CONFIGURATION

Issue	Description	Date
11	STAGE 5 90% DETAILED DESIGN ISSUE	22-08-23
10	STAGE 5 90% DETAILED DESIGN ISSUE	11-07-23
11	STAGE 3 100% DETAILED DESIGN ISSUE	03-03-23
10	100% DETAILED DESIGN ISSUE - TNSW REVIEW	27-10-22
9	ISSUED FOR INFORMATION	17-10-22
8	90% DETAILED DESIGN ISSUE - TNSW REVIEW	05-07-22
7	90% DETAILED DESIGN ISSUE - PVNSW REVIEW	10-06-22
6	ISSUED FOR COUNCIL APPROVAL	24-02-22
5	ISSUED FOR REVIEW	18-02-22

Bar Scales

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Client

Scales	1:500	Drawn	GB
Grid	MGA (GDA94)	Designed	GB
Height Datum	AHD	Checked	PW
RMS Registration Number	DS2021/000232		

Project	SYDNEY FISH MARKETS BRIDGE ROAD, GLEBE
Title	OVERALL PLAN

Civil Engineers and Project Managers

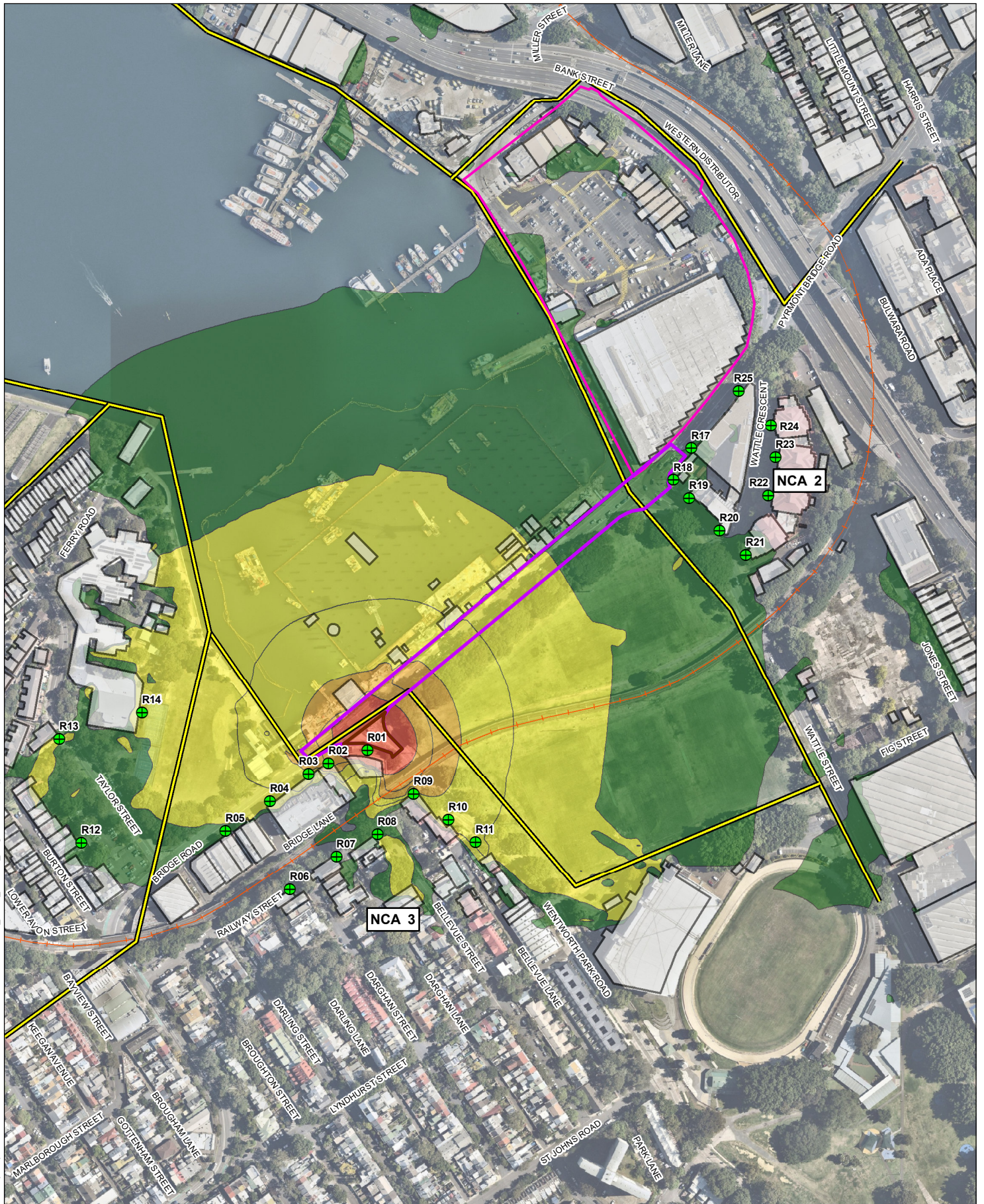
Level 7, 153 Walker Street  
North Sydney NSW 2060  
ABN 96 130 882 405  
Tel: 02 9439 1777  
Fax: 02 9923 1055  
www.atl.net.au  
info@atl.net.au


Status	90% DETAILED DESIGN NOT FOR CONSTRUCTION	A1
Project - Drawing No.	ATL-CV-40011	Issue
		11








# Appendix C:





## Contour Plots of $L_{Aeq}$ Noise Level Predictions

H:\Projects-SLR\610-Sr\Sr\610-SYD1610-30264-00000-New Sydney Fish Markets\06-SLR Data\01-CAD\GIS\GIS\SLR\61030264\_Noise\_Contour\_Stage 1A West Representative SWL 118.mxd



 0 50 100 m  
 Coordinate System: GDA 1994 MGA Zone 56  
 Scale: 1:4,000 at A4  
 Project Number: 610.30264  
 Date: 06-Feb-2024  
 Drawn by: AS

-  Receivers
-  Noise Catchment Area Boundary
-  Light Rail
-  Extent of Works
-  Stage Work Boundary
-  Existing Sydney Fish Markets
-  Buildings

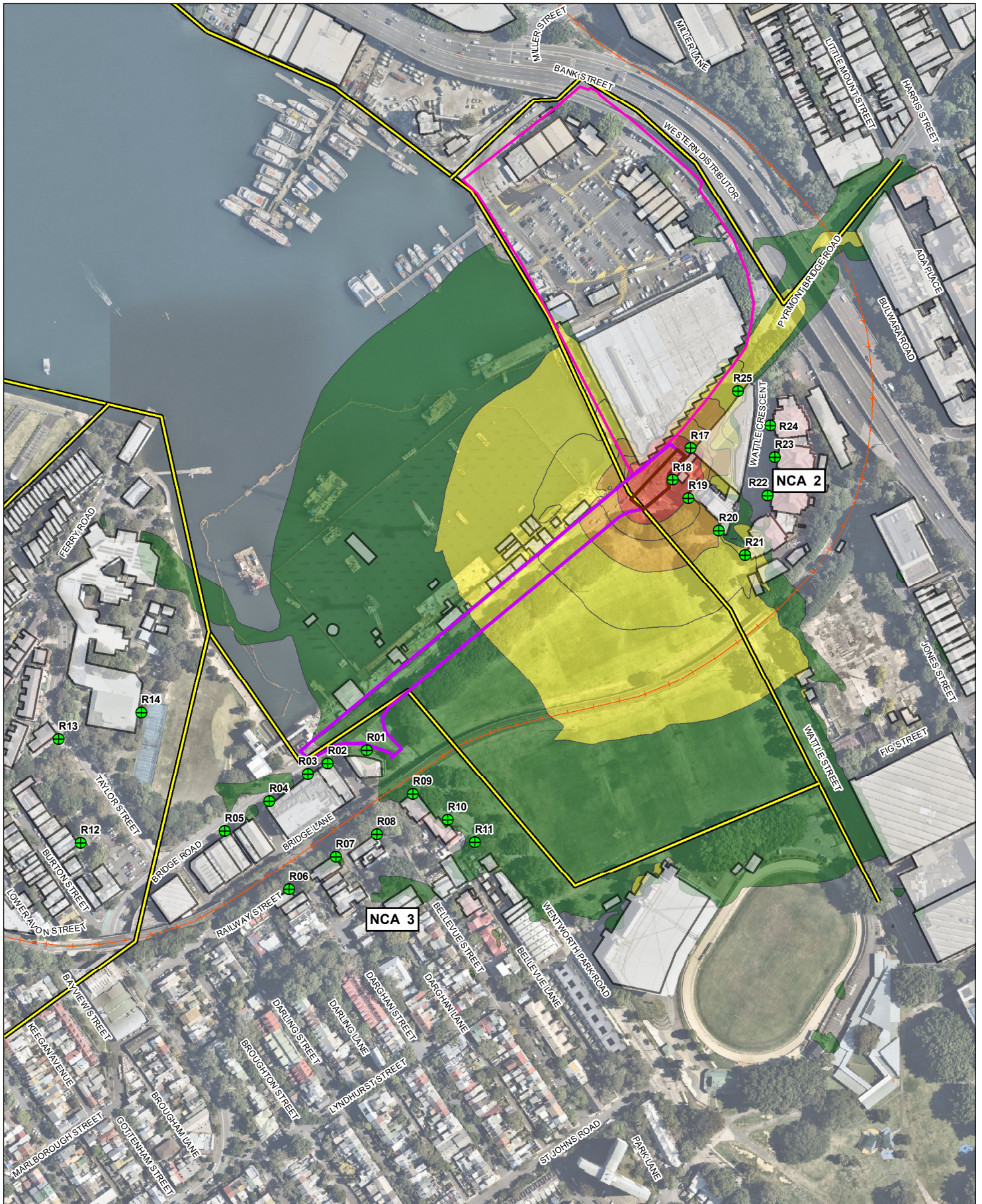
- Predicted Noise Levels**
-  55 - 60 dBA (Noticeable)
  -  60 - 70 dBA (Clearly Audible)
  -  70 - 80 dBA (Moderate Intrusive)
  -  > 80 dBA (Highly Intrusive)


## SYDNEY FISH MARKET NOISE ASSESSMENT

**STAGE 1A- WESTERN  
REPRESENTATIVE  
SWL 118 dBA**







H:\Projects-SLR\610-Sr\Sr\610-SYD\610-30264-00000-New Sydney Fish Markets\06-SLR Data\01-CAD\GIS\GIS\SLR\610\030264\_Noise\_Contour\_Stage 1A\_East Representative SWL 118.dwg



 0 50 100 m  
 Coordinate System: GDA 1994 MGA Zone 56  
 Scale: 1:4,000 at A4  
 Project Number: 610.30264  
 Date: 06-Feb-2024  
 Drawn by: AS

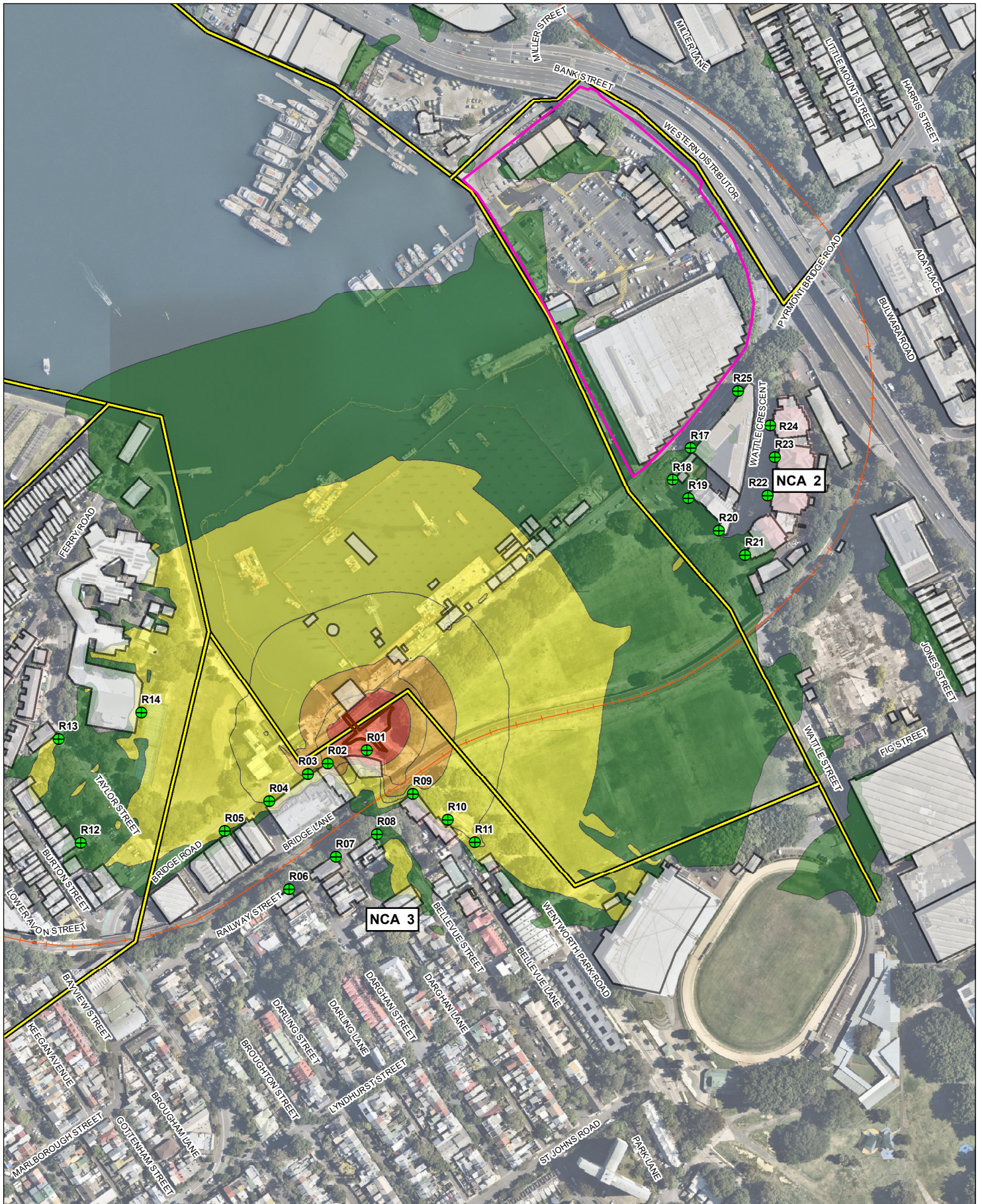
-  Receivers
-  Noise Catchment Area Boundary
-  Light Rail
-  Extent of Works
-  Stage Work Boundary
-  Existing Sydney Fish Markets
-  Buildings

- Predicted Noise Levels**
-  55 - 60 dBA (Noticeable)
  -  60 - 70 dBA (Clearly Audible)
  -  70 - 80 dBA (Moderate Intrusive)
  -  > 80 dBA (Highly Intrusive)


**SYDNEY FISH MARKET  
NOISE ASSESSMENT**







**STAGE 1A- EASTERN  
REPRESENTATIVE  
SWL 118 dBA**









H:\Projects\SLR\610\SYD\610\_30264\_00000 - New Sydney Fish Markets\06\_SLR Data\01\_CAD\GIS\GIS\SLR\610\_30264\_Noise\_Contour\_Stage 2A\_Representative\_SWL 118.dwg

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 Scale: 1:4,000 at A4  
 Project Number: 610.30264  
 Date: 06-Feb-2024  
 Drawn by: AS

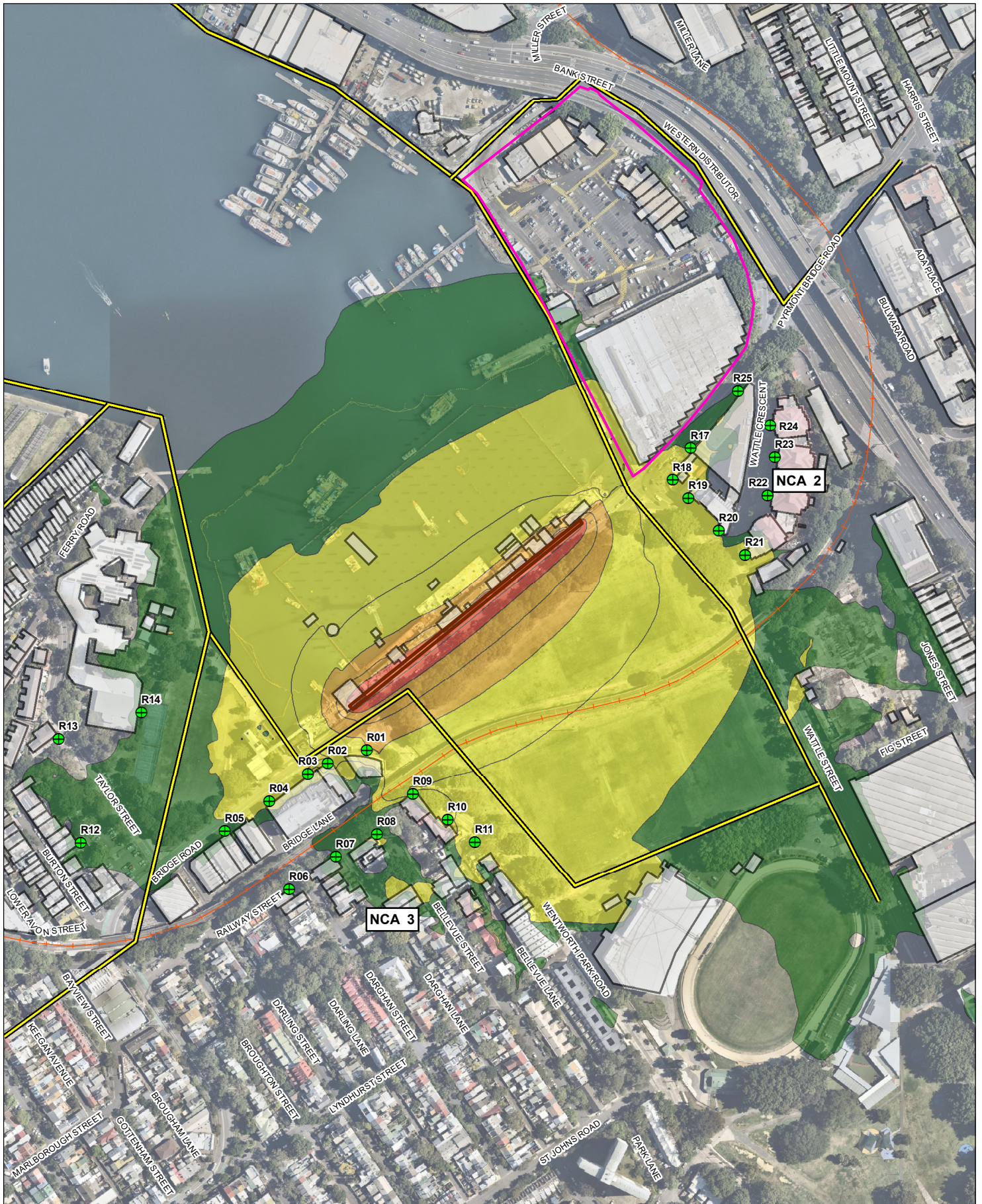
-  Receivers
-  Noise Catchment Area Boundary
-  Light Rail
-  Extent of Works
-  Existing Sydney Fish Markets
-  Buildings

- Predicted Noise Levels**
-  55 - 60 dBA (Noticeable)
  -  60 - 70 dBA (Clearly Audible)
  -  70 - 80 dBA (Moderate Intrusive)
  -  > 80 dBA (Highly Intrusive)


**SYDNEY FISH MARKET  
NOISE ASSESSMENT**







**STAGE 2A  
REPRESENTATIVE  
SWL 118 dBA**









H:\Projects\SLR\610-Sr\Sr\610-SYD\610-30264\_00000-New Sydney Fish Markets\06\_SLR Data\01\_CAD\GIS\GIS\SLR\610\030264\_Noise\_Contour\_Stage 2B\_Representative\_SWL\_118.mxd

 0 50 100 m  
 Coordinate System: GDA 1994 MGA Zone 56  
 Scale: 1:4,000 at A4  
 Project Number: 610.30264  
 Date: 06-Feb-2024  
 Drawn by: AS

-  Receivers
-  Noise Catchment Area Boundary
-  Light Rail
-  Extent of Works
-  Existing Sydney Fish Markets
-  Buildings

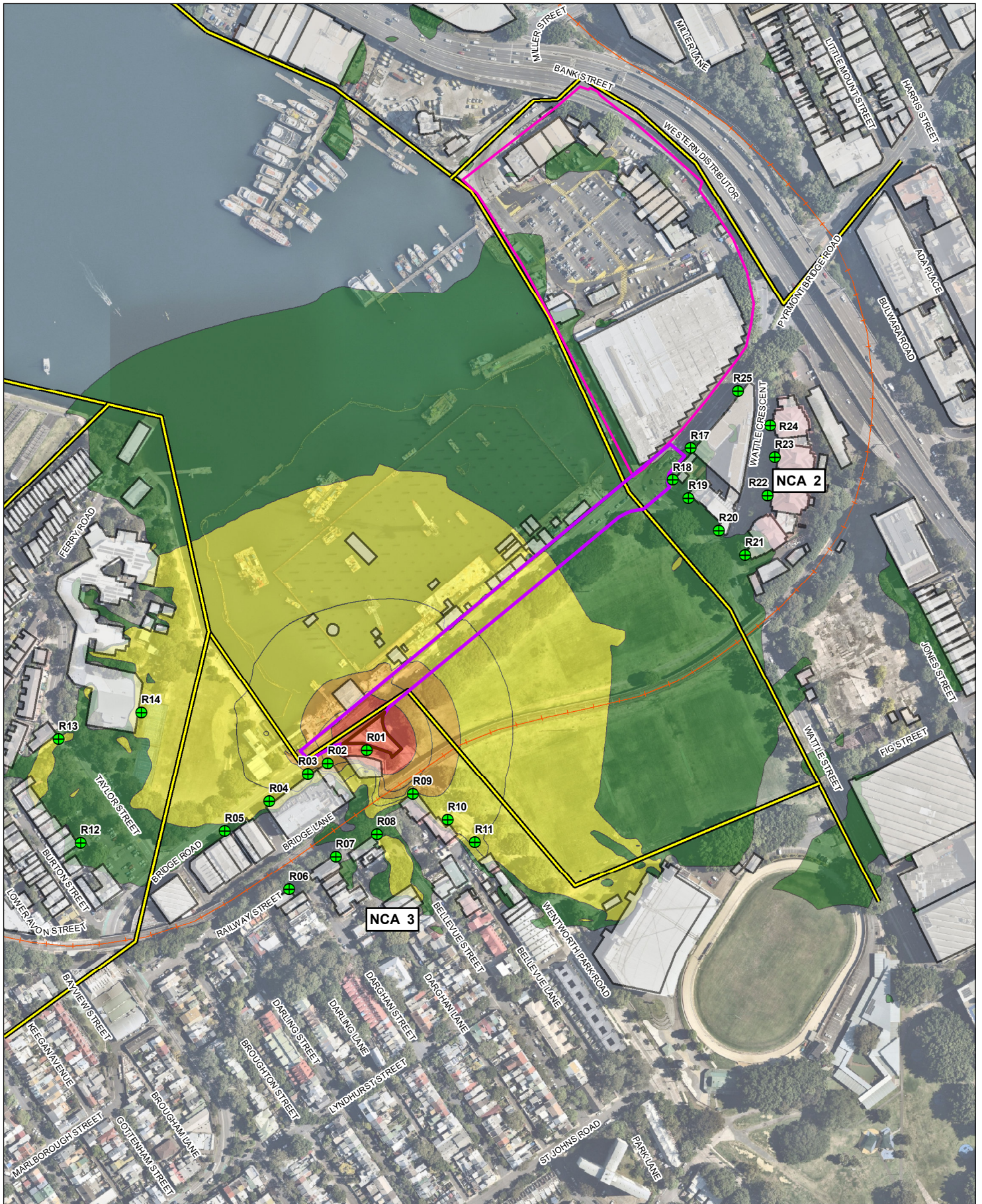
- Predicted Noise Levels**
-  55 - 60 dBA (Noticeable)
  -  60 - 70 dBA (Clearly Audible)
  -  70 - 80 dBA (Moderate Intrusive)
  -  > 80 dBA (Highly Intrusive)


**SYDNEY FISH MARKET  
NOISE ASSESSMENT**

**STAGE 2B  
REPRESENTATIVE  
SWL 118 dBA**







H:\Projects-SLR\610-Sr\SYD\610-30264-00000-New Sydney Fish Markets\06-SLR Data\01-CAD\GIS\SLR\610\030264\_Noise\_Contour\_Stage 3 West Representative SWL 118.mxd



 0 50 100 m  
 Coordinate System: GDA 1994 MGA Zone 56  
 Scale: 1:4,000 at A4  
 Project Number: 610.30264  
 Date: 06-Feb-2024  
 Drawn by: AS

-  Receivers
-  Noise Catchment Area Boundary
-  Light Rail
-  Extent of Works
-  Stage Work Boundary
-  Existing Sydney Fish Markets
-  Buildings

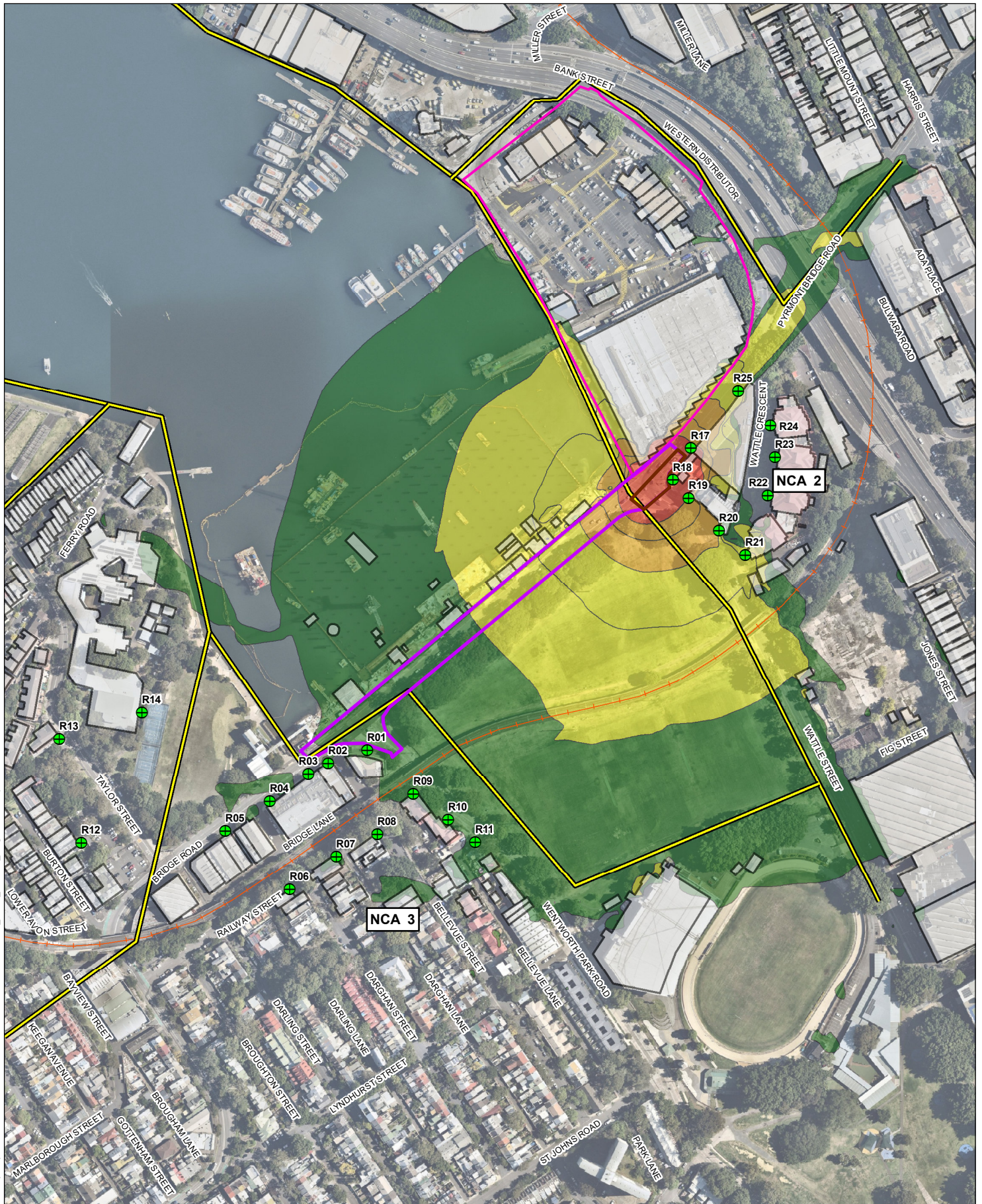
- Predicted Noise Levels**
-  55 - 60 dBA (Noticeable)
  -  60 - 70 dBA (Clearly Audible)
  -  70 - 80 dBA (Moderate Intrusive)
  -  > 80 dBA (Highly Intrusive)


**SYDNEY FISH MARKET  
NOISE ASSESSMENT**

**STAGE 3- WESTERN  
REPRESENTATIVE  
SWL 118 dBA**







H:\Projects-SLR\610-Sr\SYD\610-30264-00000-New Sydney Fish Markets\06-SLR Data\01-CAD\GIS\GIS\SLR\61030264\_Noise\_Contour\_Stage 3\_East Representative SWL 118.mxd



 0 50 100 m  
 Coordinate System: GDA 1994 MGA Zone 56  
 Scale: 1:4,000 at A4  
 Project Number: 610.30264  
 Date: 06-Feb-2024  
 Drawn by: AS

-  Receivers
-  Noise Catchment Area Boundary
-  Light Rail
-  Extent of Works
-  Stage Work Boundary
-  Existing Sydney Fish Markets
-  Buildings

- Predicted Noise Levels**
-  55 - 60 dBA (Noticeable)
  -  60 - 70 dBA (Clearly Audible)
  -  70 - 80 dBA (Moderate Intrusive)
  -  > 80 dBA (Highly Intrusive)

**SYDNEY FISH MARKET  
NOISE ASSESSMENT**

**STAGE 3- EASTERN  
REPRESENTATIVE  
SWL 118 dBA**



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