Southwest Metro – Southwest Metro Conversion and Station Works Package 3

Noise and Vibration Management Plan

Sydney Metro Integrated Management System (IMS)

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NOTE - This Noise and Vibration Management Plan was prepared by Sydney Metro for the purposes of a previous planned procurement for the Southwest Metro project in the first instance. In the second instance JHLORJV have updated this Noise and Vibration Management Plan Construction to be specific to the SWM3 scope of works.

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00	04/06/2024	Submitted to Sydney Metro and ER
01	23/07/2024	Updated with Sydney Metro and ER comments
02	21/08/2024	JHLORJV transferred to new template, updated with ER comments. Updated with comments following Consultation with IWC and CBCC.
03	12/09/2024	Response to DPHI comments
04	27/02/2024	Update to CNVIS to include Dynamic Train testing as a construction activity for MTR as an Interface Contractor implementing the Approved SWM3 CEMP & Sub Plan
05	15/06/2025	Update Appendix B- Land Use Survey and S 7.2 with new Appendix H Site request form

Terms and Definitions

Terms	Definitions
AMM	Additional Mitigation Measures
AS	Australian Standard
AVTG	NSW EPA Assessing Vibration – a Technical Guideline
CEMF	Construction Environmental Management Framework
CEMP	Construction Environmental Management Plan
CNVIS	Construction Noise and Vibration Impact Strategy
CNVS	Sydney Metro Construction Noise and Vibration Strategy (2016)
CoA	Conditions of Approval
CSSI	Critical State Significant Infrastructure
CTMP	Construction Traffic Management Plan
dB	Decibels, used to express sound power or pressure level and vibration velocity or acceleration
dB(A)	A-weighted decibel (sound or vibration)
DECC	NSW Department of Environment and Climate Change (now OEH)
DPHI	Department of Planning, Industry and Environment
ECM	Environmental Control Map
EIS	Environmental Impact Statement
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW)
EPA	NSW Environment Protection Authority
EPL	Environment Protection Licence under the POEO Act
ER	Environmental Representative
Frequency	Repetition of a sound or vibration wave, measured in Hertz (Hz), or cycles per second
HMP	Heritage Management Plan
HNA	Highly Noise Affected
ICNG	NSW EPA Interim Construction Noise Guideline
IMS	Sydney Metro Integrated Management System
ISO	International Standardization Organisation
I&S	TfNSW Infrastructure and Services
IWC	Inner West Council
$LA_{1(period)}$	A-weighted sound pressure level that is exceeded 1% of the measurement period
$LA_{90(period)}$	A-weighted sound pressure level that is exceeded 90% of the measurement period, used to derive background noise levels
$LA_{eq(period)}$	A-weighted sound pressure level, energy average over the measurement period
Minister, the	The Minister of New South Wales (NSW) Planning
NML	Noise Management Level
NPfI	Noise Policy for Industry (NSW EPA, 2017)
NSW	New South Wales
NVMP	Noise and Vibration Management Plan

Terms	Definitions
OOHW	Out-of-Hour Works
POEO Act	Protection of the Environment Operations Act 1997 (NSW)
PPV	Peak Particle Velocity (vibration)
Proponent	The person or organisation identified as the proponent in Schedule 1 of the planning approval. In this case Transport for NSW
RBL	Rating Background Level
REMM	Revised Environmental Mitigation Measure
RMS	Roads and Maritime Services
r.m.s.	Root Mean Square (acoustics, noise and vibration)
RNP	NSW EPA Road Noise Policy
Secretary	The Secretary of the Department of Planning, Industry and Environment
SLR	SLR Consulting Australia
SM	Sydney Metro
SPIR	Submissions and Preferred Infrastructure Report
SPL	Sound Pressure Level
SSI	State Significant Infrastructure
SWL	Sound Power Level
TfNSW	Transport for New South Wales
VC	Vibration Criteria
VDV	Vibration Dose Value
VML	Vibration Management Level

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Glossary of Acoustic Terms

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph below, are here defined.

Maximum Noise Level (L_{Amax}) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

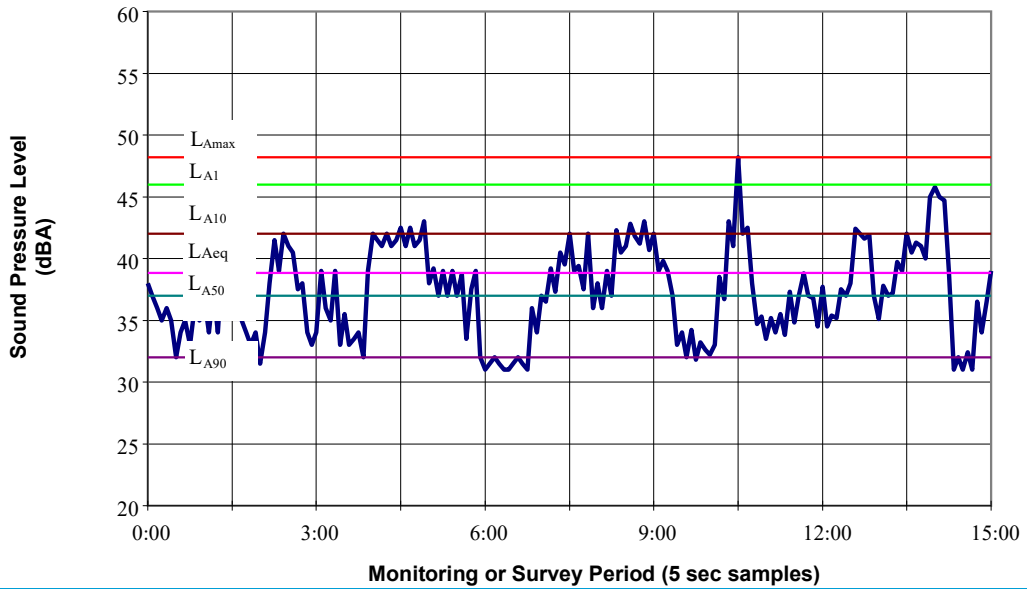
L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level (L_{A90}) for each period.

RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.

Typical Graph of Sound Pressure Level vs Time



1. Introduction

1.1. Context and scope of this Sub-plan

This Noise and Vibration Management Plan (NVMP or Plan) forms part of the Construction Environmental Management Plan (CEMP) for Sydenham to Bankstown Metro Conversion and Station Works Package 3 (SWM3 -the Project)

This NVMP has been prepared to address requirements of the State Significant Infrastructure (SSI) 8256 Conditions of Approval (CoA), the Revised Environmental Mitigation Measures (REMM), the Project's Submissions and Preferred Infrastructure Report (SPIR) and the Sydney Metro Construction Environmental Management Framework (CEMF).

This NVMP describes how JHLORJV and Interface Contractors (ICs) working under the approved CEMP & Sub Plans proposes to manage noise and vibration during the construction of the Project. The acronym JHLORJV here on in will be used synonymously for both JHLORJV and ICs. Operational management measures do not fall within the scope of this Plan and therefore are not included.

This NVMP forms part of the suite of construction noise and vibration documents aiming to achieve the above objectives. The NVMP:

- Applies the Sydney Metro Construction Noise and Vibration Strategy (CNVS, 2016) during the construction phase of the Project;
- Applies the SSI 8256 CoA for the Project;
- Applies the principles of the NSW EPA Interim Construction Noise Guideline (ICNG, 2009); and
- Considers the interaction of Conditions of Approval including the Sydney Metro OOH Protocol and any applicable conditions within an Environmental Protection Licence (EPL) 21147 or other.

This NVMP summarises the requirements from the documents listed above and explains how they are to be applied in practice for the proposed SWM3 works.

This NVMP is supplemented by a Construction Noise and Vibration Impact Statement (CNVIS) refer to Appendix D, which provides a detailed description of the proposed works and the predicted noise and vibration impacts for each site.

The NVMP and the associated CNVIS share the main objectives of the ICNG Section 1.3, a portion of which is presented below:

> *"The main objectives of the Guideline are to:*
>
> - *promote a clear understanding of ways to identify and minimise noise from construction works*
> - *focus on applying all 'feasible' and 'reasonable' work practices to minimise construction noise impacts*
> - *encourage construction to be undertaken only during the recommended standard hours unless approval is given for works that cannot be undertaken during these hours*
> - *streamline the assessment and approval stages and reduce time spent dealing with complaints at the project implementation stage*

- *provide flexibility in selecting site-specific feasible and reasonable work practices in order to minimise noise impacts."*

The NVMP and CNVIS:

- Identify sensitive receivers and noise and vibration management levels applying at each potentially affected receiver;
- Identify and clarify applicable project-specific construction noise and vibration management requirements under the CoA, Sydney Metro's CNVS and LOR EPL 21147 which may apply;
- Identify the key noise and / or vibration generating construction activities;
- Identify and recommend feasible and reasonable construction noise and vibration mitigation measures (both engineering and management controls);
- Clarify the requirements of Sydney Metro's City and Southwest Out of Hours Works Strategy/Protocol;
- Clarify the requirements for all necessary noise and vibration monitoring;
- Reference applicable Sydney Metro communications strategies and requirements for responding to and effectively addressing any community noise complaints relating to construction noise and / or vibration;
- Outline the requirements for maintaining records for noise and vibration monitoring and for community enquiries and complaints.

1.1.1. Relationship of City with Southwest Project Area

Sydney Metro have prepared a Consistency Assessment in the lead up to the transition from the construction phase to the operational phase of the S2B project titled: Sydenham to Bankstown - Final track configuration works to complete the connection between Marrickville Station and Sydenham Station.

The purpose of the Planning and Consistency Assessment (PACA) is to conduct works outside of the CSSI 8256 Project Area and to present a more detailed understanding of the final track configuration/corridor works between Marrickville Station and Sydenham Station and demonstrate how this scope of works is consistent with the works undertaken under CSSI_8256 Planning Approval.

Both the Chatswood to Sydenham and Sydenham to Bankstown projects include corridor works to connect the two projects at a location near Meeks Road (Figure 2b of this CEMP). Given that the final track configuration/corridor works must be completed in a consistent manner across the C&SW alignment and do not clearly start and stop at the construction boundaries identified in the planning approvals, Sydney Metro is proposing for the S2B contractor to deliver the Corridor works under one planning approval (CSSI_8256) – delivering all the necessary corridor works between Marrickville and Sydenham stations to connect the projects, including works in project areas across both the CSSI_7400 and CSSI_8256.

This CNVMP has included assessment context for NCA 14, 15 & 16 existing noise environment from the Sydenham Station Upgrade Project (SMu) approved under CSSI 7400.

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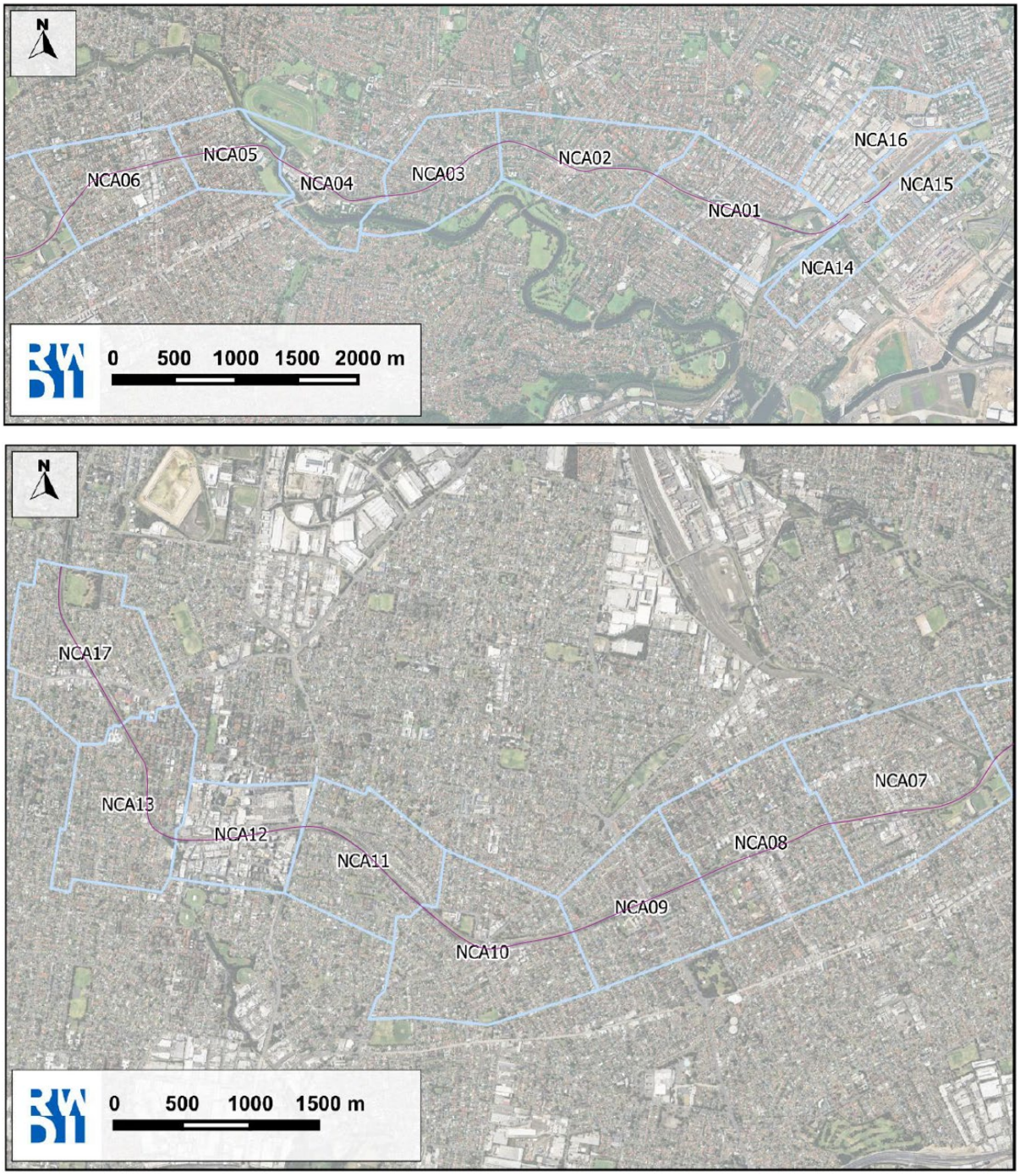

Figure 1: Project site and surrounding area

1.2. Project background

The Sydney Metro City and Southwest - Sydenham to Bankstown Upgrade Environmental Impact Statement (EIS) (GHD/AECOM September 2017) assessed the noise and vibration impacts of construction within Chapter 12 (Construction noise and vibration). The Sydney Metro City and Southwest - Sydenham to Bankstown Upgrade Submissions and Preferred Infrastructure Report (SPIR) (GHD/AECOM June 2018) was prepared in response to the submissions received during the EIS exhibition period. The SPIR revised the scope of the

Sydenham to Bankstown Upgrade project and updated construction noise and vibration assessment was included in SPIR Appendix E.

This CNVMP has been prepared to address the requirements of the Conditions of Approval (CoA), the Revised Environmental Mitigation Measures (REMM) and the Sydney Metro Construction Environmental Management Framework (CEMF).

1.3. Scope of Works

This document refers to the Southwest Metro – Sydenham to Bankstown; Southwest Metro Conversion and Station Works Package Scope 3 (SWM3 the Project). Below is a description of the Construction scope for the Project:

Permanent Works

Bankstown Station and Precinct Works: New, and modification to existing, infrastructure and systems to facilitate a new cross-corridor plaza between The Appian Way (north of the rail corridor) and Restwell Street (south of rail corridor) retail facilities and Station Precinct and Public Domain improvements.

Divided into four Stages of delivery to facilitate:

- **Stage 1: Sydney Trains Bankstown Works** (To enable Sydney Trains 4-Car operation) Separation of the current Sydney Trains line at Bankstown into sections for Sydney Metro and Sydney Trains
- **Stage 2: Sydney Metro Turn back, fencing and rail adjustment** to enable dynamic testing in the Sydney Metro portion
- **Stage 3a: Sydney Trains Bankstown Works** (To enable Sydney Trains 8-Car operation)
    - Bankstown Station Works: extension of the existing platforms further west, a new eastern entrance to Bankstown Station with Gatelines and back of house operational spaces
    - Sydney Trains Corridor: track adjustments, new diamond crossing (or alternative equivalent), OHWS and signalling and rail systems infrastructure to accommodate the modifications to Bankstown Station and continued operations between Bankstown and Yagoona stations

  Stage 3b: Bankstown Metro Works
    - Bankstown Metro Station Works
    - Bankstown Metro Corridor Works
- **Stage 4: all remaining Bankstown Station and Precinct Works,** to achieve the final station and precinct configuration

Southwest Station Work

- Remaining (S2B works from SWMC, BEW, SWM1, SWM2)
    - Remaining South West Metro Corridor Work
        - Segregation Fencing between;
            - Marrickville and Dulwich Hill
            - Hurlstone Park and Canterbury

- Canterbury and Campsie
- Campsie to Belmore

  - Remaining South West Metro Corridor Work Package 2
    - Guard Rail installation various locations along corridor
    - Overhead Wire installation various locations along corridor
    - Station Security Fencing
      - Marrickville
      - Dulwich Hill
      - Canterbury
      - Campsie
      - Belmore
      - Lakemba
      - Wiley Park
      - Punchbowl
    - Segregation Fencing
      - Sydenham
      - Dulwich Hill
      - Campsie
    - Mechanical Gap Filler/Platform Screen Doors- all stations excluding Sydenham and Bankstown (delivered by IC in accordance with the Approved SWM3 CEMP and Sub Plans)
    - Signalling at Sydenham and Bankstown

- Additional (SWM3)

Southwest Corridor Works

- Corridor access stairs
- Screens fixed to CSR on bridges
- Veg management
- Acoustic treatment
- Boundary fencing
- Track monitoring
- Corridor Intrusion Detection System/Object Detection System (CIDS/ODS) (delivered by IC in accordance with the Approved SWM3 CEMP and Sub Plans)

Asset Upgrades

- Infringement and track rectification
- Bridge upgrades renewals
- Civil asset upgrade renewal

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Final Conversions

- Sydenham junction final track configuration, fencing, wayfinding & signage (all stations), BMCS and lift conversions (Marrickville Station to Punchbowl Station)
- Earthing bonding, alteration works, insulated rail joints, redundant asset works
- Clean up work (final rail grind, final rail tamp, station refresh/deep clean)
- Station meal room alterations at 9 stations (excluding Bankstown)
- Fixed gap filler works
- UTO Gate - Cable hauling, cabinet install and terminations, balise removal & re-installation, PEK cable hauling, Testing and Commissioning work (delivered by IC in accordance with the Approved SWM3 CEMP and Sub Plans)

ARTC Works

Temporary and permanent adjustments to ARTC operated and maintained infrastructure

Utility works

- Qenos Pipe removal
- Non Sydney Trains (ST) or Sydney Metro (SM) assets (typically non-contestable works)

Local area works

modification, reinstatement of public space, roads and pedestrian way, required for, or as a consequence of the SWM3 Contractor's Activities

Property works

The Property Works comprises permanent adjustments to existing private properties required for, or as a consequence of the SWM3 Works and Temporary Works

Temporary Works

- Temporary arrangements to divert and control pedestrians, public transport users, cyclists, public transport and traffic and to provide public access, amenity, security and safety during all stages of design and construction of the Works;
- Temporary arrangements for people and vehicles to safely access all property, including publicly accessible space affected by the Contractor's Activities;
- Temporary arrangements for people and vehicles to safely access the Site;
- Temporary access stairs, walkways and platforms within the Site;
- Temporary construction hoardings, fencing, noise walls, access gates, barriers and signage on and around the Site;
- All environmental safeguards and measures necessary to mitigate environmental effects which may arise during the design and construction of the Works;
- Cleaning, maintenance, repair, replacement and reinstatement, as required, of all areas occupied by the Contractor during design and construction of the Works;

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- Temporary site facilities/compounds required for design and construction of the Works (i.e. Canterbury Bowls Club), including set-up and operation;
- Temporary infrastructure, safety screens and ground support installed or erected to undertake design and construction of the Works;
- Temporary arrangements for Utility Services including water, electricity, stormwater, sewerage, gas and electronic communications;
- Temporary power for stations
- Temporary works and measures required as a consequence of requirements arising from the stakeholder and community liaison process; and
- All other temporary works and measures required for the construction of the Works.
- Investigation works including services searching and geotechnical investigations, insitu waste classification along the full alignment from Sydenham to Bankstown.

Temporary Construction facilities to facilitate Construction of the Project would be located at the locations outlined in Table 1. Refer to Figure 2.1 within Appendix B of the SPIR for indicative layouts of these facilities.

MTR Dynamic Train Testing

- T1: Train moving at walking speed
- T2: Train accelerating from 0km/hr to 40km/hr
- T3: Train moving at 100km/hr
- T4: Train moving at 25km/hr
- T5: Train accelerating from 0km/hr to 100km/hr, train decelerating from 100km/hr to 0km/hr

Table 1: Temporary Construction facilities

Temp Facility	EIS/SPIR reference to Compounds* or applicable CoA	Status and expiry
A17 Way Street Ancillary Facility and Laydown	A17	August 2025
A19 Belmore Triangle Minor Ancillary Facility	A19	Currently not in use, however maybe reapplied for as required
A19 Punchbowl Minor Ancillary Facility (Access from The Boulevard, Punchbowl)	A19	Currently not in use, however maybe reapplied for as required

Temp Facility	EIS/SPIR reference to Compounds* or applicable CoA	Status and expiry
A17 Carrington Road Ancillary Facility and Laydown	A17	August 2025
A17 Belmore Triangle (Upper) Ancillary Facility and Laydown	A17	September 2025
A1 Hurlstone Park Ancillary Facility	Compound 4	EIS Approved
A1 Canterbury Station Worksite	Worksite 9	EIS Approved
A1 Belmore Station Compound	Compound 10	EIS Approved
A1 Belmore Bridge Rd	Compound 13	EIS Approved
A1 Wiley Park Station Compound	Compound 4	EIS Approved
A19 Marrickville Ancillary Facility	A19	August 2025
A19 Dulwich Hill Station	A19	August 2025
A1 Lakemba Station Compound	Compound 15/16	EIS Approved
A1 Campsie Compound	Compound 9	EIS Approved
A16 Punchbowl Station	A19	August 2025
A19 Way St Substation	A19	October 2025
A16 Sydney Steel Road	A16	August 2025
A16 Murray Road laydown	A16	August 2025
A19 Sydney Steel Road	A19	August 2025

***Compounds as identified in Figure 9.1 Map 1 to 5, CSSI 8256**

When establishing a construction facility, JHLORJV will consider the requirements of the CEMF, CoA and REMM in developing the layout of the site. Including, but not limited to:

- The location of noise intensive works and 24 hour activities in relation to noise sensitive receivers;
- The location of site access and egress points in relation to noise and light sensitive receivers, especially for sites proposed to be utilised 24 hours per day;
- The use of site buildings to shield noisy activities from receivers;
- The use of noise barriers and / or acoustic sheds where feasible and reasonable for sites proposed to be regularly used outside of daytime hours;

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- Aim to minimise the requirement for reversing, especially of heavy vehicles.

1.4. Objectives and targets

This NVMP provides the basis for the management of construction noise and vibration in order to minimise the risk of impact during works. The objectives and targets of noise and vibration management and mitigation are outlined below:

Table 2: Noise and vibration objectives and targets

Objective	Target
Minimise unreasonable noise and vibration impacts on residents and businesses	Mitigation and management measures adopted in accordance with Section 7. Aim is to achieve Noise and Vibration Management Levels where feasible and reasonable, and apply Additional Mitigation Measures for residual excess noise in accordance with Section 7.13
Avoid structural damage to buildings or heritage items as a result of construction vibration	Measured vibration levels from construction activities all meet agreed vibration criteria (refer Section 5.7)
Undertake active community consultation	Community consultation and management provided in accordance with the Sydney Metro Overarching Community Consultation Strategy (OCCS) and with notification provided in accordance with Section 7.6 and the Additional Mitigation Measures Matrix (Section 7.14)
Maintain positive, cooperative relationships with schools, childcare centres, local residents and building owners.	Community consultation and management provided in accordance with the Sydney Metro Community Consultation Strategy (CCS) and in accordance with Section 7.6

These objectives conform to Sydney Metro objectives as described in the Construction Environmental Management Framework.

1.5. NVMP and supporting documents

This NVMP and the associated CNVIS have been developed to assess works to be carried out by JHLORJV. Sydney Metro has provided indicative works stages, locations, and plant for assessment.

In accordance with the CoA, the CNVIS and NVMP can be updated at any time to reflect the detailed design, development of construction methods, and coordination with other contractors / projects in the areas to manage cumulative impacts.

If JHLORJV proposes to carry out any works activity which is not covered in the CNVIS, and if that activity is predicted to exceed CNVIS noise predictions, be in a different location, or be noticeably different in noise character to the assumed activities for the associated works stage, then the predict tool (or whichever approved method the Interface Contractors use) will be used to refine the predictions during detailed construction planning refer to Section 6.

JHLORJV can refer to the NVMP and CNVIS to consider ways to mitigate impacts from their proposed works, through plant selection and / or screening, and scheduling of noisy activities to less noise-sensitive periods when possible.

JHLORJV will prepare works plans and out of hours works (OOHW) applications in accordance with the LOR EPL 21147. These will build on the findings of the CNVIS but be

broken down further when plant selection is confirmed and sequencing and location of activities is clear, allowing impacts to be managed appropriately.

Interface Contractors will prepare work plans and out of hours works (OOHW) applications in accordance with their applicable EPL. If an EPL does not apply, the IC will work under the Sydney Metro OOH Work Protocol.

The NVMP and CNVIS are part of a suite of construction noise and vibration management documents and have an interrelationship with other documents, as outlined below:

- Site Environment Plans or Environmental Control Maps identify nearby residential and other noise-sensitive receivers and Noise Catchment Areas. These are progressively updated to incorporate physical noise management measures identified in the CNVIS, such as solid hoarding;
- The Heritage Management Plan prepared for the Project, given the potential for vibration intensive works to be carried out at heritage-listed railway stations;
- The Construction Traffic Management Plan (CTMP) prepared for the Project; and
- The Sydney Metro City and Southwest Overarching Community Communications Strategy (OCCS) (SM-17-00083972). The OCCS describes the procedures and processes for community notification, consultation and complaints management.

1.6. Consultation

CoA C3(a) and CoA C8(a) require that the NVMP and Noise and Vibration Monitoring Program be prepared in consultation with the relevant Council. As such the following stakeholders will be consulted in developing this Plan:

- City of Canterbury Bankstown; and
- Inner West Council

A summary of the consultation is provided below and in Appendix G.

Table 3: Consultation carried out in the development of this Plan

No.	Agency Consultation	Requirements and date submitted	Key issues raised	NVMP Section Reference
Conditions of Approval				

No.	Agency Consultation	Requirements and date submitted	Key issues raised	NVMP Section Reference
C6	Department of Planning, Housing & Infrastructure (DPHI)			
C3(a) & C8 (a)	Inner West Council	26/07/2024	• While the developments are likely to have amenity impacts, the measures presented in the report will minimise the impacts to sensitive receivers. • No further comments, Council is satisfied that this plan is appropriate.	NA
C3(a) & C8 (a)	Canterbury Bankstown City Council	26/07/2024	Provide Council with details of the complaint management system and a direct contact in order for community concerns to be documented and forwarded onto the ARA for investigation and action.	Refer to Section 3.8.4 of the SWM3 CEMP. Sydney Metro's OCCS details the Complaints Management System Refer to Section 2.3 of the SWM3 CNVMP The Appropriate Regulatory Authority (ARA) for the Project is the NSW Environmental Protection Authority (EPA) [for Scheduled 1 activities under the POEO Act].

2. Legal and other requirements

This Plan addresses applicable requirements within the following documents:

- The Sydney Metro *City and Southwest - Sydenham to Bankstown Upgrade Conditions of Approval SSI-8256*, determined 12 December 2018;
- The Sydney Metro *City and Southwest - Sydenham to Bankstown Upgrade Environmental Impact Statement,* September 2017;
- The Sydney Metro *City and Southwest - Sydenham to Bankstown Upgrade Submissions and Preferred Infrastructure Report*, June 2018;
- The Sydney Metro *City and Southwest - Sydenham to Bankstown Upgrade Bankstown Modification Report,* May 2020;
- The Sydney Metro *Sydenham to Bankstown Staging Report* (2020);
- Sydney Metro *City and Southwest Construction Noise and Vibration Strategy* (2016);
- Sydney Metro *City and Southwest Out-of-Hours Works Strategy/Protocol* (2019); and
- Sydney Metro *Construction Environmental Management Framework v3.2* (2017); and
- Laing O'Rourke Australia Construction Pty Ltd (LOR) Environment Protection Licence (EPL) 21147.

The Compliance Matrix in Section 2.2 provides a comprehensive list of compliance requirements, environmental documents and the contract documents.

Table 4 below details the legislation and planning instruments considered during development of this Plan.

Table 4: Legislation and Planning Instruments

Legislation	Description	Relevance to this Plan
Environmental Planning and Assessment Act 1979	This Act establishes a system of environmental planning and assessment of development proposals for the State.	The approval conditions and obligations are incorporated into this NVMP.
Protection of the Environment Operations Act 1997 (POEO Act)	This Act includes all the controls necessary to regulate pollution and reduce degradation of the environment, provides for licensing of scheduled development work, scheduled activities and for offences and prosecution under this Act.	This Plan defines how the Project will manage works to comply with this Act. The works will be conducted in accordance with the requirements of the LOR EPL 21147 or EPL applicable to the ICs works.

2.1. Policies, Standards and Guidelines

Additional guidelines and standards to the management of noise and vibration include:

- NSW EPA *Noise Policy for Industry* (NPfI, 2017).
- NSW EPA *Interim Construction Noise Guideline* (2009)

- NSW EPA *Assessing Vibration – a Technical Guideline* (AVTG, 2006 – for human exposure)
- NSW *EPA Road Noise Policy* (RNP, 2011)
- Transport for NSW (TfNSW) *Infrastructure and Services Construction Noise and Vibration Strategy* (I&S CNVS, 2018, for supplementary information not provided in the Sydney Metro CNVS)
- TfNSW Roads and Maritime Services *Construction Noise and Vibration Strategy* (RMS CNVS, 2016, for supplementary information not provided in the Sydney Metro CNVS)
- Australian Standard *AS 2017-2016 Acoustics – Recommended design sound levels and reverberation times for building interiors*
- Australian Standard *AS 3671-1989 Acoustics – Road traffic noise intrusion – Building Siting and Construction (for guidance only; applies to siting of the receiver buildings);*
- Australian Standard *AS/NZS 2107:2016 Acoustics - Recommended design sound levels and reverberation times for building interiors;*
- Australian Standard *AS 2187:2-2006 Explosives - Storage and Use - Part 2: Use of Explosives*
- Australian Standard *AS/NZS ISO 3100:2009 Risk Management – Principals and Guidelines;*
- British Standard *BS 6472-1992 Guide to evaluation of human exposure to vibration in buildings (1 Hz to 80 Hz)*
- British Standard *BS 7385:2-1993 Evaluation and measurement for vibration in buildings Part 2*
- German Standard *DIN 4150: Part 3-1999 Structural Vibration Part 3: Effects of Vibration on Structures*.

The primary reference for managing noise and vibration from construction and maintenance is the Environment Protection Authority (EPA) *Interim Construction Noise Guideline* ("ICNG", 2009).

2.2. Conditions of Approval

The CoA and REMM relevant to this NVMP are listed in Table 5 below. In accordance with CoA C4, the relevant requirements of the CEMF have also been included in Table 5.

Table 5 also provides a cross reference to demonstrate where the CoA, REMM or CEMF requirement is addressed in this NVMP or other management documents.

Please refer to Appendix A for all other CoA, REMM and CEMF requirements relevant to the development of this Plan.

Table 5: NVMP Compliance Matrix

No.	Requirement	Reference	How addressed?
Conditions of Approval			
C3	The CEMP Sub-plans must be prepared in consultation with the relevant government agencies identified for each CEMP Sub-plan and be consistent with the CEMF and CEMP referred to in Condition C1: (a) Noise and vibration — Relevant council(s)	Section 1.6 Appendix G	This Plan has been prepared in accordance with this condition and describes how JHLOR proposes to manage noise and vibration during construction of the Project. This plan will be provided to City of Canterbury Bankstown, Inner West Council and OEH for consultation.
C4	The CEMP Sub-plans must be prepared in accordance with the CEMF	This Table	Table 5 demonstrates how this Plan has been prepared in accordance with the relevant requirements of the CEMF.
C5	Details of all information requested by an agency to be included in a CEMP Sub-plan as a result of consultation, including copies of all correspondence from those agencies, must be provided with the relevant CEMP Sub-Plan.	Section 1.6 Appendix G	This Plan will be provided to City of Canterbury Bankstown and Inner West Council for consultation. Refer to Section 1.6 and Appendix E of this Plan for a summary of consultation.
C6	Any of the CEMP Sub-plans may be submitted along with, or subsequent to, the submission of the CEMP but in any event, no later than one (1) month before Construction.	Section 9.2	This Plan will be submitted for approval to DPHI prior to the final submission of the CEMP for DPHI approval.
C7	Construction must not commence until the CEMP and all CEMP Sub-plans have been approved by the Planning Secretary. The CEMP and CEMP Sub-plans, as approved by the Planning Secretary, including any minor amendments approved by the ER must be implemented for the duration of Construction. Where Construction of the CSSI is staged, Construction of a stage must not commence until the CEMP and CEMP Sub-plans for that stage have been approved by the Planning Secretary.	Section 9.2	Construction will not commence until the CEMP and all CEMP Sub-plans have been approved by DPHI. The CEMP and Sub-plans will be implemented for the duration of construction.
C8	The following Construction Monitoring Programs must be prepared in consultation with the relevant government agencies identified for each to compare actual performance of Construction of the CSSI against the predicted performance. (a) Noise and Vibration — Relevant council(s)	Section 1.6 Section 8 Section 9.2 Appendix G	The Noise and Vibration Monitoring Program will be provided to City of Canterbury Bankstown and Inner West Council for consultation, as part of the NVMP. Refer to Section 1.6 and Appendix G of this Plan for a summary of consultation.
C9	Each Construction Monitoring Program must provide:		

No.	Requirement	Reference	How addressed?
	(a) details of baseline data available; (b) details of baseline data to be obtained and when;	Section 8.1	Details of baseline noise and vibration data available, and how and when further baseline data is to be obtained is outlined in Section 8.1 of this Plan.
	(c) details of all monitoring of the project to be undertaken;	Section 8.2	Details of all monitoring of the Project to be undertaken, including the parameters, frequency and location of monitoring is outlined in Section 8.2 of this Plan.
	(d) the parameters of the project to be monitored;	Section 8.2 Section 8.3	Details of the parameters of the project to be monitored are outlined in Section 8.2 and 8.3 of this Plan.
	(e) the frequency of monitoring to be undertaken;	Section 8.4	Details of the frequency of monitoring to be undertaken is outlined in Section 8.4 of this Plan.
	(f) the location of monitoring;	Section 8.2	Details of the location of monitoring to be undertaken is outlined in Section 8.2 of this Plan.
	(g) the reporting of monitoring results;	Section 8.5	The reporting of monitoring results is outlined in Section 8.5 of this Plan.
	(h) procedures to identify and implement additional mitigation measures where results of monitoring are unsatisfactory; and	Section 8.6	The procedures to identify and implement additional mitigation measures where results of noise and vibration monitoring are unsatisfactory are outlined in Section 8.6 of this Plan.
	(i) any consultation to be undertaken in relation to the monitoring programs.	Section 1.6 Section 8.7 Appendix G	Consultation undertaken in relation to the monitoring program is detailed in Sections 1.6, 8.7 and Appendix E of this Plan.
C10	The Construction Monitoring Programs must be developed in consultation with relevant government agencies as identified in Condition C8 of this approval and must include reasonable information requested by an agency to be included in a Construction Monitoring Programs during such consultation. Details of all information requested by an agency including copies of all correspondence from those agencies, must be provided with the relevant Construction Monitoring Program.	Section 1.6 Section 8.7 Appendix G	The Noise and Vibration Monitoring Program has been prepared in accordance with this condition and describes how JHLOR propose to monitor noise and vibration during construction of the Project. The monitoring program will be provided to City of Canterbury Bankstown and Inner West Council for consultation. Refer to Section 1.6 and Appendix G of this Plan for a summary of consultation.

No.	Requirement	Reference	How addressed?
C11	The Construction Monitoring Programs must be endorsed by the ER and then submitted to the Planning Secretary for approval at least one (1) month before the commencement of Construction.	Section 8	The Noise and Vibration Monitoring Program will be endorsed by the ER. The Noise and Vibration Monitoring Program will be submitted to DPHI as part of this Noise & Vibration Management Plan, for approval no later than one month prior to the commencement of construction activities.
C12	Construction must not commence until the Planning Secretary has approved all of the required Construction Monitoring Programs.	Section 8	Construction will not commence until the CEMP and Sub-plans, including relevant construction monitoring programs have been approved by DPHI.
C13	The Construction Monitoring Programs, as approved by the Planning Secretary including any minor amendments approved by the ER must be implemented for the duration of Construction and for any longer period set out in the monitoring program or specified by the Planning Secretary, whichever is the greater.	Section 8	The Noise and Vibration Monitoring Program will be implemented for the duration of construction as detailed in Section 8 of this Plan.
C14	The results of the Construction Monitoring Programs must be submitted to the Planning Secretary, and relevant regulatory agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program.	Section 8.5 Section 9.3	Section 8.5 details the reporting requirements and the frequency required for this reporting.
C15	Where a relevant CEMP Sub-plan exists, the relevant Construction Monitoring Program may be incorporated into that CEMP Sub-plan.	Section 8	The Noise and Vibration Monitoring Program is incorporated in Section 8 of this this Plan.
Construction Environmental Management Framework			
9.2(a)	JHLOR will develop and implement a Construction Noise and Vibration Management Plan for their scope of works consistent with the Interim Construction Noise Guidelines (Department of Environment and Climate Change, 2009). The Construction Noise and Vibration Management Plan will include as a minimum:	This NVMP	The NVMP addresses the key requirements of 9.2(a) as follows:
	i. Identification of work areas, site compounds and access points,	Section 3.3	Work areas, site compounds and access points described in this NVMP and presented in the CNVIS Appendix B – Worksite Maps

No.	Requirement	Reference	How addressed?
	ii. Identification of sensitive receivers and relevant construction noise and vibration goals,	Section 3.1 Section 4.1 Section 5	Sensitive receiver types are described in Section 3.1 and are identified individually in the NVMP Appendix B (Land Use Map) and in CNVIS Appendices D, E and F (noise prediction tables). Receiver sensitivity is described in Section 4.1. Construction noise and vibration goals are presented in Section 5 for different receiver types. These are also presented in the CNVIS Appendices D, E and F (noise prediction tables).
	iii. Be consistent with and include the requirements of the noise and vibration mitigation measures as detailed in the environmental approval documentation and the Sydney Metro Construction Noise and Vibration Strategy (CNVS).	Section 7	CNVS noise and vibration mitigation measures relevant to the scope of works are presented in Section 7 of this Plan.
	iv. Details of construction activities and an indicative schedule for construction works, including the identification of key noise and/or vibration generating construction activities (based on representative construction scenarios) that have the potential to generate noise or vibration impacts on surrounding sensitive receivers, in particular residential areas.	Section 3.3	Section 3.3 of this Plan includes a description of the main phases of work and the main works scenarios expected to generate noise and / or vibration with potential to impact on surrounding receivers.
	v. Identification of feasible and reasonable procedures and mitigation measures to ensure relevant vibrations and blasting criteria are achieved, including a suitable blast program.	Section 7.5 Section 8.2.2 Section 8.2.3	Section 7.5 describes vibration controls to minimise vibration impacts, and Section 8.2.2 and Section 8.2.3 describe vibration monitoring and building condition survey requirements. Blast program is not applicable to the proposed works.
	vi. Community notification provisions specifically in relation to blasting	Section 7.6	Community notification requirements are covered in Section 7.6 (Community Consultation and Management) and 7.13 of this Plan (Additional Mitigation Measures which include community notification requirements based on predicted noise levels). Blast program is not applicable to the proposed works.

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No.	Requirement	Reference	How addressed?
	vii. The requirements of any applicable EPL conditions.	Section 2.3 Section 5.1	Section 2.3 of this Plan presents LOR EPL 21147conditions which apply to the Project's works when carried out under a rail possession. Section 5.1 of this Plan explains permissible hours of work under LOR EPL 21147.
	viii. Additional requirements in relation to activities undertaken 24 hours of the day, 7 days per week.	Section 5.1	Section 5.1 of this Plan describes permissible hours of work under the Conditions of Approval and the LOR EPL 21147 (for works carried out under a rail possession). 24-hours a day, 7-days a week work is not anticipated for the proposed SWM3 works. However EPL21147 does make allowances for such work under a week-long rail possession.
	ix. Pre-construction compliance requirements and hold points.	Section 9.1 Section 8.2.3 Section 8.2.2	Section 9.1 of this Plan describe hold points for NVMP and Noise and Vibration Monitoring Plan approvals which are required prior to carrying out the works covered by the NVMP. Section 8.2.3 requires that Condition or Dilapidation surveys are required in any building or structure which is inside the recommended Minimum Working Distance for vibration-generating activities. These surveys must be carried out prior to commencement of the vibration-generating works. Section 8.2.2 requires that "site-law" vibration propagation measurements are carried out at the commencement of vibration-generating works, to ensure that the Minimum Working Distances applied in the vibration assessment are suitable.
	x. The responsibilities of key project personnel with respect to the implementation of the plan.	Section 2.4	Roles and responsibilities are listed in Section 2.4 of this Plan.
	xi. Noise monitoring requirements.	Section 8 Section 7.14	Section 8 of this Plan presents noise monitoring requirements for obtaining additional baseline noise data (if required), plant noise audits (as required or requested during the project), and general environmental noise monitoring in accordance with the CNVS Additional Mitigation Measures Matrix (Section 7.14).

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No.	Requirement	Reference	How addressed?
	xii. Compliance record generation and management.	Section 9.3 Section 7.6 Section 8.5	Section 9.3 describes requirements for record-keeping. Section 7.6 also describes requirements for keeping records of complaints and community consultation. Section 8.5 describes requirements for noise and vibration monitoring reports.
	xiii. Community consultation requirements.	Section 7.6 Section 7.13	Section 7.6 describes community consultation requirements Section 7.13 includes Additional Mitigation Measures which include community notification requirements based on predicted noise levels.
	xiv. An Out of Hours Works Protocol applicable to all construction methods and sites.	Section 7.7 Appendix E for JHLORJV and Appendix F for Sydney Metro Protocol	Section 7.7 refers to the approved Sydney Metro City and Southwest Out of Hours Works Strategy/Protocol. A copy of Sydney Metro's Out of Hours Works Application (to be utilised in accordance with the Strategy/Protocol) is provided in the Appendix E & F. Note: only the JHLORJV Application will be completed as the works will be undertaken in accordance with the LOR EPL 21147.

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2.3. Environment Protection Licence

The SWM3 portion of the S2B works will be delivered in accordance with the LOR EPL 21147, under Scheduled Activity 33; Railway Activities – Railway Infrastructure Construction.

It is noted that this EPL also includes the Sydenham Station Junction works, occurring under the Sydney Metro City and Southwest - Chatswood to Sydenham Planning Approval (CSSI_7400), refer to section 2.4.1 of Sydenham to Bankstown – SWM3 CEMP for more information.

Compliance with all relevant licence conditions will be tracked and monitored.

For any works being undertaken under EPL 21147, if an inconsistency is identified (with the planning approval), JHLORJV will consult with Sydney Metro and the ER to determine whether the works can be carried out through an approved path. Should a variation to the licence be required, JHLORJV will consult with the EPA.

The environmental authority or licence includes specific minimum requirements which are addressed within this EMP through the Environmental Procedures and specifically included in ERAPs. These will be addressed and implemented by JHLORJV as the project progresses.

A copy of relevant Permits, Licences and Development Consents will be kept on site as controlled documents in the project's Document Management System.

Note: No elements of the SWM3 Project's scope will require the use of the Sydney Trains' EPL 21147.

2.4. Roles and responsibilities

The roles and responsibilities of key JHLOR's personnel (and the ER) with respect to noise and vibration management are as follows in Table 6.

Table 6: Roles and Responsibilities

Roles	Responsibilities
Project Director (Project Leader)	• Ensure that sufficient resources are allocated for the implementation of this CNVMP. • Ensure all appropriate noise and vibration mitigation measures are implemented. • Authorise cessation of construction activities on-site if exceedances are identified, in accordance with this CNVMP. • Authorise all monitoring reports and any revisions to this CNVMP.
Site Foreman (Site Superintendent)	• Oversee the overall implementation of this CNVMP. • Ensure all appropriate noise and vibration mitigation measures are implemented. • Ensure works occur within standard construction hours unless the appropriate out of hours works approval is in place. • Manage deliveries to mitigate noise impacts.
Project Environmental Manager	• Oversee the overall implementation of this CNVMP. • Consider and advise senior management on compliance obligations.

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Roles	Responsibilities
	• Ensure that the outcomes of compliance monitoring / incident reporting are systematically evaluated as part of ongoing management of construction activities. • Ensure all appropriate noise and vibration mitigation measures are implemented. • Where standard mitigation measures are deemed insufficient, undertake reasonable steps to manage adverse impacts and implement all additional measures. • Authorise cessation of construction activities on-site if exceedances are identified, in accordance with this CNVMP. • Ensure construction activity records / monitoring records/ incident reports are kept and maintained on-site. • Ensure audits of construction site activity records / monitoring records/ incident reports are undertaken as needed, findings are shared with relevant site personnel and corrective actions are implemented. • Ensure all relevant personnel have and understand the most up-to-date copy of this CNVMP. • Ensure the construction noise and vibration monitoring program is implemented across the project.
Senior Environmental Coordinator/ Environmental Coordinator	• Implement this CNVMP. • Consider and advise PEM on compliance obligations. • Undertake compliance monitoring / incident reporting are systematically evaluated as part of ongoing management of construction activities. • Ensure all appropriate noise and vibration mitigation measures are implemented. • Where standard mitigation measures are deemed insufficient, undertake reasonable steps to manage adverse impacts and implement all additional measures. • Refer cessation of construction activities on-site if exceedances are identified, in accordance with this CNVMP to the PEM. • Maintain construction activity records / monitoring records/ incident reports and ensure records are kept and maintained on-site. • Ensure audits of construction site activity records / monitoring records/ incident reports are undertaken as needed, findings are shared with relevant site personnel and corrective actions are implemented. • Ensure all relevant personnel have and understand the most up-to-date copy of this CNVMP. • Implement construction noise and vibration monitoring program across the project.
Communication and Stakeholder Relations Manager	• Leadership and management of the Communications, Stakeholder and Community Relations Team.

Roles	Responsibilities
	• Build and maintain effective working relationship with TfNSW's representative and Stakeholder and Community Liaison team. • Develops and oversees the implementation of the CCS and subplans. • Responsible for a stakeholder and community relations induction and training program for all personnel involved in the performance of the project. • Approves the Communications, Stakeholder and Community Relations team roles, role descriptions and responsibilities. • Ensures the Community Communications Strategy and key activities are integrated into the project schedule. • Attends the TfNSW led Communications Management Control Group and reports on activities, strategies and issues. • Attends the monthly Project Management Review Group meeting to discuss project status and issues. • Issues and crisis management. • Manages media issues and acts as media spokesperson for JHLORJV (subject to media protocols). • Responsible for the Communications and Stakeholder Management KPI as well as the Communications and Stakeholder management component of the Quality of Information and Relationship with the Principal's representative KPI. • Required to be on call 24 hours based on the team rotation. • Liaise directly with the Independent Environment Representative as required and where appropriate to facilitate any environmental management requirements, including those identified within the Planning Approvals.
Community Place Manager	• Build and maintain effective working relationship with community, businesses, and stakeholders. • Support the successful delivery of the project's Community Communication's Strategy and requirements. • Implementation of the Community Communications Strategy and any relevant subplans. • Establish effective working relationships with local stakeholder to support the effective delivery of the project. • Required to be on call 24 hours based on the team rotation to respond to enquiries and complaints. • Review, approve and oversee the development and distribution of all notification, newsletter, social media, photography, and other communication material. • Maintain the Consultation Manager database and generate reports as required.

Roles	Responsibilities
	• Drives Communications and Stakeholder Management KPIs as well as the Communications and Stakeholder management component of the Quality of Information and Relationship with the Principal's representative KPI.
Site personnel and Subcontractors	• Understand and implement mitigation as required in the CNVMP and any additional required measures identified during construction. • Participate in (or conduct if authorised) relevant training to implement the requirements of this CNVMP.
Noise and Vibration Monitoring Personnel (JHLOR / Consultants)	• Undertake relevant training, where required, to implement the requirements of this CNVMP. • Undertake all monitoring activities in accordance with this CNVMP and the construction noise and vibration monitoring program. • Ensure regular maintenance and calibration of monitoring equipment. • Ensure all relevant monitoring quality control / assurance procedures are effectively implemented.
Independent Environmental Representative	• Receive and respond to communication from the Planning Secretary in relation to the environmental performance of the CSSI. • Consider and inform the Planning Secretary on matters specified in the terms of this approval. • Consider and recommend to the Proponent any improvements that may be made to work practices to avoid or minimise adverse impact to the environment and to the community. • Review documents identified in Conditions C1, C3 and C8 and any other documents that are identified by the Planning Secretary, to ensure they are consistent with requirements in or under this approval and if so: (i) make a written statement to this effect before submission of such documents to the Planning Secretary (if those documents are required to be approved by the Planning Secretary); or (ii) make a written statement to this effect before the implementation of such documents (if those documents are required to be submitted to the Planning Secretary for information or are not required to be submitted to the Secretary). • Regularly monitor the implementation of the documents listed in Conditions C1, C3 and C8 to ensure implementation is being carried out in accordance with the document and the terms of this approval. • As may be requested by the Planning Secretary, help plan, attend or undertake audits of the development commissioned by the Department including scoping audits, programming audits, briefings and site visits, but not independent environmental audits required under Condition A34 of this approval. • As may be requested by the Planning Secretary, assist the Department in the resolution of community complaints;

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Roles	Responsibilities
	• Assess the impacts of minor ancillary facilities as required by Condition A19 of this approval. • Assess and make determination on out of hours applications for works not subject to an EPL in accordance with CoA-E25. • Consider any minor amendments to be made to the documents listed in Conditions C1, C3 and C8 and any document that requires the approval of the Planning Secretary that comprise updating or are of an administrative or minor nature and are consistent with the terms of this approval and the documents listed in Conditions C1, C3 and C8 or other documents approved by the Planning Secretary and, if satisfied such amendment is necessary, approve the amendment. This does not include any modifications to the terms of this approval. • Prepare and submit to the Planning Secretary and other relevant regulatory agencies, for information, an Environmental Representative Monthly Report detailing the ER's actions and decisions on matters for which the ER was responsible in the preceding month. The Environmental Representative Monthly Report must be submitted within seven (7) days following the end of each month for the duration of the ER's engagement for the CSSI. • Must complete project induction covering LORs' environmental management system.

It is noted that the site team, including the JHLOR's Environmental Manager, Environmental Coordinator, Construction Manager and Site Foreman/Site Superintendent (roles outlined in Section 3.3 of the CEMP) will attend site inspections with the ER upon request.

The ER may request information relating to noise and vibration management from the JHLOR, the primary contact being the Environmental Manager.

2.5. SWM3 Sustainability Requirements

To achieve an "Design & As-built" ISC Rating Scheme (V1.2) rating of at least 65 for the constructed SWM3 Works. Below is the list of ISC requirements related to this CNVMP.

- Dis-2: Noise
    - Mitigation of noise is conducted during construction.
    - Monitoring of noise is undertaken at appropriate intervals and in response to complaints
    - Demonstrating no divergence from noise management process in ISCA approved noise guidelines.
- Dis-3: Vibration
    - Mitigation of vibration occurs during construction.
    - Monitoring of vibration is undertaken at appropriate intervals and in response to complaints.

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- Demonstrating no exceedance of vibration goals for structural damage to buildings and structures.
- No physical damage has been caused to any buildings or structures by vibration caused by construction

3. Existing environment and proposed works

3.1. Existing environment

The proposed SWM3 works are to be carried out from Sydenham to Bankstown, with a potential laydown at Yagoona. The project footprint is located in predominantly suburban residential areas with mixed use near the stations, including commercial, residential, child care and medical consulting rooms.

For residential receivers, construction noise targets are set relative to existing background noise levels in the local area.

For other receiver types, noise and vibration targets are often set at absolute levels, without reference to the existing environment.

Nearby sensitive receivers have been divided into 3 different noise catchment areas (NCA). The defined noise catchment areas are consistent with those defined in the EIS for the Sydney Metro City & Southwest Sydenham to Bankstown project.

More detailed maps of each NCA can be found in Appendix B of this NVMP.

The Land Use Survey, as required by CoA E18, has identified some buildings with multiple uses such as shop-top residences. The Land Use Survey is being updated as the Project progresses, also in accordance with E18. Any updates to the receiver list including adding new receivers and changing classification types are to be included in updates to the CNVIS.

Most commercial receivers in the vicinity of these works are located along corridor near stations.

A large number of the commercial properties are mixed use with residential or other uses above. The CNVS requires that premises with different uses or receiver types should be classified separately. The other sensitive receivers, as defined in the CNVS, that have been identified are presented in Appendix B, and listed in the Project's OCCS.

In order to understand the potential for construction activities to affect structures, the type of structure needs to be identified. All stations between Sydenham to Bankstown are heritage-listed, with either local or state significance. The EIS identifies heritage-listed buildings along the Sydenham to Bankstown route. The locations of heritage-listed buildings and the EIS assessment of vibration impacts are summarised in the Table below. Refer to the Project's Heritage Management Plan for further information about these items.

Notwithstanding the EIS assessment of vibration impacts summarised in the Table below and in the NVMP assessment in Section 6.4, it is the Contractor's responsibility to re-assess potential impacts on any heritage receiver and determine whether the proposed vibration-generating works have the potential to cause damage to heritage structures or building fabric.

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Table 7: List of Heritage buildings and structures within the minimum recommended offset to avoid cosmetic damage

NCA	Item/address	Building occupancy	Construction type
NCA 01	Marrickville Station	Commercial	Masonry
NCA 01	Carrington Road, Marrickville	Public Building	Masonry (Brick)
NCA 01	1 Myrtle Street, Marrickville	Residential	Masonry (Brick)
NCA 01	Electricity substation no. 275	Commercial	Masonry (Brick)
NCA 02	Dulwich Hill Station	Commercial	Weatherboard
NCA 02	217 Livingstone Road, Marrickville	Residential	Masonry (Brick)
NCA 02	219 Livingstone Road, Marrickville	Residential	Masonry (Brick)
NCA 02	2 Hollands Avenue, Marrickville	Residential	Masonry (Brick)
NCA 02	4 Hollands Avenue, Marrickville	Residential	Masonry (Brick)
NCA 02	6 Hollands Avenue, Marrickville	Residential	Masonry (Brick)
NCA 02	242 Wardell Road, Dulwich Hill	Residential	Masonry (Brick)
NCA 02	240 Wardell Road, Dulwich Hill	Residential	Masonry (Brick/Rendered)
NCA 02	5 Wilga Avenue, Dulwich Hill	Residential	Masonry (Brick)
NCA 02	7 Wilga Avenue, Dulwich Hill	Residential	Masonry (Brick)
NCA 02	14 Wilga Avenue, Dulwich Hill	Residential	Masonry (Brick)
NCA 02	47 School Parade, Marrickville	Residential	Masonry (Brick)
NCA 02	43 School Parade, Marrickville	Residential	Masonry (Brick)
NCA 02	41 School Parade, Marrickville	Residential	Masonry (Brick)
NCA 02	22 Kays Avenue, Marrickville	Residential	Masonry (Brick)
NCA 02	26 Kays Avenue, Marrickville	Residential	Masonry (Brick)
NCA 02	28 Kays Avenue, Marrickville	Residential	Masonry (Brick)
NCA 02	37 Kays Avenue, Marrickville	Residential	Masonry (Brick)
NCA 02	39 Kays Avenue, Marrickville	Residential	Masonry (Brick)
NCA 02	34 Challis Avenue, Dulwich Hill	Residential	Masonry (Brick)
NCA 02	36 Challis Avenue, Dulwich Hill	Residential	Masonry (Brick)
NCA 02	35 Challis Avenue, Dulwich Hill	Residential	Masonry (Brick)
NCA 02	39 Challis Avenue, Dulwich Hill	Residential	Masonry (Brick/Rendered)
NCA 02	116 Ewart Street, Dulwich Hill	Residential	Masonry (Brick)

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NCA	Item/address	Building occupancy	Construction type
NCA 03	Hurlstone Park Railway Station	Commercial	Masonry (Brick)
NCA 04	Canterbury Station	Commercial	Masonry (Brick)
NCA 04	2 Sugar House Road, Canterbury	Residential	Masonry
NCA 04	193 Canterbury Road, Canterbury	Residential	Masonry (Brick)
NCA 04	3 Broughton Street, Canterbury	Residential	Masonry (Brick)
NCA 06	Campsie Station	Commercial	Masonry
NCA 06	203 Beamish Street, Campsie	Commercial	Masonry (Brick/Rendered)
NCA 07	Belmore Station	Commercial	Weatherboard
NCA 08	Lakemba Station	Commercial	Masonry (Brick)
NCA 08	60 The Boulevarde, Lakemba	Commercial	Masonry (Brick)
NCA 09	Wiley Park Station	Commercial	Weatherboard
NCA 10	Punchbowl Station	Commercial	Weatherboard
NCA 14	125 Unwins Bridge Road Tempe	Residential	Masonry (Brick)
NCA 14	62 Union Street Tempe	Private Recreation	Masonry (Brick)
NCA 14	60 Union Street Tempe	Private Recreation	Masonry (Brick)
NCA 14	368 Unwins Bridge Road Tempe	Educational Establishments	Masonry (Brick)
NCA 14	119 Unwins Bridge Road Tempe	Educational Establishments	Masonry (Brick)
NCA 14	3 Collins Street Tempe	Residential	Masonry (Stone)
NCA 14	1 Collins Street Tempe	Residential	Masonry (Stone)
NCA 14	13 Collins Street Tempe	Residential	Masonry (Stone)
NCA 14	11 Collins Street Tempe	Residential	Masonry (Stone)
NCA 14	22 Hillcrest Street Tempe	Residential	Masonry (Brick)
NCA 14	88 George Street Sydenham	Residential	Weatherboard
NCA 14	41 Unwins Bridge Road Sydenham	Residential	Masonry (Brick)
NCA 14	20 Swain Street Sydenham		
NCA 14	39 Unwins Bridge Road Sydenham	Public Building	Masonry (Brick)
NCA 15	204 Unwins Bridge Road Sydenham	Commercial	Masonry (Brick)
NCA 15	52 Sutherland Street St Peters	Residential	Masonry (Brick)
NCA 15	45 Edith Street St Peters	Residential	Masonry (Brick)
NCA 15	10 Unwins Bridge Road St Peters	Residential	Masonry (Brick)

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NCA	Item/address	Building occupancy	Construction type
NCA 15	2 Unwins Bridge Road St Peters	Commercial	Masonry (Brick)
NCA 15	1-7 Unwins Bridge Road St Peters	Commercial	Masonry (Brick)
NCA 16	290 Edgeware Road Newtown	Private Recreation	Masonry (Brick)
NCA 16	2–24 Laura Street, Marrickville	Residential	Masonry (Brick)
NCA 16	127–137 Wells Street, Marrickville	Educational Establishments	Masonry (Brick)

In accordance with REMM NVC4 where vibration screening levels are predicted to be exceeded at heritage items, condition assessments which consider the specific heritage values of the structure will be undertaken by the JHLOR in consultation with a heritage specialist (refer Section 8.2.3). This assessment is to ensure heritage fabric is monitored and managed during vibration intensive activities.

3.2. Existing noise levels

The Project site is surrounded by properties of varying types, including industrial, commercial, residential and recreational. During the noise assessment for the EIS, background noise monitoring of the areas surrounding the site was undertaken. The following Noise Catchment Areas (NCA) and associated rating background levels (RBL) have been taken from the EIS. The corresponding background monitoring location from the EIS is also shown. Additional NCAs (NCA 14 – 16) were developed to assess impacts from the acquisition of the Sydenham Junction Stabling Yard area as part of the project. The background monitoring data for these NCAs were acquired from the Sydenham Station and Junction Project CNVIS, prepared by Wilkinson Murray in July 2020.

Note that the background monitoring results used to establish noise criteria in the EIS for NCA 01 and NCA 02 were reported incorrectly. There were discrepancies between the values used for each NCA in different tables of the report, which led to uncertainty with which results were correct. Results from different monitoring locations, that did not have these discrepancies were instead used. These new monitoring locations were equally as appropriate or better for representing each NCA.

Table 8: Rating background levels

NCA	Reference monitoring ID	Area	Day RBL 7am – 6pm	Evening RBL 6pm – 10pm	Night RBL 10pm – 7am
NCA 01	B.02	Marrickville	38	38	33
NCA 02	B.03	Marrickville	38	38	33
NCA 03	B.06	Hurlstone Park	38	38	34
NCA 04	B.07	Hurlstone Park	40	40	35
NCA 05	B.09	Canterbury	36	36	32
NCA 06	B.10	Campsie	45	42	35
NCA 07	B.13	Belmore	41	41	35

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NCA	Reference monitoring ID	Area	Day RBL 7am – 6pm	Evening RBL 6pm – 10pm	Night RBL 10pm – 7am
NCA 08	B.14	Lakemba	47	47	41
NCA 09	B.16	Lakemba	44	44	36
NCA 10	B.19	Punchbowl	47	47	41
NCA 11	B.20	Bankstown	47	47	39
NCA 12	B.22	Bankstown	54	51	42
NCA 13	B.23	Bankstown	42	42	39
NCA 14	*SSJ CNVIS NCA2*[1]	Tempe	41	41	40
NCA 15	*SSJ CNVIS NCA3*[1]	Sydenham	51	51	43
NCA 16	*SSJ CNVIS NCA4*[1]	St Peters	58	52	38
NCA 17	*L1*	Yagoona	48	48	44

Note 1 - Background noise was adopted from Sydenham Metro upgrade Construction Noise and Vibration Management Plan Ref: SMCSWSSJ-JHL-WSS-EM-PLN-000029. Monitoring for NCA14 to NCA16 was undertaken within the surrounding area between 18th & 27th June 2018. L1 was undertaken between 26/02/25 until 10/03/25.

Maps detailing the boundaries of each NCA are included in Appendix B – Land Use Survey. These maps also indicate the land use type for each building with the NCA.

The different noise catchment areas contain a variety of receiver types (i.e. residential receivers, non-residential receivers, sensitive non-residential receivers) and as such a number of noise and vibration management requirements are applicable to all NCAs.

3.3. Proposed construction works

A schedule of the proposed construction works has been developed that details each construction activity, its proposed timeframe and the likely plant and equipment required. The proposed works are presented in Table 9. This information is to be used to produce a project specific construction noise and vibration impact statement (CNVIS), as required by CoA E27. It should be noted that no blasting is proposed as part of the SWM3 Works.

Table 9: Proposed Construction Works

Activity	Indicative Time frame	Details	Plant
Bankstown Station and Precinct Works	Sept 2024-May 2026	New, and modification to existing, infrastructure and systems to facilitate a new cross-corridor plaza between The Appian Way (north of the rail corridor) and Restwell Street (south of rail corridor) retail facilities and Station Precinct and Public Domain improvements. Separation of the current Sydney Trains line at Bankstown into sections for Sydney Metro and Sydney Trains including demolition of platform	Excavators, mobile cranes, light towers, EWPs, compaction equipment, hand tools, grinders, welding equipment, hi-rail plant, telehandlers, generators tipper trucks, non-destructive digging trucks. Jack hammering, saw cutting, CFA Piling Rig, telehandler, concrete truck, concrete pump, concrete vibrator, 24t excavator, powered hand tools (grinders etc), delivery trucks, 2t tipper, powered hand tools, EWP/scissor lift, 120t crane, Telehandlers, and delivery trucks, Excavators, mobile cranes, EWPs, compaction equipment including rollers, paving & asphalt machines, hi-rail & non hi-rail plant (including excavators, mulitcranes, scissor lifts, crane trucks, vac trucks, hydremas, concrete agitators), telehandlers, non-destructive digging trucks. Jack hammers, demolition/concrete saws & concrete cutting equipment, bored piling rigs,

Activity	Indicative Time frame	Details	Plant
			Continuous Flight Auguring Piling Rig, telehandlers, concrete trucks, concrete pumps, concrete vibrators, powered hand tools (grinders etc), delivery trucks, generators, tipper trucks, light vehicles, powered hand tools, saw cutting, grinders, welding equipment, lighting towers.
		Construction of Turn back, fencing and rail adjustment to Sydney Metro area to facilitate testing	Excavators, tampers, regulator, mobile cranes, light towers, EWPs, compaction equipment, hand tools, grinders, welding equipment, hi-rail plant, telehandlers, generators tipper trucks, non-destructive digging trucks.
Southwest Station Work	Sept 2024-Dec 2025	Equitable canopies and lifts, switchback ramps, landscaping, defect close out, station deep clean, heritage painting, final conversion scope (Platform Screen Doors), gap filler works	Jack hammering, saw cutting, CFA Piling Rig, telehandler, concrete truck, concrete pump, concrete vibrator, 24t excavator, powered hand tools (grinders etc), delivery trucks, 2t tipper, powered hand tools, EWP/scissor lift, 120t crane, Telehandlers, and delivery trucks, Excavators, mobile cranes, EWPs, compaction equipment including rollers, paving & asphalt machines, hi-rail & non hi-rail plant (including excavators, mulitcranes, scissor lifts, crane trucks, vac trucks, hydremas, concrete agitators), telehandlers, non-destructive digging trucks. Jack hammers, demolition/concrete saws & concrete cutting equipment, bored piling rigs, Continuous Flight Auguring Piling Rig, telehandlers, concrete trucks, concrete pumps, concrete vibrators, powered hand tools (grinders etc), delivery trucks, generators, tipper trucks, light vehicles, powered hand tools, saw cutting, grinders, welding equipment, lighting towers.
Southwest Corridor Works	Sept 2024-Dec 2025	Corridor access stairs Screens fixed to CSR on bridges Vegetation management Acoustic treatment Boundary fencing Track monitoring	Excavators, mobile cranes, piling rig, concrete truck, concrete pump, compaction equipment, hand tools, grinders, welding equipment, tipper trucks, EWP, Mulcher, chainsaw, trucks
Asset Upgrades	Sept 2024-Dec 2025	Infringement and track rectification	Excavators, tampers, regulator, mobile cranes, light towers, EWPs, compaction equipment, hand tools, grinders, welding equipment, hi-rail plant, telehandlers, generators tipper trucks, non-destructive digging trucks.
		Bridge upgrades renewals	Excavators, mobile cranes, concrete pump, concrete vibrator, light towers, EWPs, compaction equipment, hand tools, grinders, welding equipment, hi-rail plant, telehandlers, generators
		Civil asset upgrade renewal	
Final Conversions	Sept 2024-Dec 2025	Sydenham junction final track configuration, fencing , wayfinding & signage (all stations), BMCS and lift conversions (Marrickville	Excavators, tampers, regulator, mobile cranes, light towers, EWPs, compaction equipment, hand tools, grinders, welding equipment, hi-rail plant, telehandlers, generators tipper trucks, non-destructive digging trucks.

Activity	Indicative Time frame	Details	Plant
		Station to Punchbowl Station) Earthing bonding, alteration works, insulated rail joints, redundant asset works Clean up work (final rail grind, final rail tamping, station refresh/deep clean) Station meal room alterations at 9 stations (Bankstown not included) Fixed gap filler works	
ARTC Works	Sept 2024-Dec 2025	Temporary and permanent adjustments to ARTC operated and maintained infrastructure	Excavators, tampers, regulator, mobile cranes, light towers, EWPs, compaction equipment, hand tools, grinders, welding equipment, hi-rail plant, telehandlers, generators tipper trucks, non-destructive digging trucks.
Utility works	Sept 2024-Dec 2025	Qenos Pipe removal Non ST or SM assets (typically non-contestable works)	Excavators, mobile cranes, hand tools, grinders, welding equipment, tipper trucks, EWP, trucks
Property works	Sept 2024-Dec 2025	The Property Works comprises permanent adjustments to existing private properties required for, or as a consequence of the SWM3 Works and Temporary Works	
Demolition of Punchbowl Candy Shop and Parcel Office, Canterbury Signalling Building	Sept 2024-Dec 2025	Canterbury Signalling Building (Care must be taken not to damage the heritage listed timber signal hut nearby) Demolition of Punchbowl Candy and parcel office which are with the S170 heritage curtilage, however non-significant elements.	Excavators, mobile cranes, light towers, EWPs, hand tools, grinders, generators, tipper trucks, non-destructive digging trucks, concrete saw, jack hammers, water carts, sweepers.
Temporary site compound removal including Canterbury and North Terrace Road Bankstown	Sept 2024-May 2026	Removal of compound at Close St Canterbury Removal of compound within the carpark adjacent to North Terrace on the country (northern) side of Bankstown Station	Excavators, rollers, front end loader, crane, telehandler, EWP, hand tools, power tools, jack-hammer, concrete saw, trucks, water cart, street sweeper
		Ancillary facilities listed in Table 3 Temporary Construction facilities	Mobile Caravan Office and SWM3 satellite offices and laydown areas as required (in the process of investigation).
Temporary works	Sept 2024-May 2026	Geotech investigation, service searching, waste classification, bridge investigation, condition	Drill rigs, excavators, trucks, concrete trucks (for stabilised sand backfill), compaction equipment,

Activity	Indicative Time frame	Details	Plant
		assessments other activities as per Section 1.1 of this CEMP.	lighting towers, watercart, street sweeper, hand tools Vacuum trucks, hand tools, lighting towers Elevated work platforms, hand tools, lighting towers Survey equipment, hand tools
Dynamic Train Testing & other MTR works to enable Dynamic Train Testing	Quarter 2 to Quarter 4 2025	T1: Train moving at walking speed T2: Train accelerating from 0km/hr to 40km/hr T3: Train moving at 100km/hr T4: Train moving at 25km/hr T5: Train accelerating from 0km/hr to 100km/hr, train decelerating from 100km/hr to 0km/hr T&C Works - Communication Based Train Control (CBTC) testing and commissioning activities T&C Works -Communication and Central Control (CCCS) system testing and commissioning activities TOCC Rail Ops UTO Gate Work	Metro, HVAC, CVS, AGTU and traction systems, flat bed hi-rail truck, EWP, vac truck, hand tools

Note: Refer to Sydney Metro CNVS for plant SWL.

Access gates to the rail corridor are at the following locations:

- Access 1 (via Fraser Park Football Club interior road off Marrickville Road, Marrickville)
- Access 2 (via Victoria Road, Marrickville)
- Access 3 (via Unnamed Lane off Warburton Street, opposite Wooley Lane, Marrickville)
- Access 4 (via Randall Street, Marrickville)
- Access 5 (via Kays Avenue East, Marrickville)
- Access 6 (via Ewart Lane, Dulwich Hill) – light vehicles only
- Access 7 (via Ewart Street east of Terrace Road, Dulwich Hill)
- Access 8 (via Ewart Street west of Terrace Road, Dulwich Hill)
- Access 9 (via The Greenway onto Ness Avenue, Dulwich Hill)
- Access 10 (via The Parade Dulwich Hill)
- Access 11 (via Floss Street, Hurlstone Park)

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- Access 12 (via Railway Street, Hurlstone Park)
- Access 13 & 13a (via Foord Avenue, Hurlstone Park)
- Access 14 (via Keir Avenue, Hurlstone Park)
- Access 15 (via Hurlstone Avenue, Hurlstone Park)
- Access 16 (via Hutton Street, Hurlstone Park)
- Access 17 (via Hutton Street at Sugar House Road, Hurlstone Park)
- Access 18 (via rail service road near Church Street footbridge, Hurlstone Park)
- Access 19 (via Charles Street, Canterbury)
- Access 20 (via Broughton Street, Canterbury)
- Access 21 (via Wairoa Street and Cooks River Path, Canterbury)
- Access 22 (via South Parade opposite Wonga Street, Canterbury)
- Access 23 (via South Parade opposite Park Street, Campsie)
- Access 24 (via South Parade opposite Duke Street, Campsie)
- Access 25 (via North Parade, opposite Browning Street)
- Access 26 (via Wilfred Ave, opposite Assets St, Campsie)
- Access 27 (via Lilian Street, Campsie)
- Access 28 (via Loftus Street, Campsie)
- Access 29 (via Redman Parade, Belmore)
- Access 30 (via Belmore Station Carpark at Tobruk Ave, Belmore)
- Access 31 (via Railway Parade, Belmore)
- Access 32 (via Bridge Road, Belmore)
- Access 33 (via The Boulevard, Lakemba)
- Access 34 (via Railway Parade, opposite Croydon Street North, Lakemba)
- Access 35 (via The Boulevard, opposite Croydon St, Lakemba)
- Access 36 (via Railway Parade, opposite Ernest Street North, Lakemba)
- Access 37 (via The Boulevard, opposite Kathleen St, Lakemba)
- Access 38 (via Shadforth St, Wiley Park)
- Access 39 (via The Boulevard St, Wiley Park)
- Access 40 (via Urunga Parade, opposite Defoe St, Wiley Park)
- Access 41 (via Urunga Parade, opposite Dudley St North, Punchbowl)
- Access 42 (via The Boulevard, opposite Dudley St, Punchbowl)
- Access 43 (via Breust Place, Punchbowl)
- Access 44 (via Stansfield Avenue, Punchbowl)
- Access 45 now Gate 3 for BEW

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- Access 46 (via Depot Pl, Bankstown)
- BEW Gate 1: Located on the norther side of the corridor, adjacent to Bankstown Station carpark. Access via North Terrace
- BEW Gate 2: Located on the southern side of the rail corridor, approx. 100m east of East Terrace. Access via South Terrace
- BEW Gate 3: Located on the southern side of the rail corridor, opposite Carnation Ave. Access via South Terrace
- BEW Gate 4: Located on the northern side of the rail corridor, opposite Wattle St. Access via North Terrace
- BEW Gate 5: Located on the northern side of the rail corridor, opposite Lady Cutler Ave. Access via North Terrace
- Gate at Yagoona, Church St to the west of the Corridor and Ritchie Rd to the west.

It is noted that the above list of access gates is indicative and may change during the construction phase.

In addition to the known site compounds, JHLORJV may be required to establish additional compounds/laydowns to support SWM3 works. Where site compounds/laydowns are to be established, JHLOR will attempt to utilize existing gates where feasible. Site compounds/laydowns will generally be used during standard construction hours. Any use outside of standard construction hours during possessions will be subject to an OOHW Permit. The noise and vibration impacts will be considered in the associated ancillary facility checklist in relation to the requirements of the Planning Approval, EPL, relevant guidelines and legislation.

4. Aspects and potential impacts

When assessing and managing noise and vibration due to construction activities, the following general considerations apply:

- Airborne noise levels generated by the works, and how audible or intrusive they are at noise-sensitive receivers (both internal and external noise level may need to be assessed);
- Ground-borne or structure-borne noise, which is related to vibration energy being transferred through the ground and / or structures and being re-radiated as audible sound. Typically ground-borne noise is assessed inside buildings, while structure-borne noise may be a consideration inside buildings as well as externally (for example, if a structure radiates sound which is audible in the open environment, such as structure-radiated noise from a bridge or viaduct); and
- Ground borne or structural vibration, which is transmitted through the ground and / or structures. Humans can feel vibration at relatively low levels, and human comfort is an important consideration for the management of ground-borne vibration. At much higher levels, vibration can be associated with damage to structures, and even minor cosmetic damage such as development of cracks is to be avoided where possible. Other potentially vibration-sensitive items include highly vibration-sensitive equipment such as medical imaging equipment, or underground services such as buried pipes.

4.1. Receiver sensitivity

The sensitivity of the receiver to noise and vibration depends on the receiver type. This means that the identification of the receiver type is important to any noise and vibration assessment.

Each receiver in the NCA is identified as falling into one of the following categories:

- Commercial
- Educational
- Industrial
- Mixed residential/commercial
- Residential
- Place of Worship
- Medical facilities
- Other sensitive receivers such as Public Buildings

These receivers are identified on Environmental Control Maps and are included in the SoundPlan model which has been used for construction noise predictions.

Note that noise and vibration management levels assigned to receiver types are based on statistical research, however there is a range in noise and vibration sensitivity between individuals.

For the vibration assessment, heritage-listed buildings and structures within the proximity of the Project have been identified, so that they can be inspected to understand if they are structurally unsound. This affects the vibration management level which applies to the

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heritage-listed buildings or structures. No structurally unsound heritage structures have been identified.

5. Construction noise and vibration criteria

5.1. Construction hours

JHLOR will undertake works in accordance with the Laing O'Rourke Environmental Protection Licence (EPL) 21147. The EPL premise boundary will be updated to capture all works. No scheduled activities are expected to occur outside the EPL 21147 premise boundary. In the event works must be carried out outside of the EPL premise boundary, the EPL premise boundary will be varied

Interface Contractors will prepare work plans and out of hours works (OOHW) applications in accordance with their applicable EPL. If an EPL does not apply, the IC will work under the Sydney Metro OOH Work Protocol.

CoA-E19 states the construction hours as per the Planning Approval. **CoA-E20** states that if the works are to be undertaken under an EPL, than the hours stipulated within the EPL must be complied with. As such, JHLORJV will undertake works in accordance with the hours stipulated within the Laing O'Rourke EPL.

CoA– E19 states that construction must only be undertaken during the following standard construction hours:

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

CoA-E20 states "*Work may be undertaken outside the hours specified in the following circumstances:*

a) for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or
b) where it is required in an emergency to avoid injury or the loss of life, to avoid damage or loss of property or to prevent environmental harm; or
c) where different Construction hours are permitted or required under an EPL in force in respect of the CSSI; or
d) Work approved under an Out-of-Hours Work Protocol for Work not subject to an EPL as required by Condition E25; or
e) Construction that causes LAeq(15 minute) noise levels:
  i. no more than 5 dB(A) above the rating background level at any residence in accordance with the Interim Construction Noise Guideline (DECC, 2009), and
  ii. no more than the 'Noise affected' noise management levels specified in Table 3 of the Interim Construction Noise Guideline (DECC, 2009) at other sensitive land uses, and
  iii. continuous or impulsive vibration values, measured at the most affected residence are no more than the maximum values for human exposure to vibration, specified in Table 2.2 of Assessing Vibration: a technical guideline (DEC, 2006), and
  iv. intermittent vibration values measured at the most affected residence are no more than the maximum values for human exposure to vibration, specified in Table 2.4 of Assessing Vibration: a technical guideline (DEC, 2006); or
f) where a negotiated agreement has been reached with a substantial majority of sensitive receivers who are within the vicinity of and may be potentially affected by the particular Construction, and the noise management levels and/or limit for ground-borne noise and vibration (human comfort) cannot be achieved. All agreements must be in

writing and a copy forwarded to the Planning Secretary at least one (1) week before the commencement of activities."

EPL Condition L5.1 States; "*Unless permitted by another condition of this licence, construction works and activities must:*

a) only be undertaken between the hours of 0700 and 1800 Monday to Friday; and

b) only be undertaken between the hours of 0800 and 1300 Saturday; and

c) not be undertaken on Sundays or Public Holidays."

The CNVS presents a methodology for determining numerical limits – or Noise Management Levels (NMLs) – for the impacts of construction noise on residences and other land uses according to the time period during which the noise occurs. This methodology was derived from the *ICNG* but has been refined for the Sydney Metro project.

Where JHLORJV must undertake works outside of standard construction hours, and the activities are not permitted under the Laing O'Rourke EPL 21147, JHLORJV will seek a variation from the NSW EPA to the licence in accordance with the requirements of the EPL.

In accordance with EPL condition L5.2 low noise work may occur outside the standard construction hours where the requirements of the condition is met.

In addition to this, EPL condition L5.3 allows for works to occur outside of standard construction hours during exceptional circumstances, including emergencies, delivery of oversized plant outside of standard hours and directed by authorised authorities. On becoming aware of the need to undertake emergency works under conditions of EPL 21147, contractors must notify the EPA as per L5.3(b) and submit a report no later than 2pm the next business day.

Condition L5.6 of the EPL permits work to occur outside of standard hours during Local Possessions.

Conditions L5.7, L5.8 and L5.9 of the EPL allow for Local Area and Utility Works to be undertaken where the works meet the requirements of these conditions.

In accordance with Condition L5.10 and L5.11, JHLOR may also undertake works in agreement with the community and as approved by the NSW EPA.

Refer to the CNVIS Addendum Report RWDI # 2508677, 28 January 2025 for application of EPL 21247.

5.2. General construction noise and vibration criteria

The Sydney Metro CNVS is applied for deriving construction noise and vibration management levels for Sydney Metro projects.

The primary reference for managing noise and vibration from construction and maintenance is the ICNG. Where specific receiver types are not explicitly assigned an NML in the ICNG, Sydney Metro has derived NMLs with reference to Australian Standard *AS/NZS 2107:2016 Acoustics - Recommended design sound levels and reverberation times for building interiors* AS2107 and Vibration Management Levels (VMLs) in accordance with relevant guidelines and standards. Refer to Section 2.1 for a list of guidelines and standards referenced in the CNVS.

5.3. Airborne construction noise

Table 10 sets out the ICNG airborne NML for residential receivers and how they are to be applied. The noise management levels are based on the RBL in each relevant assessment period. RBL is the overall single-figure background noise level derived from measurements in

each relevant assessment period (as defined in the EPA "Noise Policy for Industry" dated October 2017).

Sydney Metro recognises that there are periods during the night (10pm to 7am) when ambient noise is elevated, such as from traffic during the 10pm to midnight and 6am to 7am shoulder periods. Residents may be less sensitive to noise at these times due to the ambient noise providing more effective masking than during the quietest; midnight to 6am night-time period.

Noise management levels are external noise levels from construction activity and apply at the property boundary that is most exposed to construction noise. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence.

Table 10: How noise management levels at residences are derived (external)

Time of Day	Management Level $L_{Aeq(15minute)}$	How to Apply
Recommended standard hours: Monday to Friday 7.00 am to 6.00 pm Saturday 8.00 am to 6.00 pm No work on Sundays or public holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq(15min)}$ is greater than the noise affected level, the proponent would apply all feasible and reasonable work practices to minimise noise. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dB	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the proponent would consider very carefully if there is any other feasible and reasonable way to reduce noise to below this level. If no quieter work method is feasible and reasonable, and the works proceed, the proponent would communicate with the impacted residents by clearly explaining the duration and noise level of the works, and by describing any respite periods that will be provided.
Outside recommended standard hours	Noise affected RBL + 5 dB	A strong justification would typically be required for works outside the recommended standard hours. JHLORJV apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5dBA above the noise affected level, JHLORJV will apply appropriate mitigation measures. For guidance on negotiating agreements see section 7.2.2 of the ICNG.

Table 11 presents airborne NML for non-residential noise-sensitive land uses. The NML apply only when the property is being used, for example classrooms during school hours (including before- and after school activities). Internal noise levels are to be assessed at the centre of

the occupied room. External noise levels are to be assessed at the most-affected point within 50 m of the area boundary.

Table 11: NMLs at non-residential sensitive land uses

Land Use	Management Level, $L_{Aeq(15minute)}$ (Applies When Land Use is being Utilised)
Classrooms at schools and other educational institutions, when in use Places of worship, when in use Library, opening hours *Hospital wards and operating theatres*	Internal noise level 45 dB Equivalent external noise level 55 dB (windows open), or 65 dB (windows closed)
Childcare Centre, when in use	Outside play area External noise level 60 dB Inside play area Internal noise level 45 dB Equivalent external noise level 55 dB (windows open), or 65 dB (windows closed) Inside sleeping area Internal noise level 40 dB Equivalent external noise level 50 dB (windows open), or 60 dB (windows closed)
Active recreation areas (parks, sports grounds or playgrounds)	External noise level 65 dB
Passive recreation areas (such as outdoor grounds used for teaching, outdoor cafes or restaurants)	External noise level 60 dB
Café, Bar, Restaurant, opening hours *Hotel Bars and Lounges, Day and Evening*	Internal noise level 50 dB Equivalent external noise level 60 dB, windows open, or 70 dB, windows closed
Offices, retail outlets (commercial), when in use	External noise level 70 dB
Hotel Sleeping areas, Night time	*Internal noise level 40 dB*
Recording Studio, when in use	*Internal noise level 25 dB*
Theatre / Auditorium, when in use	*Internal noise level 30 dB*
Industrial premises	*External noise level 75 dB*

The noise management levels for residential, commercial and industrial receivers are applicable to external areas of the premises. When assessing other sensitive non-residential receivers with internal noise criteria, such as education facility, place of worship or medical centre, a 10dB reduction through a partially open window can be assumed, as detailed in the ICNG and CNVMP (except where the building is air conditioned). This allows for equivalent predictions to external areas of the premises.

Hospitals, industrial premises, hotels, bars, lounges, recording studios or theatres identified in the vicinity of the SWM3 works has been labelled in Appendix B. Detailed land use survey can be found in *Community Communications Strategy (CCS) (SMCSWSSJ-JHL-WSS-CL-PLN-000023)*.

Where internal noise management levels apply, the external equivalent has been derived assuming a 10dB noise reduction is used as a default assumption through a window opened sufficiently to allow natural ventilation through the window.

However, depending on observed and repeatable specific receiver characteristics, alternative external noise management equivalents can be revised as follows:

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- 20dB through a standard window with poor seals, if it can be demonstrated or reasonably assumed that the windows are fixed or kept closed. That is, the external noise level presented in the table above can be increased by 10dB. This must be determined through observations, and may change during the Project – for example people are more likely to keep their windows closed during colder winter nights than during the spring or summer;
- Higher levels of attenuation may be adopted, if agreed with Sydney Metro or the ER, if site inspections by a qualified acoustic consultant have determined that windows and facades of individual buildings provide a higher level of sound attenuation than 20dB and if it can be demonstrated or reasonably assumed that the windows are fixed or kept closed. In that case, the external noise level presented in the table above can be increased by 15dB or more, depending on the acoustic consultant's receiver-specific building envelope attenuation advice.
- Residential receivers may have been provided with property treatment, for example, as part of the NSW government roll out of aircraft, road noise or freight rail noise abatement programs, or as a result of pro-active construction noise management (including as a consequence of Condition E32 for this project). In these cases, the noise benefit achieved by the property treatment can be considered in the assessment of construction airborne noise impacts at these individual receivers. It is the Contractor's responsibility to determine if specific receivers have benefitted from property treatments. Sydney Metro must approve of any modifications to the external residential noise trigger levels for considering Additional Mitigation Measures (refer to Section 7.14).

Based on the background noise levels measured by SLR for the EIS, the applicable airborne NMLs are as presented in Table 12 below.

Table 12: Project specific residential

NCA	Recommended standard hours[1] (RBL + 10dB)	Outside recommended standard hours (RBL + 5dBA)		
	Daytime	Daytime (7am - 6pm)	Evening (6pm - 10pm)	Night-time (10pm - 7am)
NCA 01	48	43	43	38
NCA 02	48	43	43	38
NCA 03	48	43	43	39
NCA 04	50	45	45	40
NCA 05	46	41	41	37
NCA 06	55	50	47	40
NCA 07	51	46	46	40
NCA 08	57	52	52	46
NCA 09	54	49	49	41
NCA 10	57	52	46	56
NCA 11	57	52	52	44
NCA 12	64	59	56	47
NCA 13	52	47	47	44

NCA	Recommended standard hours[1] (RBL + 10dB)	Outside recommended standard hours (RBL + 5dBA)		
	Daytime	Daytime (7am - 6pm)	Evening (6pm - 10pm)	Night-time (10pm - 7am)
NCA 14 (*SSJ CNVIS NCA2*)[2]	51	46	51	45
NCA 15 (*SSJ CNVIS NCA3*)[2]	61	56	54	47
NCA 16 (*SSJ CNVIS NCA4*)[2]	62	57	48	43
NCA 17	53	48	48	44

Note 1 - Recommended standard hours (defined in the ICNG) are Monday to Friday 7am to 6pm, Saturday 8am to 1pm and no time on Sundays or public holidays.

Note 2 - Background noise was adopted from Sydenham Metro upgrade Construction Noise and Vibration Management Plan Ref: SMCSWSSJ-JHL-WSS-EM-PLN-000029. Monitoring for NCA14 to NCA16 was undertaken within the surrounding area between 18th & 27th June 2018, NCA 17 26/02/25 until 10/03/25.

5.4. High impact noise

High impact noise can be defined in two ways in the context of Sydenham to Bankstown works.

The ICNG defines “highly noise affected” (HNA) levels as exceeding 75dB(A) at residential receivers during daytime hours. It is common practice to adjust the HNA levels for evening and night time, by 5 and 10dB respectively. Where predicted noise levels exceed the HNA level, all reasonable and feasible mitigation measures are to be applied to the works.

In practice, this already occurs as Sydney Metro aims to meet the lower NML where reasonable and feasible. Residual impacts that cannot be eliminated through engineering controls are managed through timing of works and application of Additional Mitigation Measures (refer Section 7.13).

REMM NVC10 requires high noise and vibration generating activities including ballast tamping may only be carried out in continuous blocks, not exceeding 3 hours each, with minimum respite periods of one hour between each block and these works. CoA E24 also imposes additional restrictions on the timing of “Highly Noise Intensive Works.

There is no definition in the CoA SSI 8256 for “Highly Noise Intensive Works” mentioned in Condition E24. As such, JHLORJV have adopted the NSW EPA definition for High Noise Impact as documented in EPL 21147:

jack hammering, rock breaking or hammering, pile driving, vibratory rolling, cutting of pavement, concrete or steel or other work occurring on the surface that generates noise with impulsive, intermittent, tonal or low frequency characteristics.

Restrictions on timing of highly noise intensive or high noise impact generating works are summarised in Table 13 below.

Table 13: Restrictions on highly noise intensive works

	Conditions apply if the predicted noise exceeds the NML		
	CoA E24	LOR EPL 21147	REMM NVC6
Precedence	Except as permitted by an EPL	During rail possessions, LOR EPL 21147 applies	CoA and EPL override REMM if they are more onerous
Timing – general restrictions	**Must** only be undertaken: (a) between the hours of 8:00 am to 6:00 pm Monday to Friday; (b) between the hours of 8:00 am to 1:00 pm Saturday	**L5.4 states:** Unless otherwise specified by another condition of this licence, the following applies in relation to high noise impact works: (a) High noise impact works and activities must only be undertaken: 1. between the hours of 8:00am to 6:00pm Monday to Friday; 2. between the hours of 8:00am to 1:00pm Saturday; and 3. in continuous blocks not exceeding 3 hours each with a minimum respite from those activities and works of not less than 1 hour between each block. For the purposes of this condition 'continuous' includes any period during which there is less than a 1hour respite between ceasing and recommencing any of the work that is the subject of this condition. **L5.6 States:** b) High noise impact works and activities (excluding rail adjustment, tamping and regulating) may be undertaken during any local possession permissible by Condition L5.6(a) as follows: (i) where feasible and reasonable between the hours of 6:00am to 10:00pm on any day subject to the works and activities being undertaken in continuous blocks not exceeding 3 hours each with a minimum respite from those works and activities of not less than one hour between each block. For the purposes of this condition "continuous" includes any period during	Noise intensive plant would not be used during the night-time period (10pm to 7am) unless: • during a weekend rail possession or shut down • a requirement of a road authority, emergency services or Sydney Coordination Office requires works to be undertaken during this period. *Interpretation*: CoA E24 restrictions on Standard Construction Hours must be observed, unless there is a LPA under Condition L5.6 (weekend rail possession or shutdown) ROL under Condition L5.7 (local area/utility work)
Respite	In continuous blocks not exceeding three (3) hours each with a minimum respite from those activities and Works of not less than one (1) hour between each block. For the purposes of this condition, 'continuous' includes any period during which there is less than a one (1) hour respite between ceasing and recommencing any of the work that are the subject of this condition. *Interpretation*: other works can take place during the 1-hour "respite" time. 3:1 respite for HNI is offered where additional mitigation measures have not eliminated the impact ie AA not offered, or the noise impact is less than the high noise affected level when measured at the façade of the nearest sensitive receiver.		

	Conditions apply if the predicted noise exceeds the NML		
	CoA E24	LOR EPL 21147	REMM NVC6
		which there is less than a 1 hour respite between ceasing and recommencing any of the works or activities that are the subject of this condition.	
Assessment and Notification	Assessment and notification in accordance with Sydney Metro's CNVS and CCS.	**L5.12** Notification of works approved outside of standard construction hours	
Notification	Assessment and notification in accordance with Sydney Metro's CNVS and CCS.	(a) The licensee must notify affected noise sensitive receivers of works approved outside of standard construction hours not less than 5 days and not more than 14 days before those works are to be undertaken. (b) The notification must be: • by letterbox drop or email; and • be detailed on the project website. (c) The notification required by paragraphs (a) and (b) of this condition must: • clearly outline the reason that the work is required to be undertaken outside the hours specified in Condition L5.1; • include a diagram that clearly identifies the location of the proposed works in relation to nearby cross streets and local landmarks; • include details of relevant time restrictions that apply to the proposed works; • clearly outline, in plain English, the location, nature, scope and duration of the proposed works; • detail the expected noise impact of the works on noise sensitive receivers; • clearly state how complaints may be made and additional information obtained; and • include the number of the telephone complaints line required by Condition M4.1, an after hours contact phone number specific to the works undertaken outside the	

	Conditions apply if the predicted noise exceeds the NML		
	CoA E24	LOR EPL 21147	REMM NVC6
		hours specified in Condition L5.1, and the project website address. This condition does not apply to works undertaken in accordance with Condition L5.3.	

5.5. Sleep disturbance

At residential receivers, the ICNG and the RNP require an assessment of sleep disturbance for noise occurring at night (10pm to 7am). Sydney Metro's CNVS adopts the following approach for assessing sleep disturbance:

- External sleep disturbance screening level of L_{Amax} > RBL + 15 dB
- External sleep awakening level of 65 dB L_{Amax} (assuming open windows).

If the Sleep Disturbance screening level is not exceeded, then no further review of sleep disturbance is required. If the screening level is exceeded, then the L_{Amax} level is to be compared with the external equivalent Sleep Awakening Level (65dBL_{Amax}).

If the Sleep Awakening Level is exceeded, then sleep disturbance is to be reviewed in more detail. This may include consideration of whether windows are open or can be kept closed. If windows can be kept closed, then the External sleep awakening criterion is 75 dBL_{Amax} because it is based on an internal Sleep Awakening noise level.

The aim of sleep disturbance assessments is to determine appropriate mitigation measures. Mitigation measures may involve the use of quieter equipment, relocating equipment, using screens, or changing the timing of the work to a less noise-sensitive time. Refer to Section 7.

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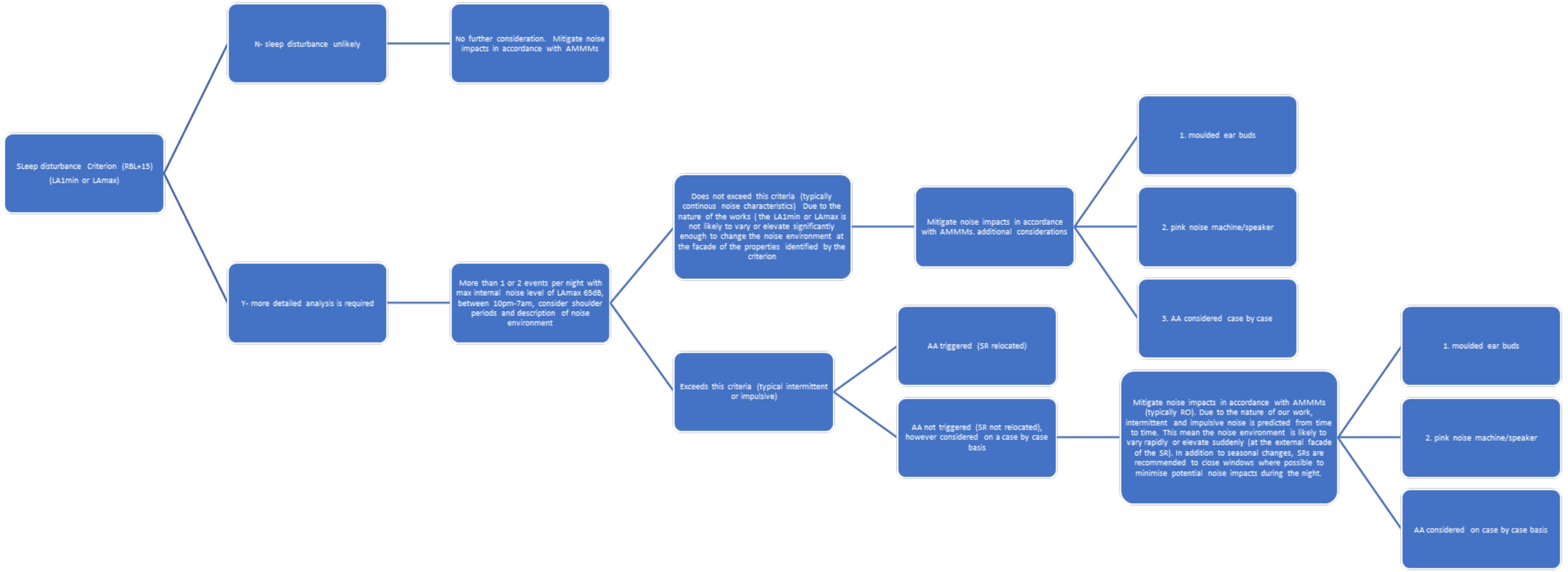
Figure 2 JHLOR JV Sleep disturbance assessment flow chart



5.6. Construction traffic noise

When trucks and other vehicles are operating within the boundaries of the various construction sites, road vehicle noise contributions are included in the overall predicted $L_{Aeq(15minute)}$ construction site noise emissions.

When construction related traffic moves onto the public road network a different noise assessment methodology is appropriate, as vehicle movements would be regarded as 'additional road traffic' rather than as part of the construction site. More detail is provided in the Sydney Metro CNVS.

In addition to the Sleep Disturbance criteria provided in Section 5.5, the RNP refers to Practice Note 3 of the Environment Noise Management Manual (ENMM) for specific impacts from road traffic. The ENMM recommends an evaluation of the number and distribution of night-time pass by events where:

- Construction-related truck event L_{Afmax} – General ambient $L_{Aeq(1hour)}$ > 15 dB, and
- Construction-related truck event L_{Afmax} > 65 dB L_{Amax}.

The ICNG does not provide specific guidance in relation to acceptable noise levels associated with construction traffic. For assessment purposes, guidance is taken from the RNP, which suggests feasible and reasonable noise mitigation measures should be considered where:

- The road traffic noise levels are predicted to increase by more than 2 dB as a result of construction traffic, and
- The resultant road traffic noise level, including construction traffic, exceeds the following road traffic noise criteria in the RNP:
  - 60 dB $L_{Aeq(15hour)}$ day and 55 dB $L_{Aeq(9hour)}$ night for existing sub-arterial roads.
  - 55 dB $L_{Aeq(1hour)}$ day and 50 dB $L_{Aeq(1hour)}$ night for existing local roads.

In addition, night-time road traffic noise due to intermittent maximum noise events, such as truck passby events, should be assessed against the sleep assessment criteria summarised above.

5.7. Building damage vibration goals

Most commonly specified 'safe' structural vibration limits are designed to minimise the risk of threshold or cosmetic surface cracks, and are set well below the levels that have potential to cause damage to the main structure.

Sources of vibration that are considered include demolition, excavation, piling, ground treatments (e.g. compaction), construction equipment and road traffic.

Details about the derivation and application of Sydney Metro construction vibration criteria to protect structures are presented in the Sydney Metro CNVS.

The British Standard 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.

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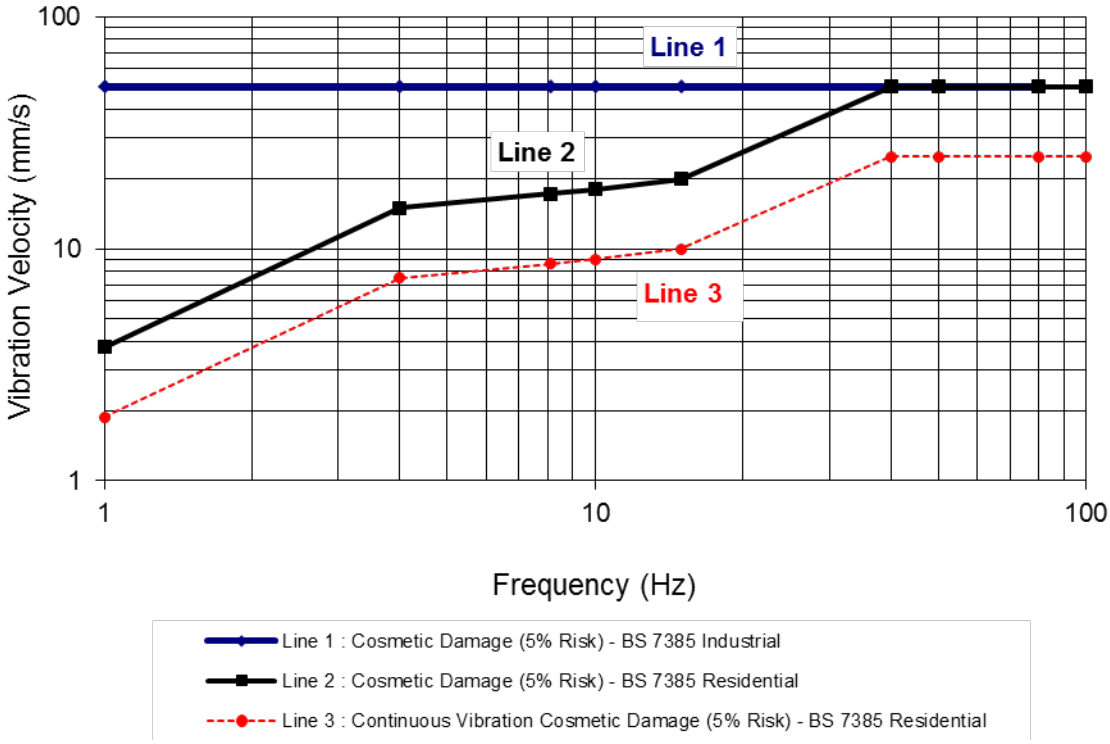
The recommended limits (guide values) for transient vibration to ensure minimal risk of cosmetic damage to residential and industrial buildings are presented numerically in Table 14 and graphically in Figure 3. These vibration goals are applicable to relevant structures, building elements or facades with the potential of being affected by vibration impacts.

Table 14: 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

Figure 3: Graph of Transient Vibration Guide Values for Cosmetic Damage



The Standard goes on to state that the vibration values given in Table 14 are less than half of vibration magnitudes at which minor damage is possible, and less than a quarter of the vibration magnitudes at which major damage to a building structure may occur.

It is noteworthy that extra to the guide values nominated in Table 14, 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."

The Standard states that the guide values in Table 14 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 may give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values in Table 14 may need to be reduced by up to 50%.

Most construction activities involving intermittent vibration sources such as rock breakers, vibratory rollers, excavators and the like, produce predominant vibration energy at frequencies greater than 4 Hz (and usually in the 10 Hz to 100 Hz range), and have the potential to cause dynamic loading in some structures (e.g. residences). On this basis, a conservative vibration damage screening level per receiver type adopts 50% of the values in Table 14 as listed below:

- Reinforced or framed structures: 25.0 mm/s
- Unreinforced or light framed structures: 7.5 mm/s
- Heritage structures (structurally sound): 7.5 mm/s
- Heritage structures (structurally unsound): 2.5 mm/s

If a heritage building or structure is found to be structurally unsound (following inspection) a more conservative cosmetic damage criteria (from DIN 4150) would be considered. At construction stage, prior to carrying out works, a structural or condition survey of heritage buildings within 30m of vibration-generating works is required (refer Section 8.2.3).

If the structural or condition survey is not carried out prior to vibration-generating works commencing, then heritage buildings are to be considered "structurally unsound" for the purpose of determining applicable construction-related vibration criteria. This is to adopt a precautionary approach until surveys establish the condition of the building.

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

5.8. Human comfort vibration goals

For vibration, EPA Construction Noise Guideline refers to the EPA Vibration Guideline for assessment of human comfort.

The construction noise and vibration management levels adopted by Sydney Metro represent applicable standards and guidelines. It is important to acknowledge that individual receivers respond to noise and vibration differently. During implementation phase, active community engagement plays a role in understanding individual perception and sensitivity.

The NSW EPA "Assessing Vibration: a technical guideline" dated February 2006 (AVTG) recommends the use of BS 6472-1992 for the purpose of assessing vibration in relation to human comfort.

Vibration dose values are considered appropriate for the assessment of non-continuous vibration sources associated with construction. The vibration dose value depends on both the

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level and duration of the short-duration vibration event, as well as the number of events occurring during the daytime or night-time period.

The levels highlighted in **bold** in Table 15 below are used in Sydney Metro projects as the Vibration Management Level.

Table 15: Vibration Dose Value (VDV) Ranges which might result in various probabilities of adverse comment within residential buildings, from BS6472-1992

Place and Time	Low Probability of Adverse Comment ($m/s^{1.75}$)	Adverse Comment Possible ($m/s^{1.75}$)	Adverse Comment Probable ($m/s^{1.75}$)
Residential buildings 16 hr day	0.2 to **0.4**	0.4 to 0.8	0.8 to 1.6
Residential buildings 8 hr night	0.1 to **0.2**	0.2 to 0.4	0.4 to 0.8

Note: For offices / schools and workshops, multiplying factors of 2 and 4 respectively would be applied to the above vibration dose value ranges for a 16 hr day, ie 0.8 $m/s^{1.75}$ for offices, educational institutions and places of worship, and 1.6 $m/s^{1.75}$ for workshops. It is not always practical to measure VDV during construction works, as the calculation relies upon duration, intensity and characteristic frequency of the measured vibration events throughout a work day.

In some cases, it may be necessary to relate to an instantaneous measurement, such as Peak Particle Velocity (PPV). Appendix C of the AVTG provides guidance on relating measurements of continuous and impulsive vibration to PPV. The criteria are included within Table 16.

Table 16: Criteria for exposure to continuous and impulsive vibration – alternative screening level for human comfort measured in real-time

Place and Time	Peak particle velocity (mm/s) – preferred / maximum	
	Continuous vibration	Impulsive vibration[1]
Residential buildings 16 hr day	0.28 – 0.56	8.6 – 17.0
Residential buildings 8 hr night	0.20 – 0.40	2.8 – 5.6
Offices, when in use	0.56 – 1.10	18.0 – 36.0
Workshops, when in use	1.10 – 2.20	18.0 – 36.0

[1] Impulsive vibration must be defined and measured in accordance with the relevant standard. The PPV levels associated with impulsive vibration would be considered to be intolerably high for intermittent and repetitive "impulsive" events, and should be applied to construction works with caution. It is not to be used to set any Alert / Alarm level in a vibration monitoring system used to assess human comfort.

5.9. Vibration affecting sensitive equipment

Some scientific equipment (e.g. electron microscopes and microelectronics manufacturing equipment) can require more stringent objectives than those applicable to human comfort.

No facilities in the vicinity of the proposed station works have been identified as having vibration-sensitive medical or scientific equipment. The following information is provided for reference in case a receiver with vibration-sensitive equipment is identified in future.

Where it has been identified that vibration sensitive scientific and/or medical instruments are likely to be in use inside the premises of an identified vibration sensitive receiver, objectives for the satisfactory operation of the instrument would be sourced from manufacturer's data. Where manufacturer's data is not available, generic vibration criterion (VC) curves as

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published by the Society of Photo-Optical Instrumentation Engineers (Colin G. Gordon – 28 September 1999) may be adopted as vibration goals. These generic VC curves are presented in Sydney Metro's CNVS.

The generic VC curves are considered to be conservative. It is beneficial for the project to carry out baseline vibration measurements are carried out at the building where vibration-sensitive equipment is located. If the ambient vibration already exceeds the VC curves, without affecting the equipment operation, then the site-specific sensitive equipment vibration criteria may be reviewed. If the site-specific equipment criteria are reviewed, any changes (ie increased levels compared with VC curves) would need to be agreed with the occupant / users of the equipment.

Table 17: Application and Interpretation of generic Vibration Criterion (VC) curves (as shown in Figure 2)

Criterion Curve	Max Level (µm/sec, rms)[1]	Detail Size (microns)[2]	Description of Use
VC-A	50	8	Adequate in most instances for optical microscopes to 400X, microbalances, optical balances, proximity and projection aligners, etc.
VC-B	25	3	An appropriate standard for optical microscopes to 1000X, inspection and lithography equipment (including steppers) to 3 micron line widths.
VC-C	12.5	1	A good standard for most lithography and inspection equipment to 1 micron detail size.
VC-D	6	0.3	Suitable in most instances for the most demanding equipment including electron microscopes (TEMs and SEMs) and E-Beam systems, operating to the limits of their capability.
VC-E	3	0.1	A difficult criterion to achieve in most instances. Assumed to be adequate for the most demanding of sensitive systems including long path, laser-based, small target systems and other systems requiring extraordinary dynamic stability.

Note 1: As measured in one-third octave bands of frequency over the frequency range 8 to 100 Hz.

Note 2: The detail size refers to the line widths for microelectronics fabrication, the particle (cell) size for medical and pharmaceutical research, etc. The values given take into account the observation requirements of many items depend upon the detail size of the process.

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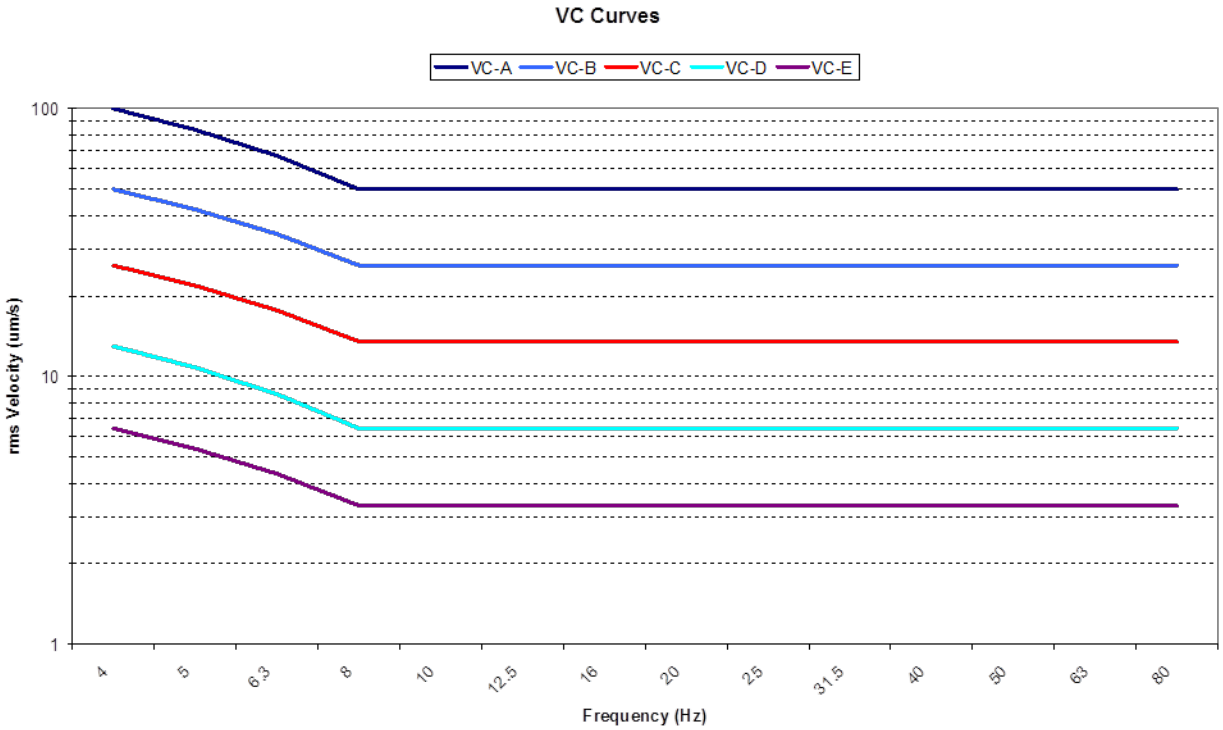
Figure 4: Vibration Criterion (VC) Curves



5.10. Vibration affecting buried utilities and services

Where structures and utilities are encountered which may be considered to be particularly sensitive to vibration, a vibration goal which is more stringent than structural damage goals presented in Section 5.7 may need to be adopted.

Examples of such structures and utilities include:

- Tunnels
- Gas pipelines
- Fibre optic cables

Specific vibration goals would be determined on a case-by-case basis, as the construction of these structures and utilities vary considerably. An acoustic consultant would be engaged by the construction contractor and would liaise with the structure or utility's owner in order to determine acceptable vibration levels.

The British Standard BS 7385-2:1993 'Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from ground-borne vibration' notes that structures below ground are known to sustain higher levels of vibration and are very resistant to damage unless in very poor condition (British Standard BS 7385-2:1993, p5). Further guidance is taken from the German Standard DIN 4150: Part 3-1999.02 'Structural vibration in buildings – Effects on Structures'. Section 5.3 of DIN 4150: Part 3 sets out guideline values for vibration velocity to be used when evaluating the effects of vibration on buried pipework.

Table 18 presents the initial reference guideline for utilities and other buried pipework to evaluate the effects of short-term vibration impact, for this Sydney Metro NVMP.

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If buried services are encountered for the proposed works, the Contractor must consult with the owner of the services to ensure that they agree with the vibration limit set for the works. An acoustic consultant and structural specialist may need to be involved in the consultation and review process.

Table 18: Transient vibration guide values for buried services – minimal risk of cosmetic damage (BS7385) – peak component particle velocity

Pipe material	Guideline values for vibration velocity measured on the pipe[1]
Steel (including welded pipes)	100 mm/s
Clay, concrete, reinforced concrete, pre-stressed concrete, metal (with or without flange)	80 mm/s
Masonry, plastic	50 mm/s
[1] Rockbreaking / hammering and sheet piling activities have the potential to cause dynamic loading in some structures and it may therefore be appropriate to reduce the transient values by 50%	

5.11. Ground-borne noise

Ground-borne (regenerated) noise is noise generated by vibration transmitted through the ground into a structure. Ground-borne noise caused, for example by underground works such as tunnelling, can be more noticeable than airborne noise.

The ground-borne NML adopted by Sydney Metro are provided in the CNVS.

The ICNG nominates ground-borne NML for residences during evening and night only. The internal noise levels are to be assessed at the centre of the most-affected habitable room. Under the ICNG, these ground borne noise management levels only require consideration of mitigation when ground-borne noise levels are higher than airborne noise levels.

Sydney Metro recognises that ground borne noise from some activities, for example by underground works such as tunnelling, can affect residential receivers during the day, and also other sensitive receivers. The following ground-borne noise levels incorporate the ICNG residential evening and night time noise management levels, and add other receiver types and times for Sydney Metro projects:

- Day (7.00 am to 6.00pm)
  Internal Residential: 45 dB $L_{Aeq(15minute)}$
  Internal Commercial: 50 dB $L_{Aeq(15minute)}$
- Evening (6.00 pm to 10.00pm)
  Internal Residential: 40 dB $L_{Aeq(15minute)}$
  Internal Commercial (if in use during Evening hours): 50 dB $L_{Aeq(15minute)}$
- Night-time (10.00 pm to 7.00 am) – typically not occupied, therefore not applicable
  Internal Residential: 35 dB $L_{Aeq(15minute)}$

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6. Predicted noise and vibration levels

JHLORJV provided acoustic consultant; RWDI with:

- Worksite locations for each station included in the Project's works;
- Works scenarios and likely timing of those works scenarios;
- A full list of plant and equipment expected during each works scenario.

RWDI has reviewed the plant and equipment and made assumptions about likely worst case scenarios in terms of the number of plant items which might operate at once on the worksite.

It is assumed that works may be carried out at any time of Day / Evening / Night, particularly during rail possessions. Noise predictions are presented in detail in the CNVIS, and summarised in this NVMP.

The CNVIS prepared in accordance with CoA E27 and REMM NVC1, predicts noise and vibration levels using more accurate understanding of the works scenarios, duration of each scenario, locations of equipment, timing of the works. These predictions are presented in detail, at each receiver. Where exceedances of management levels are predicted, reasonable and feasible mitigation is recommended for consideration by the contractor (refer Section 7).

On the basis of residual exceedances at individual receivers, the CNVIS determines which Additional Mitigation Measured (AMM) are required in accordance with the Sydney Metro CNVS (refer Section 7.13).

Predictions from the CNVIS is based on worst case for single activity scenario, or if the actual works scenario may be different to the CNVIS scenarios (for example if fewer plant items are on site and multiple activity scenarios taken place at the same location). JHLORJV will use Predict Tool (a noise modelling application developed RWDI specifically for SWM3) to revise all related predictions prior to any Out of Hour (OOH) works as part of the OOH Approval process under the LOR EPL 21147.

Interface Contractors will prepare work plans and out of hours works (OOHW) applications in accordance with their applicable EPL. If an EPL does not apply, the IC will work under the Sydney Metro OOH Work Protocol.The works scenario assessed in the approved CNVIS will be refined during detailed construction planning using the Predict Tool to model a more accurate noise impact by including modifying factor adjustments for annoying characteristics as applicable.

6.1. Prediction methodology

Site related noise emissions were modelled using the CadnaA noise prediction software. To complete this, a representative 3-D model within the software was constructed of the site and surrounding receivers.

Factors that are included in the modelling are:

- Source sound level emissions and locations;
- Screening effects from buildings
- Receiver locations;
- Ground topography;
- Noise attenuation due to geometric spreading; and

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- Atmospheric absorption and ground effects.

Detailed topographic information has been sourced from NSW Government – Land & Property Information and used in our acoustic model.

The modelling software allows for ground effects (assigned as 50% hard ground on this project), air absorption, distance attenuation and shielding from the terrain as well as buildings. A 10m x 10m grid has been used to generate contours for predictions.

The results of the airborne noise predictions are presented in the CNVIS associated with this NVMP.

For the CNVIS a number of scenarios have been assessed. It is not clear at this stage whether the proposed activities will occur concurrently. Therefore the approach for the assessment is to predict noise levels generated from various location listed in Table 19.

Table 19: Proposed Construction Works

Activity	Indicative Time frame	Details	Plant
Bankstown Station and Precinct Works	Sept 2024-May 2026	New, and modification to existing, infrastructure and systems to facilitate a new cross-corridor plaza between The Appian Way (north of the rail corridor) and Restwell Street (south of rail corridor) retail facilities and Station Precinct and Public Domain improvements. Separation of the current Sydney Trains line at Bankstown into sections for Sydney Metro and Sydney Trains including demolition of platform	Excavators, mobile cranes, light towers, EWPs, compaction equipment, hand tools, grinders, welding equipment, hi-rail plant, telehandlers, generators tipper trucks, non-destructive digging trucks. Jack hammering, saw cutting, CFA Piling Rig, telehandler, concrete truck, concrete pump, concrete vibrator, 24t excavator, powered hand tools (grinders etc), delivery trucks, 2t tipper, powered hand tools, EWP/scissor lift, 120t crane, Telehandlers, and delivery trucks, Excavators, mobile cranes, EWPs, compaction equipment including rollers, paving & asphalt machines, hi-rail & non hi-rail plant (including excavators, mulitcranes, scissor lifts, crane trucks, vac trucks, hydremas, concrete agitators), telehandlers, non-destructive digging trucks. Jack hammers, demolition/concrete saws & concrete cutting equipment, bored piling rigs, Continuous Flight Auguring Piling Rig, telehandlers, concrete trucks, concrete pumps, concrete vibrators, powered hand tools (grinders etc), delivery trucks, generators, tipper trucks, light vehicles, powered hand tools, saw cutting, grinders, welding equipment, lighting towers.
		Construction of Turn back, fencing and rail adjustment to Sydney Metro area to facilitate testing	Excavators, tampers, regulator, mobile cranes, light towers, EWPs, compaction equipment, hand tools, grinders, welding equipment, hi-rail plant, telehandlers, generators tipper trucks, non-destructive digging trucks.
Southwest Station Work	Sept 2024-Dec 2025	Equitable canopies and lifts, switchback ramps, landscaping, defect close out, station deep clean, heritage painting, final conversion scope (Platform Screen Doors), gap filler works	Jack hammering, saw cutting, CFA Piling Rig, telehandler, concrete truck, concrete pump, concrete vibrator, 24t excavator, powered hand tools (grinders etc), delivery trucks, 2t tipper, powered hand tools, EWP/scissor lift, 120t crane, Telehandlers, and delivery trucks, Excavators, mobile cranes, EWPs, compaction equipment including rollers, paving & asphalt machines, hi-rail & non hi-rail plant (including excavators, mulitcranes, scissor lifts, crane

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Activity	Indicative Time frame	Details	Plant
			trucks, vac trucks, hydremas, concrete agitators), telehandlers, non-destructive digging trucks. Jack hammers, demolition/concrete saws & concrete cutting equipment, bored piling rigs, Continuous Flight Auguring Piling Rig, telehandlers, concrete trucks, concrete pumps, concrete vibrators, powered hand tools (grinders etc), delivery trucks, generators, tipper trucks, light vehicles, powered hand tools, saw cutting, grinders, welding equipment, lighting towers.
Southwest Corridor Works	Sept 2024-Dec 2025	Corridor access stairs Screens fixed to CSR on bridges Vegetation management Acoustic treatment Boundary fencing Track monitoring	Excavators, mobile cranes, piling rig, concrete truck, concrete pump, compaction equipment, hand tools, grinders, welding equipment, tipper trucks, EWP, Mulcher, chainsaw, trucks
Asset Upgrades	Sept 2024-Dec 2025	Infringement and track rectification	Excavators, tampers, regulator, mobile cranes, light towers, EWPs, compaction equipment, hand tools, grinders, welding equipment, hi-rail plant, telehandlers, generators tipper trucks, non-destructive digging trucks.
		Bridge upgrades renewals	Excavators, mobile cranes, concrete pump, concrete vibrator, light towers, EWPs, compaction equipment, hand tools, grinders, welding equipment, hi-rail plant, telehandlers, generators
		Civil asset upgrade renewal	
Final Conversions	Sept 2024-Dec 2025	Sydenham junction final track configuration, fencing , wayfinding & signage (all stations), BMCS and lift conversions (Marrickville Station to Punchbowl Station) Earthing bonding, alteration works, insulated rail joints, redundant asset works Clean up work (final rail grind, final rail tamping, station refresh/deep clean) Station meal room alterations at 9 stations (Bankstown not included) Fixed gap filler works	Excavators, tampers, regulator, mobile cranes, light towers, EWPs, compaction equipment, hand tools, grinders, welding equipment, hi-rail plant, telehandlers, generators tipper trucks, non-destructive digging trucks.
ARTC Works	Sept 2024-Dec 2025	Temporary and permanent adjustments to ARTC operated and maintained infrastructure	Excavators, tampers, regulator, mobile cranes, light towers, EWPs, compaction equipment, hand tools, grinders, welding equipment, hi-rail plant, telehandlers, generators tipper trucks, non-destructive digging trucks.
Utility works	Sept 2024-Dec 2025	Qenos Pipe removal	Excavators, mobile cranes, hand tools, grinders, welding equipment, tipper trucks, EWP, trucks

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Activity	Indicative Time frame	Details	Plant
		Non ST or SM assets (typically non-contestable works)	
Property works	Sept 2024-Dec 2025	The Property Works comprises permanent adjustments to existing private properties required for, or as a consequence of the SWM3 Works and Temporary Works	
Demolition of Punchbowl Candy Shop and Parcel Office, Canterbury Signalling Building	Sept 2024-Dec 2025	Canterbury Signalling Building (Care must be taken not to damage the heritage listed timber signal hut nearby) Demolition of Punchbowl Candy and parcel office which are with the S170 heritage curtilage, however non-significant elements.	Excavators, mobile cranes, light towers, EWPs, hand tools, grinders, generators, tipper trucks, non-destructive digging trucks, concrete saw, jack hammers, water carts, sweepers.
Temporary site compound removal including Canterbury and North Terrace Road Bankstown	Sept 2024-May 2026	Removal of compound at Close St Canterbury Removal of compound within the carpark adjacent to North Terrace on the country (northern) side of Bankstown Station	Excavators, rollers, front end loader, crane, telehandler, EWP, hand tools, power tools, jack-hammer, concrete saw, trucks, water cart, street sweeper
		Ancillary facilities listed in Table 3 Temporary Construction facilities	Mobile Caravan Office and SWM3 satellite offices and laydown areas as required (in the process of investigation).
Temporary works	Sept 2024-May 2026	Geotech investigation, service searching, waste classification, bridge investigation, condition assessments other activities as per Section 1.1 of this CEMP.	Drill rigs, excavators, trucks, concrete trucks (for stabilised sand backfill), compaction equipment, lighting towers, watercart, street sweeper, hand tools Vacuum trucks, hand tools, lighting towers Elevated work platforms, hand tools, lighting towers Survey equipment, hand tools
Dynamic Train Testing & other MTR works to enable Dynamic Train Testing	Quarter 2 to Quarter 4 2025	T1: Train moving at walking speed T2: Train accelerating from 0km/hr to 40km/hr T3: Train moving at 100km/hr T4: Train moving at 25km/hr T5: Train accelerating from 0km/hr to 100km/hr, train decelerating from 100km/hr to 0km/hr T&C Works - Communication Based Train Control (CBTC)	Metro, HVAC, CVS, AGTU and traction systems, flat bed hi-rail truck, EWP, vac truck, hand tools

Activity	Indicative Time frame	Details	Plant
		testing and commissioning activities T&C Works -Communication and Central Control (CCCS) system testing and commissioning activities TOCC Rail Ops UTO Gate Work	

Activity	Indicative Time frame	Details	Location
Bankstown Station and Precinct Works	Sept 2024-May 2026	New, and modification to existing, infrastructure and systems to facilitate a new cross-corridor plaza between The Appian Way (north of the rail corridor) and Restwell Street (south of rail corridor) retail facilities and Station Precinct and Public Domain improvements. Separation of the current Sydney Trains line at Bankstown into sections for Sydney Metro and Sydney Trains including demolition of platform Construction of Turn back, fencing and rail adjustment to Sydney Metro area to facilitate testing	Bankstown Station and Precinct
Southwest Station Work	Sept 2024-June 2025	Equitable canopies and lifts, switchback ramps, landscaping, defect close out, station deep clean, heritage painting, final conversion scope (Platform Screen Doors), gap filler works	• Marrickville Station • Dulwich Hill Station • Hurlstone Park Station • Canterbury Station • Campsie Station • Belmore Station • Lakemba Station • Wiley Park Station • Punchbowl Station
Southwest Corridor Works	Sept 2024-June 2025	Corridor access stairs Screens fixed to CSR on bridges Vegetation management Acoustic treatment Boundary fencing Track monitoring	Entire Alignment
Asset Upgrades	Sept 2024-June 2025	Infringement and track rectification	Sydenham Station and Precinct
		Bridge upgrades renewals	• Duke St Overbridge • Beamish St Overbridge • Victoria Rd Underbridge • Meeks Road Underbridge

Activity	Indicative Time frame	Details	Location
			• Ness Av Underbridge • Foord Av Underbridge • Charles/Cooks River Underbridge • Canal 1&2 Underbridge • M24 (Part) Sewer Underbridge • 5.548 Freight Flyover • Sydenham Canal Underbridge
		Civil asset upgrade renewal	Entire Alignment
Final Conversions	Sept 2024-Dec 2025	Sydenham junction final track configuration, fencing, wayfinding & signage (all stations), BMCS and lift conversions (Marrickville Station to Punchbowl Station) Earthing bonding, alteration works, insulated rail joints, redundant asset works Clean up work (final rail grind, final rail tamping, station refresh/deep clean) Station meal room alterations at 9 stations (Bankstown not included) Fixed gap filler works	Entire Alignment
ARTC Works	Sept 2024-June 2025	Temporary and permanent adjustments to ARTC operated and maintained infrastructure	From Belmore Triangle to Meeks Road Underbridge
Utility works	Sept 2024-June 2025	Qenos Pipe removal Non ST or SM assets (typically non-contestable works)	Entire Alignment
Property works	Sept 2024-June 2025	The Property Works comprises permanent adjustments to existing private properties required for, or as a consequence of the SWM3 Works and Temporary Works	Punchbowl Station and Precinct
Demolition of Punchbowl Candy Shop and Parcel Office, Canterbury Signalling Building	Sept 2024-June 2025	Canterbury Signalling Building (Care must be taken not to damage the heritage listed timber signal hut nearby)	Canterbury Station and Precinct
		Demolition of Punchbowl Candy and parcel office which are with the S170 heritage curtilage, however non-significant elements.	Punchbowl Station
Temporary site compound removal including Canterbury and North Terrace Road Bankstown	Sept 2024-May 2026	Removal of compound at Close St Canterbury Removal of compound within the carpark adjacent to North Terrace on the country (northern) side of Bankstown Station	Canterbury Station and Precinct
		Ancillary facilities listed in Table 3 Temporary Construction facilities	Bankstown Station and Precinct

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Activity	Indicative Time frame	Details	Location
Temporary works	Sept 2024-May 2026	Geotech investigation, service searching, waste classification, bridge investigation, condition assessments other activities as per Section 1.1 of this CEMP.	Entire Alignment
Dynamic Train Testing	March 2025-September 2025	T1: Train moving at walking speed T2: Train accelerating from 0km/hr to 40km/hr T3: Train moving at 100km/hr T4: Train moving at 25km/hr T5: Train accelerating from 0km/hr to 100km/hr, train decelerating from 100km/hr to 0km/hr	Entire Alignment

It must be noted that for the purpose of preparing a CNVIS, realistic "worst case" scenarios have been assessed. For example, if the equipment list states that a 5-10T excavator would be used, the CNVIS noise prediction assumes that the noisier 10T excavator will be on site. To comply with this NVMP, it is expected that JHLORJV will make all reasonable and feasible efforts to apply at-source controls to reduce noise impacts and select the 5T excavator which would have a 5dB lower source sound power level.

It is noted also that applying an area noise source, rather than point sources at discrete locations around the work area, is conservative. JHLORJV choose to use a noise prediction tool which can position plant items around the site and take account of shielding, attenuation due to locating plant farther from receivers, and so on.

Therefore the CNVIS airborne noise predictions are typically considered to be conservative.

Ground borne noise and vibration prediction is specialist area and will be carried out by an acoustician as applicable. Due to the variation in vibration propagation through different ground types and building structures, and the low vibration-risk plant and activities proposed for the SWM3 works, a suitable screening approach for assessing vibration is to review whether vibration-generating plant will be used within "minimum working distances" of sensitive receivers. This is also considered to be conservative for most areas in Sydney; nevertheless it is important to confirm vibration propagation on site where works are within the minimum working distances (refer Section 6.4).

6.2. Predicted construction noise levels

A project specific CNVIS has been prepared for these works, as required in CoA E27. The CNVIS has predicted noise and vibration levels for a range of scenarios and compared them against the criteria and guidelines detailed in Section 5 of this management plan. Measures to manage the predicted impacts are derived from Section 7 of this management plan. Where impacts are predicted, mitigation measures as identified in Section 7 are recommended. Additionally, predictions and outcomes of the CNVIS have been used to revise the management methodology and mitigation measures in Section 7. The CNVIS has been Generated in July 2024 to assess SWM3 works.

Predicted noise and vibration levels from the CNVIS are available in **Appendix D** – CNVIS and reproduced in Table 20 and Table 21 of this plan.

A detailed land use survey has been undertaken to confirm sensitive receivers (including critical working areas such as operating theatres and precision laboratories) potentially exposed to construction noise and vibration and construction ground-borne noise. The land use survey provides details of the location and type of all noise sensitive receivers. This information is used to apply appropriate noise criteria to each nearby receiver in the CNVIS assessment.

Most of the works occurring along the rail corridor are in close proximity to receivers, a large proportion of which are residential. Table 20 and to Table 23 below demonstrates which noise catchment areas are predicted to experience LAeq noise levels exceeding the night-time NML and LAmax noise levels respectively due to these works. Table 20 and Table 22 are related to SWM3 Works and Table 21 and Table 23 are related to MTR Dynamic Testing.

Noise levels shaded light blue indicate exceedances above the applicable NML or sleep disturbance criteria.

During Scenario 1 exceedances of the NML for residential receivers are confined to NCAs 11, 12 and 13 only.

The Highly Noise Affected Management Level of LAeq(15min) 75dBA is not predicted to be exceeded. A similar outcome is predicted for Scenarios 9 and 10A.

Some of the corridor scenarios are expected to produce higher noise levels, up to 92dBA in some circumstances.

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Table 20: Predicted worst-case noise levels for all Scenarios, LAeq,15minutes

	Std Hours	OOH			Predicted Worst Case Noise Levels $L_{Aeq,15minutes}$															
	Day	Day	Eve	Night	S1A	S1B	S2	S3	S4A	S4B	S4C	S5	S6	S7	S9	S10A	S11	S12A	S12B	S12C
NCA 01	48	43	43	38	-	-	77	92	52	78	86	86	86	86	-	-	86	-	-	-
NCA 02	48	43	43	38	-	-	72	90	32	73	84	84	86	84	27	29	84	-	-	-
NCA 03	48	43	43	39	-	-	76	90	-	77	84	84	83	84	45	47	84	-	-	-
NCA 04	50	45	45	40	-	-	72	91	-	77	85	85	87	85	73	75	85	-	-	-
NCA 05	46	41	41	37	-	-	48	83	-	71	77	77	77	77	41	38	77	-	-	-
NCA 06	55	50	47	40	-	-	69	88	-	78	82	82	82	82	24	32	82	-	-	-
NCA 07	51	46	46	40	-	-	69	90	-	35	84	84	66	84	-	-	84	-	-	-
NCA 08	57	52	52	46	-	-	68	83	-	-	77	77	34	77	30	-	77	-	-	-
NCA 09	54	49	49	41	-	-	70	86	-	-	80	80	-	80	45	-	80	-	-	-
NCA 10	57	52	52	46	36	29	66	81	-	-	75	75	-	75	63	30	75	-	-	-
NCA 11	57	52	52	44	54	35	40	90	-	-	84	84	-	84	40	52	84	-	-	-
NCA 12	64	59	56	47	68	39	26	81	-	-	75	75	-	75	26	64	75	32	31	60
NCA 13	52	47	47	44	50	64	-	91	-	55	85	85	-	85	-	42	85	41	40	60
NCA 14	51	46	46	45	-	-	38	88	78	85	82	82	52	82	-	-	82	-	-	-
NCA 15	61	56	54	47	-	-	32	85	56	69	79	79	39	79	-	-	79	-	-	-
NCA 16	62	57	48	43	-	-	37	76	69	70	70	70	53	70	-	-	70	-	-	-
NCA 17	53	48	48	44	-	-	-	-	-	-	-	-	-	-	-	-	-	79	79	57

Table 21: Predicted worst-case noise levels for DTT, LAeq,15minutes

NCA[1]	Address of Worst Affected Receiver	Std Hours NMLs[2]	OOH NMLs[2]			Predicted Worst Case Noise Levels per Scenario[3], dBA $L_{Aeq,15minutes}$				
		Day	Day	Evening	Night	DTT1 walking speed	DTT2 0 km/h to 40 km/h	DTT3 100 km/h	DTT4 25 km/h	DTT5 Accel/decel to 100km/h
NCA 01	10 Arthur Street Marrickville	48	43	43	**38**	**39**	**46**	**45**	29	**34**
NCA 02	24 Kays Avenue E Marrickville	48	43	43	**38**	**42**	**49**	**48**	32	**37**
NCA 03	64 Garnet Street Hurlstone Park	48	43	43	**39**	36	**43**	**42**	26	**31**
NCA 04	22 Charles Street Canterbury	50	45	45	**40**	39	**46**	**45**	29	**34**
NCA 05	26 Bellombi Street Campsie	46	41	41	**37**	34	**41**	**40**	24	**29**
NCA 06	23 Loch Street Campsie	55	50	47	**40**	38	**46**	**45**	29	**34**
NCA 07	101-105 Bridge Road Belmore	51	46	46	**40**	36	**43**	**42**	26	**31**
NCA 08	34 Moreton Street Lakemba	57	52	52	**46**	37	44	43	27	32
NCA 09	1-3 Shadforth Street Canterbury	54	49	49	**41**	34	**41**	40	24	29
NCA 10	154-159 The Boulevarde Punchbowl	57	52	52	**46**	27	34	34	<20	23
NCA 11	105 Stansfield Avenue Canterbury	57	52	52	**44**	38	**46**	**45**	29	**34**
NCA 12	228 South Terrace Bankstown	64	59	56	**47**	33	41	40	24	29
NCA 13	2 Weigand Avenue Bankstown	52	47	47	**44**	40	**48**	**47**	31	**36**
NCA 14	110 Railway Road Sydenham	51	46	46	**45**	32	39	38	22	27
NCA 15	2 Bolton Street Sydenham	61	56	54	**47**	<20	22	21	<20	<20
NCA 16	103 Railway Parade Marrickville	62	57	48	**43**	22	29	28	<20	<20

1. NCAs identified per the CNVIS.
2. NMLs sourced from the CNVIS.
3. Refer to section 2.1 for detailed description of scenarios.

Table 22: Predicted worst-case noise levels for all Scenarios sleep disturbance, LAMax

	Night	Predicted Worst Case Noise Levels L_{AMax}															
		S1A	S1B	S2	S3	S4A	S4B	S4C	S5	S6	S7	S9	S10A	S11	S12A	S12B	S12C
NCA 01	48	-	-	87	102	62	78	86	86	95	90	-	-	95	-	-	-
NCA 02	48	-	-	82	100	42	73	84	84	95	88	31	33	93	-	-	-
NCA 03	49	-	-	86	100	-	77	84	84	92	88	49	51	93	-	-	-
NCA 04	50	-	-	82	101	-	77	85	85	96	89	77	79	94	-	-	-
NCA 05	47	-	-	58	93	-	71	77	77	86	81	45	42	86	-	-	-
NCA 06	50	-	-	79	98	-	78	82	82	91	86	28	36	91	-	-	-
NCA 07	50	-	-	79	100	-	35	84	84	75	88	-	-	93	-	-	-
NCA 08	56	-	-	78	93	-	-	77	77	43	81	34	-	86	-	-	-
NCA 09	51	-	-	80	96	-	-	80	80	-	84	49	-	89	-	-	-
NCA 10	56	44	29	76	91	-	-	75	75	-	79	67	34	84	-	-	-
NCA 11	54	62	35	50	100	-	-	84	84	-	88	44	56	93	-	-	-
NCA 12	57	76	39	36	91	-	-	75	75	-	79	30	68	84	30	29	87
NCA 13	54	58	64	-	101	-	55	85	85	-	89	-	46	94	40	39	81
NCA 14	55	-	-	48	98	88	85	82	82	61	86	-	-	91	-	-	-
NCA 15	57	-	-	42	95	66	69	79	79	48	83	-	-	88	-	-	-
NCA 16	53	-	-	47	86	79	70	70	70	62	74	-	-	79	-	-	-
NCA 17	54	-	-	-	-	-	-	-	-	-	-	-	-	-	80	80	78

Table 23: Predicted worst-case noise levels for DTT sleep disturbance, LAMax

NCA[1]	Address of Worst Affected Receiver	Sleep disturbance criteria [2]	Predicted Worst Case Noise Levels per Scenario[3], dBA L_{AMax}				
		Night	DTT1 walking speed	DTT2 0 km/h to 40 km/h	DTT3 100 km/h	DTT4 25 km/h	DTT5 Accel/decel to 100km/h
NCA 01	10 Arthur Street Marrickville	48	55	68	71	49	57
NCA 02	24 Kays Avenue E Marrickville	48	60	73	76	54	62
NCA 03	64 Garnet Street Hurlstone Park	49	51	65	68	46	54
NCA 04	22 Charles Street Canterbury	50	54	68	71	49	57
NCA 05	26 Bellombi Street Campsie	47	47	60	63	41	49
NCA 06	23 Loch Street Campsie	50	54	67	70	48	56
NCA 07	101-105 Bridge Road Belmore	50	54	68	71	49	57
NCA 08	34 Moreton Street Lakemba	56	52	66	69	47	55
NCA 09	1-3 Shadforth Street Canterbury	51	50	63	66	44	52
NCA 10	154-159 The Boulevarde Punchbowl	56	46	59	62	41	49
NCA 11	105 Stansfield Avenue Canterbury	54	56	70	73	51	59
NCA 12	228 South Terrace Bankstown	57	45	59	62	40	48
NCA 13	2 Weigand Avenue Bankstown	54	56	70	73	51	59
NCA 14	110 Railway Road Sydenham	55	51	64	67	45	53
NCA 15	2 Bolton Street Sydenham	57	28	42	45	23	31
NCA 16	103 Railway Parade Marrickville	53	37	51	54	32	40

1. NCAs identified per the CNVIS.

2. NMLs sourced from the CNVIS.

3. Refer to section 2.1 for detailed description of scenarios.

6.3. Construction traffic noise assessment

As described in the CNVS there are no specific traffic noise criteria relating to construction work. Criteria are therefore adopted from Road Noise Policy (RNP) published by the EPA.

The CNVS states that construction traffic noise management levels are set 2dB above the existing road traffic noise levels during the day and night periods. Where the road traffic noise levels are predicted to increase by more than 2dB as a result of construction traffic, consideration is to be given to reasonable and feasible mitigation measures. In considering these mitigation measures, consideration would also be given to the actual noise levels associated with the construction traffic and whether or not these levels comply with the criteria in the RNP. These criteria are presented in Table 4.

REMM NVC15 requires that the routes for construction haulage vehicles and bus services associated with the Temporary Transport Strategy would be selected on the basis of compliance with the relevant road traffic noise criteria, where reasonable and feasible. Where compliance with the noise criteria is not possible, reasonable and feasible noise mitigation would be implemented. This would be assessed on a case by case basis, using methods such as time of day or movement limits and vehicles using alternate routes.

Figure 5 Road traffic noise criteria

Road type	Period	Criteria
Freeway Arterial Sub Arterial	Day	$L_{Aeq(15\ hour)}$ 60dB
	Night	$L_{Aeq(9\ hour)}$ 55dB
Local	Day	$L_{Aeq(15\ hour)}$ 55dB
	Night	$L_{Aeq(9\ hour)}$ 50dB

When trucks and other vehicles are operating within the boundaries of construction sites/access gates, road vehicle noise contributions will be included in the predicted LAeq(15minute) noise emissions and assessed against the ICNG criteria.

Mitigation options are described in Section 7.

6.4. Construction vibration assessment

As required by CoA E18 all vibration sensitive receivers have been identified.

There are a number of heritage listed structures within the project area. The majority of those are the stations within the rail corridor. There are a small number of heritage listed structures close to the rail line however not in locations close to any vibrations intensive work and therefore not expected to be negatively impacted by vibration intensive construction works.

The Cooks River Bridge is a heritage structure that will be potentially impacted by the SWM3 construction works. There has already been construction on and around this bridge as part of earlier Sydney Metro works, and the remaining work is not considered vibration intensive.

The vibration-generating works and activities associated with the Project's works are:

- Vibratory roller

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- Bored piling rig
- Excavator with hammer attachment

Safe working distances for these vibration-generating activities are provided in TfNSW I&S CNVS (2018). Extracts of the I&S CNVS table of safe working distances are provided below for the works relating to this Project.

Table 24: Typical vibration emission and working distances from vibration-generating plant proposed for the SWM3 works

Plant	Recommended minimum working distance[1]	
	Building damage	Human comfort
Vibratory Roller (20t)	25m	100m
Vibratory Roller (7-13t)	15m	100m
Vibratory Roller (4-6t)	12m	40m
Bored Piling	2m (nominal)	N/A
Medium Hydraulic Hammer (900kg hammer on 12-18t exc)	7m	23m
Large Hydraulic Hammer (1500kg hammer on 30t exc)	22m	73m

Note 1 - Minimum working distances from TfNSW Construction Noise and Vibration Strategy.

Unless stated otherwise the assessment will be based on the screening criteria of 7.5mm/s for an unreinforced structure, including heritage-listed buildings and structures which have been found to be structurally sound.

The recommendations made in this NVMP are based on the typical Minimum Work Distances presented in the table above.

REMM NVC3 requires a more detailed assessment of the structure if the vibration levels are predicted to exceed the vibration screening level, or fall within the recommended Minimum Working Distance. REMM NCV4 further requires that heritage items located within the Safe Working Distance require a more detailed assessment including a condition assessment (refer Section 8.2.3) and specifically consider the heritage values of the structure in consultation with a heritage specialist.

The CNVS requires that attended vibration measurements are carried out before any vibration intensive construction activities commence. Potential mitigation will be reassessed following the attended measurements to determine site-specific safe working distances.

Considering that the station buildings are themselves heritage-listed structures (structurally sound), some of the vibration-generating works are expected to be within the safe work distances.

Where JHLOR prepares detailed works plans and determines that any vibration-generating works will be carried out within the safe working distances to any affected sensitive receiver, then attended vibration monitoring will be required at the commencement of vibration-generating works in accordance with the CNVS.

CoA E30 also requires that a heritage specialist be consulted when installing equipment used for vibration, movement and noise monitoring around heritage listed structures. More information is provided in Section 8.

JHLOR must select the plant and equipment which generates the lowest vibration levels while still being capable of effectively carrying out the work (refer Section 7.5). In some cases this

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may require longer work durations as a necessary outcome of ensuring that no damage occurs due to the works. JHLOR is expected to build contingencies for vibration-minimising works methods in the work plans.

6.5. Construction ground-borne noise assessment

Ground-borne or regenerated noise is noise generated by vibration transmitted through the ground into a structure that may lead to noise “regenerated” within a space in the building. The ground-borne noise criteria are presented in Section 5.11.

The CNVS states that the ground borne noise criteria are only applicable when ground-borne noise levels are higher than the airborne noise levels.

All the works previously identified with the potential to cause vibration impacts are surface works. Levels within receiver buildings are predicted to be very low, and below the ground-borne noise management levels. Importantly, in these cases noise impacts from airborne noise will be worse than ground-borne noise. A detailed ground-borne noise assessment is not required.

7. Noise and vibration management and mitigation

7.1. Site noise mitigation measures

This section sets out the standard or minimum construction noise and vibration mitigation measures to be implemented on all Sydney Metro projects.

The standard mitigation measures presented in Section 7 shall be applied by default in order to minimise the potential noise and vibration impacts at the surrounding Noise Sensitive Receivers. The aim is to meet the NML and VML where feasible and reasonable in accordance with CoA E29.

Construction hours would be in accordance with the Project's CoA and the EPL (refer Section 5.1).

Avoiding the coincidence of noisy plant working simultaneously close together and adjacent to sensitive receivers will result in reduced noise emissions. Note that clustering noisy plant can present opportunities for effective implementation noise screening, therefore this control needs to be considered on a case by case basis (refer Section 7.3).

Where feasible and reasonable, locate plant to maximise the offset distance and / or maximise screening between noisy plant items and nearby noise sensitive receivers.

Loading and unloading of materials/deliveries is to occur as far as possible from noise sensitive receivers. Provide shielding if close to noise-sensitive receivers.

Select site access points and roads as far as possible away from noise sensitive receivers. Ensure that construction-related road traffic adheres to applicable rules and requirements including speed limits and muffler performance. Staff using access gates are required to adhere to neighbour-friendly work practices such as quiet operation of gates and locks, and minimising idling.

Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.

In accordance with REMM NVC11, ongoing noise and / or vibration monitoring would be undertaken during construction at sensitive receivers during critical periods (ie times when noise emissions are expected to be at their highest) to identify and assist in managing high risk noise events (refer Section 8).

As applicable to S7.2 through to S 7.5, in accordance with EPL 21147 Condition L4.1

JHLORJV will *implement all feasible and reasonable noise and vibration mitigation measures at the premises to minimise noise and vibration impacts on noise sensitive receivers to seek to achieve the Noise Management Levels in the Interim Construction Noise Guidelines (DECC, 2006).*

7.2. Source noise control strategies

The following source noise control strategies are presented as examples of ways that selecting alternative methods and adapting plant can reduce noise at source.

Engines and exhausts are typically the dominant noise sources on mobile plant such as cranes, graders, excavators, heavy vehicles, etc. Residential grade mufflers are to be fitted on all mobile plant used on Sydney Metro construction projects.

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The noise levels of plant and equipment items are to be considered in the JHLORJV procurement and rental decisions and in any case cannot be used on site unless compliant with the criteria in table 11 of the CNVS. Refer to Appendix H – Site Request Form (as part of procurement process).

Regular inspection and maintenance of all plant and machinery used for the Project by the JHLORJV, will assist in minimising noise emissions, including the reporting of the results.

Regular compliance checks on the noise emissions of all plant and machinery used for the Project would indicate whether noise emissions from plant items were higher than predicted. This also identifies defective silencing equipment on the items of plant.

The JHLORJV will also ensure that air brake silencers are correctly installed and fully operational for any heavy vehicle that approaches and uses any of the Project's construction or compound sites.

Non-tonal reversing alarms will be used for all permanent mobile plant operating on the Project. Consideration will be given to fitting non-tonal vertical movement alarms for plant such as cherry pickers. It is noted that OH&S requirements must also be fully satisfied. Any changes or concessions will include ER recommendations.

The JHLORJV will minimise the use of high noise activities such as diamond or concrete saws and hydraulic breaker / tamping, and limit to less sensitive times where feasible and reasonable (refer also Section 5.4).

The JHLORJV will use bored piling methods where feasible, instead of impact or driven piling methods. Implement low noise methods for removing spoil from the auger, use of spoil removal accessories, or rotating the auger in one direction only to avoid the impact noise due to back-and-forth rotation (if spoil type is suited to this method of removal).

The JHLORJV will use electric pumps instead of diaphragm air pumps where possible.

The JHLORJV will use electric equipment instead of diesel such as electric chainsaws and generators where possible.

The JHLORJV will use "silent" lighting towers to minimise continuous noise from lighting towers / daymakers.

The JHLORJV will use pulverisers instead of conventional concrete breaking methods for demolition where possible (unlikely to be relevant to the SWM3 works).

Tray-back utility vehicles are to have resilient mat or carpet to minimise impact noise where feasible and reasonable.

7.3. Noise barrier control strategies

Temporary noise barriers are recommended between the noise sources and nearby potentially affected noise sensitive receivers, wherever feasible. Typically, 5 dB to 15 dB attenuation can be achieved with a well-constructed solid ply hoarding or mass-loaded vinyl noise curtain such as Echobarrier, Flexshield Sonic Quilt or Acoustica AcoustiFlex SQ products.

Stationary noise sources such as generators will be enclosed or shielded where practicable or where sensitive receivers are impacted.

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Localised noisy activities such as concrete saws and jackhammers will be used inside temporary noise screens, whilst ensuring that the occupational health and safety of workers is maintained. Note that it may be preferable in some cases to carry out the noisy activities more quickly, without erecting temporary noise curtains, to avoid the activity extending into more noise-sensitive evening or night-time periods. The use of noise curtains for high noise activities will be considered on a case-by-case basis to ensure that the Project requirements for limiting the timing of such works are met (refer to Section 5.4).

Use structures to shield residential receivers from noise such as site shed placement; earth bunds; fencing; erection of operational stage noise barriers (where practicable) and consideration of site topography when situating plant.

For the services building worksites, the majority of the works will largely be short-term in door activity. Site buildings themselves provide shielding for adjacent receivers.

Acoustic enclosures or sheds are not considered to be a reasonable option for the SWM3 works. However temporary structures can be considered for equipment used regularly on site, such as pumps and generators.

CoA E32 requires that early implementation of any operational noise mitigation measures which can be installed during construction phase. As there are no potential locations of operational noise mitigation measures near the Project's worksites, E32 is not relevant to the works covered by this NVMP.

7.4. Demolition strategies

Demolition works including the following scopes:

- Demolition of Canterbury Signalling Building
- Demolition of Punchbowl Candy Shop and Parcel Office
- Removal of redundant Sydney Trains Assets

These demolition works are not expected to be significantly more noise intensive than other construction activities associated with these works. noise and vibration management and mitigation practices for these works should be consistent with the practices outlined in Section 7.1 above.

7.5. Vibration control strategies

Vibration-minimising methods are to be selected where feasible and reasonable.

JHLORJV must select the plant and equipment which generates the lowest vibration levels while still being capable of effectively carrying out the work. In some cases this may require longer durations which may be a necessary outcome of ensuring that no damage occurs due to the works.

Examples relevant to the Project's works are:

- Smooth drum roller preferred, or else pad foot roller, instead of vibratory roller
- Diamond / concrete saw to cut platform surface to remove in pieces, instead of jackhammer

Attended vibration measurements are required at the commencement of vibration generating activities to confirm that vibration levels satisfy the criteria for that vibration generating activity.

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Where there is potential for exceedances of the criteria further vibration site law investigations will be undertaken to determine the site-specific safe working distances for that vibration generating activity. Continuous vibration monitoring with audible and visible alarms will be conducted at the nearest sensitive receivers whenever vibration generating activities need to take place inside the calculated safe-working distances.

The pattern of vibration radiation is very different to the pattern of airborne noise radiation and is very site specific. Final vibration levels are dependent on many factors including the actual plant used, its operation and the intervening geology between the activity and the receiver. Section 6.4 presents the recommended minimum working distances for vibration intensive plant. The minimum working distances for cosmetic damage must be complied with at all times, unless otherwise approved by the relevant authority.

REMMS NVC3 and NVC4 require a more detailed assessment of structures located within the Minimum Working Distances presented in Section 6.4. The purpose of the more detailed assessment is to determine the appropriate vibration limits for the potentially affected structure, and to identify sensitive heritage fabric in any heritage-listed structure. This process is described more fully in Section 8.2.3.

The minimum working distances presented in Section 6.4 are indicative and will vary depending on the plant item and local geotechnical conditions. They apply to cosmetic damage of typical buildings under typical geotechnical conditions. Vibration monitoring can be carried out to confirm the minimum working distances at specific sites (refer Section 8.2.2).

In accordance with REMM NVC13, JHLORJV will implement reasonable and feasible measures in accordance with the CNVS to minimise groundborne noise where exceedances are predicted.

7.6. Community consultation and management

The benefits of good and clear communications are often under-estimated. In practice it is one of the most important aspects of noise and vibration management.

Pro-active community engagement assists in:

- Building stakeholder support for, and understanding of, the Sydney Metro project;
- Understanding the community and supporting their objectives (be it residential, commercial, education, or other);
- Minimising, where possible, project impacts on stakeholders and the community; and
- Ensuring stakeholders and the community fully understand that activities to be undertaken by the contractors, their objectives, benefits, potential impacts and expected outcomes.

Sydney Metro's Overarching Communications Consultation Strategy (OCCS) describes the requirements for community engagement during various stages of the project. The OCCS includes time frames for responding to complaints, record-keeping, and provision of up-to-date and accurate information.

A Business Management Plan has also been prepared for the Project.

Requirements for community engagement includes, for example:

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- Notification (including targeted letterbox drops, doorknocks and email) of any planned works that may disturb local residents and businesses (such as noisy activities, access changes and night work);
- Community signage to advise of work that may affect transport (such as road closures, changes to pedestrian routes and changes to bus stops);
- Community contact facilities including via the Sydney Metro website (sydneymetro.info), community email address and 24-hour toll-free community information line; and
- Regular updates to the Sydney Metro website (sydneymetro.info) including uploading notifications and providing community contact details; and
- Individual briefings as required by the CNVS as part of implementation of Additional Mitigation Measures by Place Managers (refer Section 7.14).

JHLORJV is responsible for providing the Place Manager with as much information as is required to effectively inform the community of upcoming works and potential impacts.

As JHLORJV develops works plans, the timing and duration and location of the works will be known in more detail. This important step of assessing impacts in finer detail enables the JHLORJV to better understand what mitigation methods are available, review the works plans, and then update the residual impact predictions after application of mitigation.

Noise predictions, including CNVIS prepared in accordance with CoA E27 are to be as accurate as possible to assist project managers and contractors plan ahead to manage and mitigate the impacts of their activities, and this includes the provision of appropriate community measures.

The residual impact predictions are then provided to the Communications Manager or Place Manager to assist with their role in:

- Preparing works notices or information – such as a description of the works and what to expect, and timing plus location of the works;
- Applying management measures where predicted noise levels exceed trigger levels described in the Sydney Metro CNVS, to provide Specific Notification to affected individuals, and offer Respite, or Alternative Accommodation;
- Engaging with receivers as required to negotiate suitable respite periods, for example rest times in affected Child Care Centres;
- Informing the community of the times of planned high-noise works.

CoA E23 requires that the Proponent identify appropriate respite periods for out-of-hours work in consultation with the community at each affected location on a regular basis. This consultation must include provision of:

(a) A schedule of likely out-of-hours work for a period no less than two (2) months;

(b) The potential work / activities proposed and the location and duration of the work;

(c) The noise characteristics (such as hammering, perceptible vibration), and the likely noise levels of the work; and

(d) Likely mitigation and management measures to be applied, including the selection of lower-noise and –vibration equipment, use of screening or noise curtains, and timing of noisy works.

If Emergency works are required, JHLORJV must also “use best endeavours to notify all noise and / or vibration affected receivers of the likely impact and duration” of Emergency works in accordance with CoA E20.

A register of noise and vibration sensitive receivers is to be kept on site and in Sydney Metro’s records. The register will include the following details for all known noise and vibration sensitive receivers within 300m of the worksite:

- Address of receiver
- Category or receiver (eg residential, child care, etc)
- Contact name and number if known

Records of consultation and agreements relating to respite periods will be retained by the JHLORJV in the noise and vibration sensitive receiver register. In accordance with CoA E23, records of agreed respite periods, timing restrictions and alternate arrangements will be kept on file by the JHLORJV and be provided to the Planning Secretary or the EPA, upon request.

It is noted that the sensitive times for non-residential receivers might not align with typical sensitive periods for residential receivers. In accordance with CoA E28, JHLORJV will carry out community consultation with community, religious or educational institutions to identify their noise sensitive periods, prior to works commencing which generate noise levels above the NMLs at these locations. Works which generate noise levels above the NMLs at these locations will not be programmed within sensitive periods, where feasible. Where it is not feasible to plan works outside noise-sensitive periods, the JHLORJV will consult with the affected receiver(s) to determine if alternate arrangements can be made, at no cost to the affected institution.

JHLORJV is required to consider the impact of noise and vibration on the amenity of businesses in the preparation of the Business Management Plan. The Business Management Plan will consider the potential noise and vibration impacts on businesses, particularly for works during standard business hours, which typically align with the least noise-sensitive periods for residential receivers.

The Sydney Metro Place Manager is responsible for maintaining updated records of the local community and receiver type. If the JHLORJV learns that a receiver is incorrectly or incompletely categorised, then they must inform the Sydney Metro Place Manager to follow up and update the receiver records. For example, if a receiver is categorised as “commercial” but is found to have a shop-top residence, then Sydney Metro will need to update the records to apply both “commercial” and “residential” to the same address.

Complaints and enquiries relating to noise and vibration management will be managed in accordance with the Sydney Metro Overarching Community Communication Strategy (OCCS) and Section 3.7 of the CEMP.

7.7. Standard Construction hours and out-of-hours work

As explained in Section 5.1, CoA E19 defines Sydenham to Bankstown standard construction hours as, i.e. 7am to 6pm Monday to Friday, and 8am to 6pm Saturday.

CoA E24 requires that “highly noise intensive works” (refer Section 5.4) are only carried out between 8am and 6pm Monday to Friday and 8am to 6pm Saturday, and with the provision of respite periods such that work must only be undertaken in continuous blocks not exceeding three hours each with a minimum respite period of not less than one hour between each block.

The only exception to this Condition is if "highly noise intensive works" are carried out under an EPL, i.e. during a rail possession when LOR EPL 21147 applies (refer Section 5.4).

CoA E20 permits works outside the hours specified in E19, to allow for:

(a) Delivery of materials required by the NSW Police Force of other authority for safety reasons;

(b) Emergency requirements to avoid injury or loss of life, to avoid damage or loss of property or environmental harm;

(c) Where an EPL permits different hours of work (applicable when works are carried out under a rail possession);

(d) Where works has been approved under an Out-of-Hours Work Protocol (refer Appendix D for a copy of the approved Out-of-Hours Work Application to be used for obtaining approval for out-of-hours work);

(e) When applicable NMLs and VMLs are met; or

(f) Where a negotiated agreement has been reached with the substantial majority of nearby sensitive receivers – this condition is unlikely to be required for the Project's works, as the scheduled work periods including rail possessions (when EPL 21147 will apply) consider rail operations as well as community impacts, and are unlikely to be substantially modified due to Sydney Trains' requirements to maintain an operational railway.

Shut down periods are proposed, however 24-hour, 7-days a week work at the same sensitive receiver is not expected for the Project's works. However, if such work were required it would be carried out under a longer term rail possession, when EPL 21147 will apply (EPL Condition L5.6).

E22 notes that out of hours work may be required to avoid high safety risk to construction personnel or members of the public, or if the proponent has received advice in writing that:

- Carrying out the activities could result in a high risk to road network / utility operational performance or integrity – written advice from the relevant road authority or utility service operator;
- A road occupancy licence (ROL) is required and the ROL will not be issued for the activities during the standard Sydenham to Bankstown approved work hours – written advice from TfNSW Management Centre or other road authority; or
- A rail possession is required – advice from Sydney Trains, Sydney Metro (as the rail operator) or ARTC (in locations near the shared freight rail corridor).

Condition E22 states that the conditions listed above are either regulated by an EPL (for example, under LOR's EPL 21147 during a rail possession), or through Sydney Metro's Out-of-Hours Work Strategy/Protocol. Refer to Appendix A for a list of EPL 21147 Clauses that relate to construction noise and vibration for the Project.

Conditions E20, E22, E23 and E25 all refer to Sydney Metro's Out-of-Hours Work Strategy/Protocol.

E25 describes the requirements of the Protocol, including approvals processes. Sydney Metro has prepared a Chatswood to Bankstown document which addresses the requirements of the CNVS and the respective approval conditions for the Chatswood to Sydenham and Sydenham to Bankstown Sydney Metro projects. Both the Sydney Metro City and Southwest Out-of-

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Hours Work Strategy/Protocol and the approved OCCS describe Planning Secretary, EPA and community notification requirements for out-of-hours work, in accordance with E25.

The Out-of-Hours Work Application is a requirement of the Sydney Metro City and Southwest Out-of-Hours Work Strategy/Protocol. A copy of the JHLORJV EPL 21147 OOH Work Application is provided in Appendix E – JHLORJV EPL 21147 OOH Work Application. This Application includes both qualitative and quantitative construction noise and vibration assessment components, and allows JHLORJV to demonstrate how construction noise and vibration impacts are to be minimised for the proposed out-of-hours work. The mitigation methods include equipment selection and location, and timing of works.

The REMM NVC7 and NVC8 also consider timing of activities to provide respite periods for non-residential sensitive receivers, and management of construction-related traffic as follows:

- When working adjacent to schools, medical facilities and childcare centres, particularly noisy activities would be scheduled outside normal working hours, where feasible and reasonable.
- When working adjacent to churches and places of worship particularly noisy activities would be scheduled outside services, where feasible and reasonable.

This is in line with CoA E23, which requires consultation with affected communities. The specific requirements of E23 are described in Section 7.6.

REMM NVC5 also considers timing of construction-related traffic as follows:

- Where feasible and reasonable heavy vehicle movements would be limited to daytime hours.
- The implementation of procedures to maximise the night time onsite spoil storage capacity where spoil is produced between the hours of 10.00pm and 7.00am to reduce the noise impact to sensitive receivers from loading, transporting and offloading spoil.
- The arrival and departure times of construction-related vehicles is to be included in the out-of-hours works applications as part of the assessment of noise impacts from construction-related traffic.

7.8. Site environment induction and training

In accordance with NVC2, all employees, contractors and subcontractors are to receive an environmental induction. The site induction will include the following as a minimum:

- All relevant project specific and standard noise and vibration mitigation measures;
- Relevant licence and approval conditions;
- Permissible hours of work;
- Site opening/closing times (including deliveries);
- Any limitations on high noise generating activities;
- Location of nearest sensitive receivers;
- Designated loading/unloading areas and procedures; and
- Environmental incident reporting and management procedures

A site plan is required to illustrate the location of sensitive receivers, parking and loading areas, and plant and equipment to be used around the site.

7.9. Neighbour friendly behaviour

All staff and workers associated with Sydney Metro projects must implement neighbour-friendly behaviour.

The site induction will include the following standard requirements for all staff working on Sydney Metro projects:

- No swearing or unnecessary shouting or use of loud stereos/radios;
- No dropping of materials from height, throwing of metal items and slamming of doors;
- No excessive revving of plant and vehicle engines;
- Power down plant when not in use;
- Switch off vehicles when stopped for more than 5 minutes or when parked, including near access gates;
- Controlled release of compressed air in heavy vehicles.

All community engagement would be in accordance with the Sydney Metro OCCS.

If staff are approached by members of the public, they are to engage with courtesy and respect, but direct all queries and complaints to the central Sydney Metro information and complaints website, email address or phone service (refer Section 7.6).

7.10. Restriction on Deliveries & Site Access

Deliveries to site and removal of material from site, particularly at Belmore Triangle is to be restricted to standard construction hours, unless otherwise approved through the OOH process.

Access to the site will be as specified in the Construction Traffic Management Plan. These will consist of existing Sydney Trains access gates and any new gates that need to be constructed to access the corridor. All trucks will comply with sign-posted speed limits.

It is the responsibility of the Construction Manager and Superintendent to ensure that deliveries occur in accordance with this section.

7.11. Cumulative impacts management

The term Cumulative Impacts relates to two or more projects occurring around the same time, affecting the same receivers.

In the context of Sydenham to Bankstown project, this occurs when there is an overlap in time and the works are conducted around the same time. This may result in an overall increase in noise levels when works are carried out close to one another, at the same time. It may also result in a lack of “quiet times” or respite periods, when two project packages carry out work in the same location over the same few months but on different days or nights.

Cumulative impacts may result in receivers requiring additional consideration of mitigation and management than if they had been exposed to a single package of work.

Where projects are expected to be carried out in the same area and within a similar time frame, clustering some construction activities may result in reduced durations of noise

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exposure and may also allow for effective implementation of mitigation of all the works (eg install noise curtains around the shared worksites).

When reviewing out-of-hours works applications for individual works activities, cumulative impact considerations for other projects or contractors working in the area focus on:

- Adding noise levels from concurrent works activities, to ensure that appropriate mitigation measures are in considered and implemented; and
- Coordinating respite periods or “quiet times” to ensure that receivers experience quiet periods, free from audible work (may be one or two hours per night, or three nights per week, for example).

JHLORJV will coordinate their works with other Sydney Metro contractors, as well as external parties such as local Councils, Roads and Maritime Services and Sydney Trains, Utilities services (refer Section 7.12), other infrastructure projects such as WestConnex and also urban renewal projects.

It is the JHLORJV’s responsibility to determine concurrent works, or works just prior or just after the proposed JHLORJV activities. The purpose is to:

- Add noise levels when works occur concurrently, as this may change the additional mitigation measures which are considered (refer Section 7.13 and 7.14);
- Coordinate with other contractors’ to develop agreed hours of respite and share restrictions;
- Ensure that Evenings / Nights of Respite have been provided by confirming that works are not planned immediately before or after the Project’s planned works.

This coordination also a requirement for CoA E26. Refer to Section 7.12 for provision of respite and coordination with other contractors as required by EPL 21147, Condition L5.7 & L5.8.

It must be recognised that this Project takes place in the context of other Sydney Metro construction activities. For local receivers, the various works packages are likely to be perceived as one works package, being “Sydney Metro works”. The duration of the Project’s works may be relatively short for a large infrastructure project, but the total duration of Sydney Metro construction activities affect the same receivers for an extended period.

It is important to acknowledge that construction activities carried out over a period of more than a year, affecting the same receivers, is likely to become less tolerable.

For this reason, it is important to understand that the receivers may experience “construction fatigue”. There is no definition for construction fatigue, or when it is likely to occur. As with all noise responses, there is likely to be a significant range among individuals. This may be due to individual noise or vibration sensitivity, and individual circumstances.

Even for seemingly straightforward, relatively low noise activities, all feasible and reasonable efforts to mitigate the noise must be made. For example noise screening around noise generators will be provided out-of-hours works, not because they are the dominant noise source, but because they are constant noise sources used over long periods.

7.12. Utility coordination and respite

Related to cumulative impacts and provision of aligned respite periods described in Section 7.11 above, CoA E26 states that:

Work undertaken for the delivery of the CSSI, including those undertaken by third parties (such as utility relocations), must be coordinated to ensure respite periods are provided. The Proponent must:
*(a) reschedule Work to provide respite to impacted noise sensitive receivers so that the respite is achieved in accordance with **Condition E23**; or*
(b) consider the provision of alternative respite or mitigation to impacted noise sensitive receivers; and
*(c) provide documentary evidence to the **ER** in support of any decision made by the Proponent in relation to respite or mitigation.*

The provisions for Respite for Utility and Local Area Works are to be provided in accordance with EPL 21147 Condition L5.7 & L5.8 for JHLORJV. The Place Manager and Utility Coordination Manager will be able to assist in helping the JHLORJV coordinate works with third parties and understand the various agreed Respite Periods and, where possible, negotiate respite periods which can be effectively implemented by all contractors working in the local area. It is the responsibility of the JHLORJV to liaise directly with other Sydney Metro contractors to coordinate works and proposed respite periods. Interface Contractors will prepare work plans and out of hours works (OOHW) applications in accordance with their applicable EPL. If an EPL does not apply, the IC will work under the Sydney Metro OOH Work Protocol.

Interface meetings are regularly facilitated by Sydney Metro to coordinate works including those carried out by local Councils.

If Respite Periods cannot be aligned between Contractors working in the same area, JHLORJV must be able to justify why the proposed SWM3 and IC works cannot observe the same Respite Periods as other Contractors. Justification may be related to limited access to the worksite for a rail possession, for example. All reasonable and feasible efforts will be made to observe the same respite periods as other works packages. Community information about planned works must provide information about which package of work cannot adhere to Respite Periods which are observed by other Contractors working in the area, and provide the reason(s) for not being able to align Respite Periods.

Documentary evidence of works coordination including copies of written correspondence and meeting minutes with relevant third parties will be retained by JHLORJV, and be provided to the ER within one week - should this evidence be requested by the ER.

7.13. Additional mitigation measures

The implementation of the standard management measures, compliance with maximum sound power levels for plant and equipment, construction hour management and standard community engagement measures in this NVMP should significantly reduce the noise and vibration impacts on nearby sensitive receivers.

Nevertheless, due to the highly variable nature of construction activities and the likelihood of work outside the standard construction hours the Project, exceedances of the construction NML and VML are likely to occur, even after application of all feasible and reasonable mitigation.

Where there is a potential exceedance of the construction NML and VML a number of additional measures to mitigate such exceedances – primarily aimed at pro-active engagement with affected sensitive receivers – will be explored and have been included in this Strategy. The Additional Mitigation Measures (AMM) to be applied are outlined in Table 23.

Table 25: Additional Mitigation Measures (AMM)

Measure	Description	Abbreviation
Alternative accommodation	Alternative accommodation options may be provided for residents living in close proximity to construction works that are likely to incur unreasonably high impacts over an extended period of time. Alternative accommodation will be determined on a case-by-case basis. It is recommended that residential receivers who decline the offer of Alternative Accommodation should still have Respite Offers (such as movie tickets or dinner vouchers) made available to them, although this is not a strict requirement under the CNVS.	AA
Monitoring	Where it has been identified that specific construction activities are likely to exceed the relevant noise or vibration goals, noise or vibration monitoring may be conducted at the affected receiver(s) or a nominated representative location (typically the nearest receiver where more than one receiver have been identified). Monitoring can be in the form of either unattended logging or operator attended surveys. The purpose of monitoring is to inform the relevant personnel when the noise or vibration goal has been exceeded so that additional management measures may be implemented.	M
Individual briefings	Individual briefings (door knocks) are used to inform neighbouring properties about the impacts of high noise activities and mitigation measures that will be implemented. Place Managers from the contractor would visit identified receivers at least 48 hours ahead of potentially disturbing construction activities. Individual briefings provide affected stakeholders with personalised contact and tailored advice, with the opportunity to comment on the project.	IB
Letter box drops	For each Sydney Metro project, a newsletter is produced and distributed to the local community via letterbox drop and the project mailing list. These newsletters provide an overview of current and upcoming works across the project and other topics of interest. The objective is to engage and inform and provide project-specific messages. Advanced warning of potential disruptions (e.g. traffic changes or noisy works) can assist in reducing the impact on the community. Content and newsletter length is determined on a project-by-project basis. Most projects distribute notifications on a monthly basis. Each newsletter is graphically designed within a branded template.	LB
Project specific respite offer	The purpose of a project specific respite offer is to provide residents subjected to lengthy periods of noise or vibration respite from an ongoing impact. Respite offers may be in the form of movie tickets or dinner vouchers, to provide residents with opportunities to spend time away from their home during works exceeding the applicable level. Alternative respite offers to movie or dinner vouchers may be considered as the Place Manager is familiar with the local community.	RO
Phone calls and emails	Phone calls and/or emails detailing relevant information would be made to identified/affected stakeholders within 7 days of proposed work.	PC
Specific Notification	Specific notifications will be issued to affected properties 7 days before work starts and may include paper notifications letterbox dropped to affected properties or emailed to registered stakeholders. Phone calls and/or emails provide affected receivers with personalised contact and tailored advice, with the opportunity to provide comments on the proposed work and specific needs etc. This form of communication is used to support periodic notifications, or to advertise unscheduled works.	SN

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7.14. Applying AMM

The Sydney Metro CNVS provides guidance on the application of AMM. In circumstances where - after application of the standard mitigation measures - the $L_{Aeq(15minute)}$ construction noise and vibration levels are still predicted to exceed the noise or vibration objectives, the relevant AMM matrix (see Table 24 to Table 26) is to be used to determine the AMM to be implemented. This requirement is supplemental to the basic requirements in the ICNG.

Using the relevant AMM matrix, the following steps need to be carried out to determine the additional mitigation measures to be implemented:

- Determine the duration (time period) when the work is to be undertaken.
- Determine the level of exceedance.
- From the relevant AMM matrix, identify the additional mitigation measures to be implemented (using the abbreviations which are expanded in Table 23).

Note that the AMM matrix considers residential impacts and noise sensitivity in terms of the standard construction hours defined in the ICNG, and this concept is to be applied to Sydenham to Bankstown works. As the CSSI CoAs permit Saturday 1-6pm work as “standard” for this project, this is not considered to be “out of hours” for the purpose of applying AMM. Additionally, during works under a rail possession, in accordance with EPL21147 L5.1, Saturday 1-6 pm is considered “standard construction hour”.

Table 26: AMM matrix – Airborne construction noise

Time Period		Mitigation Measures			
		Predicted $L_{Aeq(15minute)}$ Noise Level Above Background (RBL) for residential receivers, or above NML for non-residential receivers / internal residential receiver locations			
		0 to 10 dB	10 to 20 dB	20 to 30 dB	> 30 dB
Standard	Mon-Fri (7.00 am - 6.00 pm)	-	-	M, LB	M, LB
	Sat (8.00 am - 6.00 pm)				
	Sun/Pub Hol (Nil)				
OOHW 1	Mon-Fri (6.00 pm - 10.00 pm)	-	LB	M, LB	M, IB, LB, RO,SN
	Sat (6.00 pm - 10.00 pm)				
	Sun/Pub Hol (8.00 am - 6.00 pm)				
OOHW 2	Mon-Fri (10.00 pm - 7.00 am)	-	M, LB	M, IB, LB, RO, SN	AA, M, IB, LB, RO, SN
	Sat (10.00 pm - 8.00 am)				
	Sun/Pub Hol (6.00 pm - 7.00 am)				

The AMM for airborne noise is based on external noise levels when applied to residential receivers. If the Contractor confirms that a residential receiver has a high performance building envelope, for example due to having treated as part of an aircraft sound insulation plan, then the trigger level for AMM may be adjusted to account for reduced internal noise levels. Sydney Metro and the ER must be consulted to approve any adjustments to the external AMM airborne noise trigger level for residential receivers.

Table 27: AMM matrix – Ground borne construction noise

Time Period		Mitigation Measures Predicted $L_{Aeq(15minute)}$ Noise Level Exceedance above NML		
		0 to 10 dB	10 to 20 dB	> 20 dB
Standard	Mon-Fri (7.00 am - 6.00 pm)	LB	LB	M, LB, SN
	Sat (8.00 am - 6.00 pm)			
	Sun/Pub Hol (Nil)			
OOHW 1	Mon-Fri (6.00 pm - 10.00 pm)	LB	M, LB, SN	M, IB, LB, RO, SN
	Sat (6.00 pm - 10.00 pm)			
	Sun/Pub Hol (8.00 am - 6.00 pm)			
OOHW 2	Mon-Fri (10.00 pm - 7.00 am)	M, LB, SN	AA, M, IB, LB, RO, SN	AA, M, IB, LB, RO, SN
	Sat (10.00 pm - 8.00 am)			
	Sun/Pub Hol (6.00 pm - 7.00 am)			

Table 28: AMM matrix – Ground borne construction vibration

Time Period		Mitigation Measures Predicted Vibration Levels Exceed Maximum Levels (for human comfort), or the recommended limit (for vibration-sensitive equipment)
Standard	Mon-Fri (7.00 am - 6.00 pm)	M, LB, RP
	Sat (8.00 am - 6.00 pm)	
	Sun/Pub Hol (Nil)	
OOHW 1	Mon-Fri (6.00 pm - 10.00 pm)	M, IB, LB, RO, SN
	Sat (6.00 pm - 10.00 pm)	
	Sun/Pub Hol (8.00 am - 6.00 pm)	
OOHW 2	Mon-Fri (10.00 pm - 7.00 am)	AA, M, IB, LB, RO, SN
	Sat (10.00 pm - 8.00 am)	
	Sun/Pub Hol (6.00 pm - 7.00 am)	

Based on the predicted typical worst case noise levels and the review of minimum work distances for vibration-generating works, AMM are expected to be considered for the Project's works (refer to Table 27). The requirements for AMM will be refined as JHLORJV prepares more detailed OOHW Applications which delineate when noisy equipment is used, which engineering mitigation measures can be applied, and where and when noise screening is implemented. It is expected that through careful planning of the timing of noise-intensive works, particularly in accordance with the requirements of E24 and as described in Section 5.4, the requirements for AMM can be reduced in most cases.

Table 29: Recommended AMM matrix to be considered for the Project

Scenario	Period	Mitigation Measures
All Scenarios – worst case	Day	LB, M
	OOHW 1	RO, M, IB, SN, LB

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Scenario	Period	Mitigation Measures
	OOHW 2	AA, RO, M, IB, SN, LB

7.15. Construction traffic noise management

Construction-related activities can occur outside the defined worksite or premises. The most far-reaching aspect is construction-related transport - mostly trucks and large equipment arriving on site by road.

REMM NVC15 requires that *"The routes for construction haulage vehicles and bus services associated with the Temporary Transport Strategy would be selected on the basis of compliance with the relevant road noise traffic criteria, where reasonable and feasible. Where compliance with the noise criteria is not possible, reasonable and feasible noise mitigation would be implemented."*

Mitigation measures that will be implemented where feasible and reasonable include:

- Implementing and monitoring driver behaviour rules, such as smooth braking and accelerating, adhering to truck speed limits;
- Monitoring and enforcing vehicle compliance including ensuring that compliant mufflers are fitted;
- Engineering solutions such as high grade mufflers.
- Establishing truck routes which avoid noise-sensitive residential receivers as far as practicable. Truck routes will be determined and described in the JHLORJV's CTMP;
- Deliveries to site and removal of material from site is to be restricted to standard construction hours, unless otherwise approved. Access to the site will use the access points specified in the JHLORJV's Construction Traffic Management Plan (CTMP). These will consist of existing Sydney Trains access gates and any new gates that need to be constructed to access the corridor.

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8. Construction noise and vibration monitoring program

8.1. Baseline data

Baseline noise data is available from the extensive noise surveys carried out by SLR for the EIS in late 2016. A desktop sensitive receiver survey undertaken as part of the JHLORJV Community Consultation Strategy has not identified any additional residential, commercial, or business developments, no change in industry along the Sydenham to Bankstown Corridor. Speed limits have not changed either. It is safe to assume the noise level has not increased by more than 3dB as this would require traffic to double (provided the speed does not change). The noise level is unlikely to decrease except as a result of extraordinary circumstances such as a pandemic.

Background noise was adopted from Sydenham Metro upgrade Construction Noise and Vibration Management Plan Ref: SMCSWSSJ-JHL-WSS-EM-PLN-000029. Monitoring for NCA14 to NCA16 which was undertaken within the surrounding area between 18th & 27th June 2018.

Using the original RBL's may lead to slightly more conservative noise predictions. The results of the surveys are replicated in Section 3.2.As described in this section, some NCAs have been split into two for the purpose of assessing the Project's works. This is possible without new noise measurements because SLR's EIS Technical Paper includes noise survey results from individual noise loggers along the alignment, some of which are near the Station worksites and more applicable to the proposed works covered by this NVMP and the associated CNVIS.

These SLR baseline noise survey results have been used to set the applicable NMLs for Day, Evening and Night-time works. No additional baseline noise surveys are considered necessary for the Project at this stage.

8.2. Monitoring

In accordance with CoA C13, a noise and vibration monitoring program is to be carried out for the duration of Construction.

Noise or vibration monitoring is required:

- In response to noise or vibration complaints;
- If requested by Sydney Metro, the ER, DPHI or EPA;
- To augment baseline noise levels, if the noise environment at a receiver is considered to be different from the noise logger locations used for the EIS;
- To confirm baseline vibration levels currently experienced at heritage-listed structures and at any vibration-sensitive equipment;
- To verify predictions, particularly at the commencement of vibration-generating works;
- Where vibration levels are predicted to exceed the vibration screening level, attended vibration monitoring will be carried out to ensure vibration levels remain below appropriate limits for that structure, in accordance with REMM NVC12;
- As part of a plant noise audit;

- If predicted noise or vibration levels exceed the trigger levels requiring "M" (Monitoring) in accordance with the AMM matrices provided in Section 7.14.

Noise monitoring is required if the predicted airborne noise level is above the applicable AMM trigger level, which is set relative to the NML. Vibration monitoring is required if vibration-generating works are carried out within the Safe Working Distances provided in Section 6.4.

Ground borne noise measurements are not required for the Project, as the review of ground borne noise indicates that it would not be audible above airborne noise and therefore does not require further assessment in accordance with the CNVS (refer Section 6.5).

Attended noise or vibration monitoring during construction is necessary to:

- Observe the character of the existing noise or vibration sources;
- Note the local topography, built environment, and other man-made or natural features which may affect sound or vibration propagation (eg existing walls which may act as a noise barrier or sound-reflective surface, or structural breaks on site which reduce vibration propagation);
- Validate the noise or vibration logger data by comparing attended and unattended data, and also by comparing subjective experience of how audible or perceptible the noise and vibration is with the measured levels (particularly when the NML is lower than the prevailing ambient noise level, as noted in Section 5.3);
- Obtain spot measurements at more locations around the area to understand local noise variations and confirm that the noise or vibration logger data is representative of the most-affected receivers;
- Determine whether the noise levels from the works are within the predicted levels presented in the approved works CNVIS;
- Meet the requirements of the CNVS AMM to consider monitoring when predicted levels exceed trigger levels defined in the CNVS (refer Section 7.14).

Generally, noise and vibration monitoring which is triggered by the CNVS AMMM are to be carried out in a location representing the receiver. JHLORJV will be responsible for determining the most appropriate monitoring locations, based on the proposed Construction activities and any noise and vibration modelling or assessments carried out, in accordance with the CNVS. The measurements must include a method to derive or directly compare the measured levels with the applicable NML or VML, and the predicted noise level in the CNVIS.

For example, the applicable NML is in terms of $L_{Aeq(15min)}$ which applies outside a residence. The measurement may be carried out on the footpath outside the residence, and the measured level would ideally also be a 15-minute measurement but might need to be a shorter period to exclude other ambient noises such as passing buses. If any post-processing or analysis is required to compare with measurement with the applicable NML or VML, then the adjustment method is to be clearly described in the monitoring report. The raw measured data must be presented in all monitoring reports, and the post-processed data must also be presented if requested by Sydney Metro (or EPA or DPHI).

Unattended noise or vibration loggers are suitable for meeting the requirements of the CNVS AMM matrices, particularly if the noise- or vibration-intensive work is localised (for example, at the station platform). Unattended monitoring is useful for works which move to different parts of the worksite (for example, along the rail corridor). Loggers are less labour-intensive, however the value provided by attended monitoring due to the operator's ability to make

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observations about the audibility of the noise or perceptibility of the vibration, and the changing levels as s/he moves to different receiver locations.

Each Out-of-Hours Works Application under the SM OOH Protocol must identify whether the proposed monitoring will be attended, unattended or both. The Application requires justification or explanation on the reasons for selecting attended or unattended monitoring, and locations of the proposed monitoring, to provide the Environmental Representative with sufficient information to be able to assess whether the proposed monitoring is suitable for the proposed works.For monitoring of works around the Stations, CoA E30 requires that a heritage specialist be consulted when installing equipment used for vibration, movement and noise monitoring around heritage listed structures. Generally noise and vibration monitors do not affect the building fabric in any way. The Heritage Management Plan has been reviewed by a heritage specialist and the approach to monitoring confirmed. Noise and vibration loggers will be secured such that any chains do not damage the building, and so that they are unlikely to be knocked over and thereby damage surfaces. Fixings will be temporary without penetrations.

8.2.1. Plant noise auditing

The CNVS requires that plant noise auditing is conducted on a regular basis to ensure that they are operating as expected.

Plant noise auditing would preferably be carried out on site, in order to better assess how it operates in the field. Plant noise measurements carried out on site are often affected by other activities, and therefore it is most meaningful for attended measurements to measure event noise levels at a location near to the source. This is a valid method of validating the Sound Pressure Level (SPL) at 7m or the Sound Power Level (SWL) assumed in the CNVS and for the predictions presented in the CNVIS.

However, plant noise auditing can also be carried out in controlled conditions to compare the noise output with applicable standards, including the maximum allowable plant noise levels listed in the CNVS. Off-site plant noise auditing may be requested at any time by Sydney Metro, if inspections indicate that plant used on site is louder than expected.

8.2.2. Vibration monitoring

Attended vibration measurements are required at the commencement of vibration-generating activities listed in Section 6.4 to confirm that vibration levels satisfy the criteria for that vibration generating activity.

If any vibration-generating works take place within the Safe Working Distances of buildings or structures (for both human comfort and building damage), this means that there is the potential for the VML to be exceeded. In these cases, further vibration site law investigations are to be undertaken to determine the site-specific safe working distances for that vibration generating activity. This is in recognition of the fact that vibration propagation is highly variable and site-dependent.

Attended vibration monitoring of each specific item of vibration intensive plant is to be conducted before beginning construction works to establish a more accurate minimum working distance.

Generally, the Safe Working Distances are considered to be conservative. If site conditions are atypical and the vibration levels are higher than expected, then the Safe Working Distance

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is to be extended to reflect the site conditions. Sydney Metro is to be advised of any extended site-specific Safe Working Distances.

Vibration monitoring will be carried out by a person with experience and / or qualifications in vibration and acoustics.

Continuous vibration monitoring with audible and visible alarms will be conducted at the nearest sensitive receivers whenever vibration generating activities need to take place inside the applicable safe-working distances. Where more than one building falls within the Safe Working Distance, the continuous vibration monitoring shall be located at the building which is nearest to the works and which is accessible to the Contractor's acoustic consultant.

In order to assess the likelihood of cosmetic damage due to vibration, AS2187 specifies that vibration measurements would be undertaken at the base of the building and the highest of the orthogonal vibration components (transverse, longitudinal and vertical directions) would be compared with the guidance curves presented in BS 7385. This is based on the assumption that the base of the building is most affected by construction-related vibration. Where other parts of the building are more affected than the base, for example if demolition is occurring at higher levels of a building which is structurally connected to an adjacent building, then the measurements and assessment need to apply at the most affected part of the receiver building.

CoA E30 requires that a heritage specialist be consulted when installing equipment used for vibration, movement and noise monitoring around heritage listed structures. Generally the method of affixing sensors must meet acoustic requirements of achieving a satisfactory connection with the building structure, and also meeting the heritage requirements of being removable without leaving any permanent markings or damage to the building fabric.

8.2.3. Dilapidation or Condition Surveys

If construction activities have the potential to cause damage through vibration to nearby public utilities, structures, buildings and their contents, an Existing Condition Inspection of these items is required to be undertaken in accordance with AS 4349.1 "*Inspection of Buildings*".

A Condition Survey is required for any building or structure which is located within the recommended Safe Working Distances (refer Section 6.4).

The Project REMMs specifically require:

- NVC3 – Where vibration levels are predicted to exceed the vibration screening level, a more detailed assessment of the structure would be carried out to determine the appropriate vibration limits for that structure; and
- NVC4 – For heritage items where vibration screening levels are predicted to be exceeded, the more detailed assessment would include condition assessment and specifically consider the heritage values of the structure in consultation with a heritage specialist to ensure sensitive heritage fabric is adequately monitored and managed.

Refer Section 6.4 for Minimum Working Distances used to assess whether the vibration screening level may be exceeded.

All stations require a Condition Survey. They are all heritage-listed buildings located within close proximity of vibration-generating works, and a requirement of the CNVS is that they are subject to a Condition Survey to determine whether or not they are structurally sound. The

JHLORJV is responsible for the Condition Survey, and for providing results of the survey to Sydney Metro for review.

Heritage-listed buildings are to be considered “structurally unsound” until a structural engineering survey is carried out and determines that it is “structurally sound”. In the unlikely event that the structural engineering survey for a station determines that the building is to be considered “structurally unsound”, the relevant criterion will be as stated in Section 5.7. Sydney Metro is to be advised if the station building or other railway structure is considered to be “structurally unsound”, prior to any vibration-generating works commencing.

If any buildings outside the railway premises are located within the Safe Working Distances of vibration-generating works, the potentially affected buildings also require a Condition survey. The Safe Working Distances are based on the assumption that the buildings are structurally sound. Heritage-listed buildings within 30m of vibration-generating works require a Condition Survey prior to works commencing, even if they are outside the Safe Working Distance.

Prior to conducting the Existing Condition Inspections, the property owners will be advised of the inspection scope and methodology and the process for making a property damage claim.

The JHLORJV must maintain a register of all properties inspected and of any properties where owners refused the inspection offer. Evidence is required to demonstrate that three attempts have been made to contact the property owner to offer a Condition Survey. If the property owner does not respond to requests for access to the property after three attempts by Sydney Metro contractors, then the offer for a Condition Survey is considered to be refused by the owner.

The findings of all dilapidation surveys conducted for each construction site will be compiled into a report by the JHLORJV and provided to Sydney Metro. Follow-up Condition Inspections may be required at the completion of works.

The results of any Condition Surveys are to be documented in CNVIS updates, and a register is to be kept and managed by the JHLORJV. The CNVIS and / or site register will be updated to document the vibration criteria which apply at each affected heritage building, to assist with management, monitoring and evidence in case of queries or complaints.

8.3. General monitoring requirements

CoA C13 requires that approved Construction Monitoring Programs must be implemented for the duration of the Construction, and for any longer period set out in the monitoring program or specified by the Planning Secretary (whichever is greater).

Because the proposed Project is a subset of the wider Sydney Metro Sydenham to Bankstown project, the Noise and Vibration Monitoring Program required for this Project will be carried out as required by the CNVS for these works only. Longer-duration construction noise and vibration monitoring is likely to be carried out by other contractors.

The monitoring requirements are described in detail in the CNVS. The CNVS describes technical requirements for the monitoring equipment, as well as the required content and measurement parameters to be reported. The measurement parameters must be aligned with, or comparable with, the applicable NMLs or VMLs.

If measurements are carried out at alternative locations to the receiver, such as at a publicly accessible location near the site boundary, then adjustments will be made to be able to compare the measured levels with those predicted in the approved CNVIS and the applicable NML or VML.

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Sydney Metro's acoustic representatives may accompany the JHLORJV's environmental personnel and carry out independent monitoring at any time as requested by Sydney Metro or DPHI.

8.4. Frequency of monitoring

Vibration monitoring is to be conducted whenever vibration-generating works take place within the site-specific Safe Working Distance of sensitive receivers, as described in Section 8.2.2 and instigated by the JHLORJV Environmental Manager.

Noise monitoring is to be considered whenever the predicted works noise levels exceed the trigger levels listed in the AMM matrices (Section 7.14) and instigated by the JHLORJV Environmental Manager. If JHLORJV is of the opinion that noise monitoring is not required during out-of-hours works, then justification will be provided in the OOHW Application or via email and that decision must be endorsed by the Environment Representative. Potential reasons for not carrying out noise monitoring may be that similar works with the same equipment had been carried out on a previous night and found to be compliant with applicable NMLs. In general, noise monitoring would be carried out as specified by the AMM matrices.

Noise or vibration monitoring may also be required:

- In response to noise or vibration complaints;
- To validate predicted noise levels associated with each works scenario assessed in the CNVIS;
- To confirm vibration "site-law" propagation at commencement of vibration-generating works, to confirm that the Minimum Working Distances are valid for the site (refer Section 6.4);
- To monitor vibration for human comfort and structural effects as required by the CNVS (refer Section 7.14);
- If requested by an authorised officer of the EPA for works undertaken under EPL 21147 (i.e. under a rail possession);
- If requested by Sydney Metro, the ER, or DPHI for works undertaken in accordance with the CoAs.

Additional monitoring may be requested by Sydney Metro, DPHI or EPA at any time, for example in response to complaints or observations of unexpected sound or vibration generated at worksites during inspections. Additional monitoring may be carried out by the JHLORJV, or by Sydney Metro's acoustic representatives.

8.5. Reporting

In accordance with C9(g), the JHLORJV is required to submit noise and vibration monitoring reports to Sydney Metro and the Environment Representative for their review on a 6 monthly basis.

The requirements of the reports are described in Sections 8.2 to 8.3 of this NVMP and Sections 9.2 and 9.3 of the CNVS.

CoA C14 requires that the results of the Construction Monitoring Programs must be submitted to the Planning Secretary, and relevant regulatory agencies including councils and the EPA, for information in the form of a Construction Monitoring Report.

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The Construction Monitoring Report will encompass other environmental aspect reports, and would not be limited to noise and vibration monitoring. JHLORJV's Construction Monitoring Report will be submitted to Inner West Council, City of Canterbury-Bankstown Council, the Planning Secretary and EPA on a six-monthly basis.

The six-monthly Construction Monitoring Reports will include a summary of monitoring undertaken, an overview of the results, analysis of the results and comparison against the nominated noise and vibration management levels, and raw data from monitoring. Once Sydney Metro and the ER have reviewed the reports, the monitoring reports will be provided to DPHI, EPA, the City of Bankstown-Canterbury and Inner West Council.

Reporting associated with incidents, non-conformances and non-compliances are described in the CEMP Section 3.7.2 and 3.10.3. Other noise and vibration-related reporting requirements are as follows:

- Emergency works are to be reported to the Environment Representative and the EPA (LOR EPL 21147 applies, ie for works under a rail possession), in accordance with CoA E21. The proponent / Contractor must also *"use best endeavours to notify all noise and / or vibration affected receivers of the likely impact and duration"* of Emergency works.
- E23 requires that the outcomes of the community consultation including the agreed appropriate respite periods and works scheduling must be provided to the EPA (for works carried out under LOR EPL 21147 under a rail possession) and the Planning Secretary (for high risk activities after 9pm), upon request. The Environmental Representative will determine whether the noise and / or vibration impacts for any proposed out of hours works are considered to be "high risk" in accordance with Sydney Metro's approved Out of Hours Work Strategy/Protocol.
- Upon request of an authorised officer of the EPA, a Preliminary Investigation Report to the EPA will be submitted in respect of any noise or vibration monitoring undertaken in accordance with the requirements of Condition R4.2.
- In the event of any exceedance of the best achievable noise performance objectives identified in Construction Noise and Vibration Impact Statements prepared for the works a follow up investigation report will be to the EPA within 5 working days of any noise or vibration monitoring having been undertaken in accordance with condition R4.3
- Noise and vibration validation reports will be prepared in accordance with R4.4 for out of hours works, and submitted to the EPA no later than 2 business days from the end of each fortnight.
- Monitoring for works completed under the community agreement provisions will be carried out as per conditions E1.6 to E1.8 of the EPL.

8.6. Review of monitoring

Survey notes are required for all attended surveys, which provide details of the works taking place, observed mitigation measures on site, how audible the works noise is relative to the ambient conditions at the time of the survey, and any other details as described in the CNVS which are relevant to the assessment of the success or otherwise of the site noise and vibration mitigation methods.

Attended measurements provide the opportunity to identify ways to improve future works noise and vibration management – for example whether:

- There were ways to reduce impact, for example locating fixed plant behind an existing building, or installing noise curtains to break line of sight between source and receiver;
- There were lessons learned about good or bad practice observed on site;
- Adjustments will be made to future predictions, for example if plant was significantly quieter than the CNVS plant SWLs suggest and this make / model is proposed for future works.

Attended surveys may also determine potential non-conformances and/or non-compliances, which are to be reported to Sydney Metro and the ER within one business day of the survey – for example whether:

- Noise curtains or other mitigation commitments made in the approved OOHW Application have been correctly implemented;
- Agreed respite periods have not been observed, including for Highly Noise Intensive Works (Section 5.4);
- Plant used is not among the approved list of plant from the CNVIS or approved OOHW Application;
- Any item of plant is louder than expected and resulting in exceeding the predicted CNVIS noise levels; or
- Vibration levels exceeded the predicted levels, and in particular were high enough to risk damage to structures.

If the noise mitigation was ineffective, the JHLORJV must investigate and confirm how to correctly install so that it is effective when required in future. Any observations of ineffective noise mitigation and any rectification actions will be recorded by the JHLORJV in their site inspection records and training to prevent recurrence will be provided if required.

Effectiveness of noise mitigation is determined by the decibel reduction achieved by the mitigation, and is not related to whether complaints have been received or not in relation to the works.

If mitigation has not been implemented, although it was stated as required under an approved OOHW Application, this is a non-compliance. Refer to Section 8.5.

Where the measured noise or vibration exceeds the predicted levels, the JHLORJV shall undertake an investigation.

If the investigation finds that the works were not undertaken in accordance with the approved work or this NVMP (for example, plant was different and / or mitigation not implemented), then this is to be recorded as a non-conformance under the CEMP, and may have the potential to be a non-compliance against the Planning Approval.

If the investigation finds that the approved plant and mitigation were implemented, but the predicted levels were lower than measured, the JHLORJV's acoustic consultant will investigate the reasons for this and update the noise model as required.

Monitoring results are to be reviewed by the JHLORJV's Environmental Manager (or delegate) as soon as practicable. Where an opportunity for improvement is identified, mitigation measures will be reviewed. Reviews of monitoring shall occur within a week of any monitoring. If the review must document whether an exceedance of the predicted noise or vibration levels has been recorded, or if a complaint was received related to the works in question.

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The JHLORJV's Environmental Manager will consult with the construction team to determine whether any further mitigation measures will be adopted. This consultation will occur as soon as practicable following the review finding that measured noise or vibration levels exceeded the CNVIS predictions. If the excess is severe, for example vibration levels associated with risks of damage to structures or night-time noise levels associated with sleep awakening, then the consultation will occur formally through a meeting.

Further mitigation measures which may be considered include:

- Changes to construction methodology (change plant);
- Additional or modified respite periods, such as longer continuous breaks for high impact noise, or changing day-time periods of respite to accommodate individual receiver needs);
- Modifying timing of work to less sensitive periods;
- Modifying plant if safe and practicable, for example to install non-tonal vertical movement alarms on EWPs and mobile cranes; and
- Any other reasonable and feasible measure.

8.7. Monitoring program consultation

This Noise and Vibration Monitoring Program was prepared in consultation with the local Council(s), in accordance with **CoA C8(a), CoA C9(i)** and **CoA C10.** Any feedback from Council will be incorporated into this Noise and Vibration Monitoring Program. See Section 1.6 and Appendix E for consultation carried out in the development of this program.

In accordance with **CoA-C11** the Noise and Vibration Monitoring Program will be endorsed by the ER and then submitted to the Secretary for approval at least one (1) month before commencement of Construction or within another timeframe agreed with the Secretary.

In accordance with **CoA-C12** Construction must not commence until the Secretary has approved all of the required Construction Monitoring Programs, including the Noise and Vibration Monitoring Program, and all relevant baseline data for the specific construction activity has been collected.

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9. NVMP administration

9.1. Hold points

The delivery of works covered by the NVMP cannot commence until the NVMP and associated CNVIS are approved by relevant authorities or their nominated representatives.

Approval of the NVMP and the associated CNVIS require approval of components as listed in Table 28 below.

Table 30: NVMP hold points

Item	Process Held	Acceptance Criteria	Approval Authority
CEMP and Sub-plans	Site activities (Prior to construction commencement)	Site specific CEMP and Sub-plans (including this NVMP) have been developed, reviewed, endorsed by the ER and approved by DPHI.	ER Endorsement DPHI Approval.
CNVIS	Site activities (Prior to construction commencement)	CNVIS to be prepared by Specialist Consultant	JHLORJV Environmental Manager
OOHW Applications – individual works scenarios	Works to be performed outside of approved construction hours (Pre-construction and during construction)	OOHW Strategy/Protocol and Application Form and Community Notification EPL 21147	Project Environmental Manager for works under EPL ER Endorsement and Sydney Metro Approval for works under OOHW Protocol EPA (Information to be provided on request)
Construction identified as affecting buildings	Site activities	Building Condition Survey conducted by an appropriate professional nominated by the JHLOR	JHLOR's Construction Manager

9.2. Review and improvement

The NVMP will be reviewed on a six monthly basis and earlier if required in response to the relevant findings of any audit, incident report, complaint, monitoring event or inspection.

Other reasons for updating the NVMP and the associated CNVIS are:

- Ongoing of review of construction methodology and project noise and vibration issues, aiming for continuous improvement.
- Re-assess CNVIS and NVMP based on new inputs (if necessary, eg if scope, main works scenarios or location of works changes).
- Consistency Assessment (if required).
- JHLORJV application for a works-specific EPL.
- Amendments to the relevant EPL.

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This sub-plan will be reviewed and endorsed by the Independent Environmental Representative in accordance with **CoA – A26**. Sydney Metro will also review the plan in accordance with condition 3.3e) of the CEMF.

CoA – C3 requires certain sub-plans to be developed in consultation with government agencies. This plan is to be reviewed by relevant councils (i.e. City of Canterbury Bankstown and Inner West Council).

In accordance with **CoA – C6** the sub-plan must be submitted to the Secretary one month prior to the commencement of construction. Construction must not commence until the Secretary has approved the sub-plan in accordance with **CoA – C7**.

In accordance with **CoA – C8**, consultation with the City of Canterbury Bankstown, Inner West Council and EPA has occurred on the Noise and Vibration Construction Monitoring Program.

9.3. Records

Records are to be maintained for:

- Records of community enquiries and complaints, and the JHLOR's response – Sydney Metro central complaints management (refer to OCCS);
- Community Consultation – Sydney Metro Place Manager;
- Offers of Respite and / or Alternative Accommodation – Sydney Metro Place Manager;
- Plant and equipment hire – JHLORJV Site Manager;
- Dilapidation or Condition surveys – JHLORJV Site Manager;
- Works activities including Emergency Works – JHLORJV Site Manager;
- Out of Hours Works Applications reviews, correspondence and approvals – Sydney Metro, JHLORJV, Environment Representative;
- Any works deemed by the Environment Representative to be "High Risk" in accordance with Sydney Metro's approved Out of Hours Work Strategy/Protocol – Sydney Metro, Environment Representative;
- Noise and vibration surveys – JHLORJV Site Manager;
- Records of noise and vibration monitoring results against appropriate NMLs and vibration criteria, including those published in Construction Monitoring Reports;
- Site audits and inspections – Sydney Metro, JHLORJV, Independent Auditor (where required), Environment Representative;
- Noise and vibration potential and actual incidents – Sydney Metro, JHLORJV, Independent Auditor, Environment Representative.

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Appendix A – Other CoA, REMM and CEMF requirements relevant to this plan

Other relevant Conditions of Approval relevant to the development of this Plan

CoA No.	Condition Requirement	Document Reference
A26	For the duration of the Work until the commencement of Operation, or as agreed with the Planning Secretary, the approved ER must: (a) receive and respond to communication from the Planning Secretary in relation to the environmental performance of the CSSI; (b) consider and inform the Planning Secretary on matters specified in the terms of this approval; (c) consider and recommend to the Proponent any improvements that may be made to work practices to avoid or minimise adverse impact to the environment and to the community; (d) review documents identified in Conditions C1, C3 and C8 and any other documents that are identified by the Planning Secretary, to ensure they are consistent with requirements in or under this approval and if so: (i) make a written statement to this effect before submission of such documents to the Planning Secretary (if those documents are required to be approved by the Planning Secretary), or (ii) make a written statement to this effect before the implementation of such documents (if those documents are required to be submitted to the Planning Secretary for information or are not required to be submitted to the Secretary); (e) regularly monitor the implementation of the documents listed in Conditions C1, C3 and C8 to ensure implementation is being carried out in accordance with the document and the terms of this approval; (f) as may be requested by the Planning Secretary, help plan, attend or undertake audits of the development commissioned by the Department including scoping audits, programming audits, briefings and site visits, but not independent environmental audits required under Condition A34 of this approval; (g) as may be requested by the Planning Secretary, assist the Department in the resolution of community complaints; (h) assess the impacts of minor ancillary facilities as required by Condition A19 of this approval; (i) consider any minor amendments to be made to the documents listed in Conditions C1, C3 and C8 and any document that requires the approval of the Planning Secretary that comprise updating or are of an administrative or minor nature and are consistent with the terms of this approval and the documents listed in Conditions C1, C3 and C8 or other documents approved by the Planning Secretary and, if satisfied such amendment is necessary, approve the amendment. This does not include any modifications to the terms of this approval; and (j) prepare and submit to the Planning Secretary and other relevant regulatory agencies, for information, an Environmental Representative Monthly Report detailing the ER's actions and decisions on matters for which the ER was responsible in the preceding month. The Environmental Representative Monthly Report must be submitted within seven (7) days following the end of each month for the duration of the ER's engagement for the CSSI.	The interface between the ER and this Plan are outlined in: Section 7.13 Section 8.4 Section 8.5 Section 8.6 Section 9.1 Section 9.2 Section 9.3
A36	The Department must be notified in writing to compliance@planning.nsw.gov.au immediately after the Proponent becomes aware of an incident. The notification must identify the CSSI (including the application number and the name of the CSSI if it has one) and set out the location and nature of the incident.	CEMP Section 3.9.4, 3.10.3 Section 8.5

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CoA No.	Condition Requirement	Document Reference
		Section 9.3
A37	Subsequent notification must be given, and reports submitted in accordance with the requirements set out in Appendix A. [Appendix A of CoA SSI 8256 not replicated in this NVMP]	CEMP Section 3.10.3 Section 8.5 Section 9.3
E18	A detailed land use survey must be undertaken to confirm sensitive receivers (including critical working areas such as operating theatres and precision laboratories) potentially exposed to Construction noise and vibration, Construction ground-borne noise and Operational noise. The survey may be undertaken on a progressive basis but must be undertaken in any one area before the commencement of Work which generate Construction or Operational noise, vibration or ground-borne noise in that area. The results of the survey must be included in the Construction Noise and Vibration Impact Statement(s) or Operational Noise and Vibration Review, where relevant.	Section 3.1 Appendix B
E19	Work must only be undertaken during the following Construction hours: (a) 7:00am to 6:00pm Mondays to Fridays, inclusive; (b) 8:00am to 6:00pm Saturdays; and (c) at no time on Sundays or public holidays.	Section 5.1 Section 7.7
E20	Notwithstanding Conditions E19 and E24 Work may be undertaken outside the hours specified in the following circumstances: (a) for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or (b) where it is required in an emergency to avoid injury or the loss of life, to avoid damage or loss of property or to prevent environmental harm; or (c) where different Construction hours are permitted or required under an EPL in force in respect of the CSSI; or (d) Work approved under an Out-of-Hours Work Protocol for Work not subject to an EPL as required by Condition E25; or (e) Construction that causes LAeq(15 minute) noise levels: (i) no more than 5 dB(A) above the rating background level at any residence in accordance with the Interim Construction Noise Guideline (DECC, 2009), and (ii) no more than the 'Noise affected' noise management levels specified in Table 3 of the Interim Construction Noise Guideline (DECC, 2009) at other sensitive land uses, and (iii) continuous or impulsive vibration values, measured at the most affected residence are no more than the maximum values for human exposure to vibration, specified in Table 2.2 of Assessing Vibration: a technical guideline (DEC, 2006), and (iv) intermittent vibration values measured at the most affected residence are no more than the maximum values for human exposure to vibration, specified in Table 2.4 of Assessing Vibration: a technical guideline (DEC, 2006); or (f) where a negotiated agreement has been reached with a substantial majority of sensitive receivers who are within the vicinity of and may be potentially affected by the particular Construction, and the noise management levels and/or limit for ground-borne noise and	Section 5.1 Section 7.7

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CoA No.	Condition Requirement	Document Reference
	vibration (human comfort) cannot be achieved. All agreements must be in writing and a copy forwarded to the Planning Secretary at least one (1) week before the commencement of activities. Note: Section 5.24(1)(e) of the EP&A Act requires that an EPL be substantially consistent with this approval.	
E21	On becoming aware of the need for emergency Work in accordance with Condition E20(b), the Proponent must notify the ER and the EPA (if a EPL applies) of the need for that Work. The Proponent must use best endeavours to notify all noise and/or vibration affected sensitive receivers of the likely impact and duration of those Work.	Section 5.1
E22	Out-of-Hours Work that are regulated by an EPL as per Condition E20(c) or through the Out- of-Hours Work Protocol as per Condition E25 include: (a) Work which could result in a high risk to construction personnel or public safety, based on a risk assessment carried out in accordance with AS/NZS ISO 31000:2009 “Risk Management – Principles and Guidelines”; or (b) where the relevant road authority has advised the Proponent in writing that carrying out the activities could result in a high risk to road network operational performance; or (c) where the relevant utility service operator has advised the Proponent in writing that carrying out the activities could result in a high risk to the operation and integrity of the utility network; or (d) where the Transport for NSW Transport Management Centre (or other road authority) has advised the Proponent in writing that a road occupancy licence is required and will not be issued for the activities during the hours specified in Conditions E19 and E20; or (e) where Sydney Trains (or other rail authority) has advised the Proponent in writing that a Rail Possession is required. Note: Other Out-of-Hours Work can be undertaken with the approval of an EPL, or through the project’s Out-of-Hours Work Protocol for Work not subject to an EPL.	Section 5.1 Section 7.6 Section 7.7 Section 7.11 Section 7.13 Appendix D
E23	In order to undertake Out-of-Hours Work, the Proponent must identify appropriate respite periods for the Out-of-Hours Work in consultation with the community at each affected location on a regular basis. This consultation must include (but not be limited to) providing the community with: (a) a schedule of likely Out-of-Hours Work for a period no less than two (2) months; (b) the potential work, location and duration; (c) the noise characteristics and likely noise levels of the Work; and (d) likely mitigation and management measures. The outcomes of the community consultation, the identified respite periods and the scheduling of the likely Out-of-Hours Work must be provided to the EPA (if an EPL applies) and the Planning Secretary (for high risk activities after 9pm) upon request.	Section 5.1 Section 7.6 Section 7.7 Section 7.11 Section 7.13 Appendix D
E24	Except as permitted by an EPL, highly noise intensive Work that result in an exceedance of the applicable Noise Management Level at the same receiver must only be undertaken: (a) between the hours of 8:00 am to 6:00 pm Monday to Friday; (b) between the hours of 8:00 am to 1:00 pm Saturday; and	Section 5.4 Section 7.7

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CoA No.	Condition Requirement	Document Reference
	(c) in continuous blocks not exceeding three (3) hours each with a minimum respite from those activities and Works of not less than one (1) hour between each block. For the purposes of this condition, 'continuous' includes any period during which there is less than a one (1) hour respite between ceasing and recommencing any of the work that are the subject of this condition.	
E25	An Out-of-Hours Work Protocol must be prepared to identify a process for the consideration, management and approval of Work which are outside the hours defined in Condition E19, and that are not subject to an EPL. The Protocol must be approved by the Planning Secretary before commencement of the Work. The Protocol must: (a) provide a process for the consideration of Out-of-Hours Work against the relevant noise and vibration criteria, including the determination of low and high-risk activities; (b) provide a process for the identification of mitigation measures for residual impacts, including respite periods in consultation with the community at each affected location, consistent with the requirements of Condition E23; (c) identify procedures to facilitate the coordination of Out-of-Hours Work approved by an EPL to ensure appropriate respite is provided; (d) identify an approval process that considers the risk of activities, proposed mitigation, management, and coordination, including where: (i) low risk activities and high risk activities that cease by 9pm can be approved by the ER, and (ii) all other high risk activities must be approved by the Planning Secretary; and (e) identify Planning Secretary, EPA and community notification arrangements for approved Out-of-Hours Work, which may be detailed in the Community Communication Strategy.	Sydney Metro Out Of Hours Works Strategy/ Protocol Section 5.1 Section 7.6 Section 7.7 Section 7.11 Section 7.13 Appendix D
E26	Work undertaken for the delivery of the CSSI, including those undertaken by third parties (such as utility relocations), must be coordinated to ensure respite periods are provided. The Proponent must: (a) reschedule Work to provide respite to impacted noise sensitive receivers so that the respite is achieved in accordance with Condition E23; or (b) consider the provision of alternative respite or mitigation to impacted noise sensitive receivers; and (c) provide documentary evidence to the ER in support of any decision made by the Proponent in relation to respite or mitigation.	Section 7.12
E27	Construction Noise and Vibration Impact Statements must be prepared for Construction sites before Construction noise and vibration impacts commence and include specific mitigation measures identified through consultation with affected sensitive receivers. The Statements must augment the Construction Noise and Vibration Management Sub-plan and must be implemented for the duration of Work. The Statements must be informed by a suite of potential management/mitigation options provided in the Construction Noise and Vibration Sub-plan.	Section 1.5 Section 3.3 Section 6 Section 7.14

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CoA No.	Condition Requirement	Document Reference
E28	Noise generating Work in the vicinity of potentially-affected community, religious, or educational institutions resulting in noise levels above the noise management levels must not be timetabled within sensitive periods, unless other reasonable arrangements with the affected institutions are made at no cost to the affected institution or as otherwise approved by the Planning Secretary.	Section 1.5 Section 7.6 Section 7.7
E29	Mitigation measures must be implemented with the aim of achieving the following Construction noise management levels and vibration criteria: (a) Construction 'Noise affected' noise management levels established using the Interim Construction Noise Guideline (DECC, 2009); (b) vibration criteria established using the Assessing vibration: a technical guideline (DEC, 2006) (for human exposure); (c) BS 7385 Part 2-1993 "Evaluation and measurement for vibration in buildings Part 2" as they are "applicable to Australian conditions"; and (d) the vibration limits set out in the German Standard DIN 4150-3: Structural Vibration- effects of vibration on structures (for structural damage). Note: The Interim Construction Noise Guideline identifies 'particularly annoying' activities that require the addition of 5 dB(A) to the predicted level before comparing to the Construction Noise Management Level.	Section 2 Section 5 Section 7
E30	The Proponent must seek the advice of a heritage specialist on methods and locations for installing equipment used for vibration, movement and noise monitoring at heritage-listed structures.	Section 5.7 Section 7.6 Section 7.7
E32	Operational noise mitigation measures as identified in Condition E31 that will not be physically affected by Construction, must commence implementation within six (6) months of the commencement of Construction in the vicinity of the impacted receiver(s) to minimise Construction noise impacts, and detailed in an updated Noise and Vibration CEMP Sub-plan for the CSSI. Note: For the purpose of Conditions E32 and E33, operational noise mitigation measures refer to at property or other identified non-source controls, the detail of which would broadly be included in the Noise and Vibration CEMP Sub-plan. When detail on the specific mitigation measures is known and before the implementation of the mitigation measures, the CEMP sub- plan must be updated.	CoA E32 is not relevant to the Project as station works are not near locations where operational noise mitigation is identified
E33	Where implementation of Operational noise mitigation measures will be physically affected by Construction such that they cannot commence implementation within six (6) months of the commencement of Construction in accordance with Condition E32, the Proponent must submit to the Secretary a report providing justification as to why, along with details of temporary measures that would be implemented to address construction noise impacts until such time that the Operational noise mitigation measures identified in Condition E31 are implemented. The report must be submitted to the ER for review. When the ER is satisfied that the justification and alternative measures are appropriate to address construction noise impacts, and within six (6) months of the commencement of Construction which would affect the identified sensitive receivers, the report must be submitted to the Planning Secretary for information.	CoA E32 is not relevant to the Project as station works are not near locations where operational noise mitigation is identified

Revised Environmental Mitigation Measures relevant to the development of this Plan

REMM No.	REMM Requirement	Timing	Document Reference
NVC1	In accordance with the Construction Noise and Vibration Strategy, construction noise impact statements would be prepared prior to the commencement of construction components, to consider the scale and duration of construction noise impacts, and identify measures to minimise impacts to sensitive receivers. This would include noise modelling to confirm the results of modelling undertaken as part of the Environmental Impact Statement and Submissions and Preferred Infrastructure Report. Where exceedances of the noise management levels are identified, feasible and reasonable mitigation measures would be identified.	Design/pre-construction	Relevant requirements of the Sydney Metro CNVS form part of this NVMP, as noted in Section 2. Relevant requirements of the Sydney Metro CNVS will be incorporated into the CNVIS prepared for the Station Works outlined in Section 5. Additional mitigation measures, as defined by the Sydney Metro CNVS, are outlined in Section 7.13
NVC2	In accordance with the Construction Noise and Vibration Strategy, all employees, contractors and subcontractors would receive an environmental induction. The induction must at least include: i. relevant project specific and standard noise and vibration mitigation measures ii. relevant licence and approval conditions iii. permissible hours of work iv. any limitations on high noise generating activities v. location of nearest sensitive receivers vi. designated loading/unloading areas and procedures vii. site opening/closing times (including deliveries).	Design/pre-construction	Section 7.8
NVC3	Where vibration levels are predicted to exceed the vibration screening level, a more detailed assessment of the structure would be carried out to determine the appropriate vibration limits for that structure.	Design/pre-construction	Section 5.7 Section 5.8 Section 5.9 Section 5.10 Section 8.2.2
NVC4	For heritage items where vibration screening levels are predicted to be exceeded, the more detailed assessment would include condition assessment and specifically consider the heritage values of the structure in consultation with a heritage specialist to ensure sensitive heritage fabric is adequately monitored and managed.	Design/pre-construction	Heritage Management Plan Section 5.7 Section 8.2.2

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REMM No.	REMM Requirement	Timing	Document Reference
NVC5	The Construction Noise and Vibration Strategy would be implemented with the aim of achieving the noise management levels where feasible and reasonable. This may include the following example mitigation measures alone or in combination, where feasible and reasonable: i. The provision of noise barriers around each construction site. ii. The coincidence of noisy plant working simultaneously close together would be avoided. iii. Residential grade mufflers would be fitted to all mobile plant. iv. Non-tonal reversing alarms would be fitted to all permanent mobile plant. v. High noise generating activities would be scheduled for less sensitive periods considering the nearby receivers, where reasonable and feasible. vi. The layout of construction sites would consider opportunities to shield receivers from noise. vii. Stationary noise sources would be enclosed or shielded whilst ensuring that the occupational health and safety of workers is maintained. viii. Loading and unloading of materials/deliveries is to occur as far as possible from noise sensitive receivers. ix. Select site access points and roads as far as possible away from noise sensitive receivers. x. Dedicated loading/unloading areas to be shielded if close to noise sensitive receivers wherever feasible and reasonable. xi. Use quieter and less vibration emitting construction methods where feasible and reasonable. xii. The noise levels of plant and equipment must have operating Sound Power Levels compliant with the criteria in the Construction Noise and Vibration Strategy. xiii. Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.	Construction	Section 7.1 Section 7.2 Section 7.3 Section 7.5 Section 7.6 Section 7.15 All example NVC5 mitigation measures will be considered in the development of CNVIS assessments associated with this NVMP.

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REMM No.	REMM Requirement	Timing	Document Reference
	xiv. Where feasible and reasonable, the offset distance between noisy plant items and nearby noise sensitive receivers would be as great as possible. xv. Where reasonable and feasible heavy vehicle movements would be limited to daytime and evening hours, with night-time movements avoided where possible. xvi. Active community consultation and the maintenance of positive, cooperative relationships with schools, local residents and building owners and occupiers, through: o periodic notification or work activities and progress (e.g. regular letterbox drops, e-consult) o specific notification (letter-box drop) prior to especially noisy activities o comprehensive website information o project information and construction response telephone line o email distribution lists.		
NVC6	Noise intensive plant for, would not be used during the night-time period (10pm to 7am) unless: i. during a weekend rail possession or shut down ii. a requirement of a road authority, emergency services or Sydney Coordination Office requires works to be undertaken during this period.	Construction	Section 5.1 Section 5.4 Section 7.7
NVC7	When working adjacent to schools, medical facilities and child care centres, particularly noisy activities would be scheduled outside normal working hours, where reasonable and feasible.	Construction	This will be addressed in the CNVIS and will incorporate outcomes of consultation in line with Section 7.6
NVC8	When working adjacent to churches and places of worship, particularly noisy activities would be scheduled outside services, where reasonable and feasible.	Construction	This will be addressed in the CNVIS and will incorporate outcomes of consultation in line with Section 7.6
NVC9	Alternative accommodation may be offered to residents living in close proximity to construction works where detailed construction planning identifies unreasonably high noise impacts over a prolonged period. Alternative	Construction	Alternative accommodation is to be applied where triggered in accordance with the Sydney Metro City and Southwest Construction Noise and Vibration Strategy, as outlined in: Section 7.13

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REMM No.	REMM Requirement	Timing	Document Reference
	accommodation arrangements would be offered and discussed with residents on a case-by-case basis.		Section 7.14
NVC10	High noise and vibration generating activities including ballast tamping, may only be carried out in continuous blocks, not exceeding 3 hours each, with a minimum respite period of one hour between each block and these works.	Construction	Section 5.4 Section 7.7 No ballast tamping is proposed as part of this Project's scope.
NVC11	Ongoing noise monitoring would be undertaken during construction at sensitive receivers during critical periods (i.e. times when noise emissions are expected to be at their highest) to identify and assist in managing high risk noise events.	Construction	Section 5.4 Section 7.13 Section 8.2
NVC12	Where vibration levels are predicted to exceed the vibration screening level, attended vibration monitoring would be carried out to ensure vibration levels remain below appropriate limits for that structure.	Construction	Section 5 Section 8.2.2
NVC13	Reasonable and feasible measures would be implemented in accordance with the Construction Noise and Vibration Strategy to minimise ground-borne noise where exceedances are predicted.	Construction	Section 6.5 Section 7.5 Ground borne noise management levels expected to be met
NVC14	Reasonable and feasible mitigation measures would be implemented where power supply works would result in elevated noise levels at receivers. This could include: i. carrying out works during the daytime period when in the vicinity of residential receivers ii. where out of hours works are required, scheduling the noisiest activities to occur in the evening period (up to 10pm) iii. use of portable noise barriers around particularly noisy equipment.	Construction	This NVMP and associated CNVIS Section 7 No power supply works are proposed in this Project's SWM3 scope of this Project.
NVC15	The routes for construction haulage vehicles and bus services associated with the Temporary Transport Strategy would be selected on the basis of compliance with the relevant road traffic noise criteria, where reasonable and feasible. Where compliance with the noise criteria is not possible, reasonable and feasible noise mitigation would be implemented.	Construction	Bus services for the purpose of the Temporary Transport Strategy is outside the scope of this NVMP, and is not the responsibility of the JHLOR. The sections below only address the construction haulage vehicles component of this REMM. Section 5.6 Section 7.15

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REMM No.	REMM Requirement	Timing	Document Reference
NVC16	An Out of Hours Work Strategy would be prepared, in consultation with the Environment Protection Authority, to guide the assessment, management, and approval of works outside recommended standard hours.	Construction	Sydney Metro City and Southwest Out of Hours Works Strategy/Protocol Section 1.5 Section 5.1 Section 7.6 Section 7.7 Section 7.11 Section 7.13 Appendix D

Construction Environmental Management Framework requirements relevant to the development of this Plan

CEMF Section	CEMF Requirement	Document Reference
9.1a	Construction Noise and Vibration Management Objectives The following noise and vibration management objectives will apply to construction: (i) Minimise unreasonable noise and vibration impacts on residents and businesses; (ii) Avoid structural damage to buildings or heritage items as a result of construction vibration; (iii) Undertake active community consultation; and (iv) Maintain positive, cooperative relationships with schools, childcare centres, local residents and building owners.	Section 1.4
9.2(b)	Detailed Construction Noise and Vibration Impact Statements will be prepared for noise intensive construction sites and or activities, to ensure the adequacy of the noise and vibration mitigation measures. Specifically, Construction Noise and Vibration Impact Statements will be prepared for EPL variation applications and works proposed to be undertaken outside of standard construction hours.	Section 5.4 Section 7.2 Section 7.3 CNVIS associated with this NVMP (Appendix D) Separate EPL will not be obtained for these works.
9.2(c)	Noise and vibration monitoring would be undertaken for construction as specified in the CNVS and the EPL.	Section 8

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CEMF Section	CEMF Requirement	Document Reference
9.2(d)	The following compliance records would be kept by JHLORJV: (i) Records of noise and vibration monitoring results against appropriate NMLs and vibration criteria; and (ii) Records of community enquiries and complaints, and the Contractor's response.	Section 8.5 Section 9.3
9.3(a)	All feasible and reasonable mitigation measures would be implemented in accordance with the CNVS. Examples of noise and vibration mitigation measures include: (i) Construction hours will be in accordance with the working hours specified in Section 5.1; (ii) Hoarding and enclosures will be implemented where required to minimise airborne noise impacts; and The layout of construction sites will aim to minimise airborne noise impacts to surrounding receptors.	Section 5.1 Section 7.7 Section 7.3 Section 7.1 Section 7

The table below presents the compliance matrix for the EPL21147 Clauses relating to construction noise and vibration for the Project. The matrix includes the full text of the Clause and the reference in this NVMP or the associated CNVIS which details how compliance is to be achieved.

EPL Clause	Requirement / Measure	Document Reference
Environmental awareness		
O11.1	All staff, including contractors and subcontractors, involved in the carrying out of the activities authorised by this licence must be aware of their environmental responsibilities relating to the activities regulated by this licence.	Section 7.8 Section 7.9
Other operating conditions – Railway maintenance activities		
O13	Note: The objectives of these conditions are to minimise noise impacts from railway maintenance activities, recognising that operational safety and other factors constrain when these activities can be carried out on the Sydney Trains Network. These factors include avoiding disruptions during peak periods for passenger services and ensuring that programmed track closures facilitate the efficient completion of maintenance activities. Night-time and weekend work will be required for some activities.	Section 7.7

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EPL Clause	Requirement / Measure	Document Reference
Standard railway maintenance hours		
O13.1	Maintenance activities must be undertaken: a) between the hours of 7:00am and 6:00pm Monday to Friday b) between the hours of 8:00am and 1:00pm Saturday; and c) not on Sunday or public holidays, unless an exception in condition O13.2 or condition O13.3 applies.	Section 5.1 Section 7.7
Exception to standard railway maintenance hours		
O13.2	The licensee may undertake maintenance activities outside of the hours specified in Condition O13.1: a) to provide safe and reliable train services or a safe working environment; or b) for emergency works; or c) for the delivery of oversized plant or structures that require special arrangements or authorisation to be lawfully transported along public roads.	Section 5.1 Section 7.7 Requirements are aligned with the Sydney Metro CNVS and this NVMP Out of Hours Works Protocol to be applied – refer Section 7.7
Exception to standard railway maintenance hours for low noise impact generating works		
O13.3	(a) The licensee may undertake maintenance activities outside of the hours specified in Condition O13.1, if the activities do not exceed: i. 5dBA (LAeq, 15min) above the relevant rating background levels at day, evening and night, as determined at the nearest noise sensitive receiver as assessed by acoustic investigation, and ii. 15dBA (LA1, 1min or LAmax) above the relevant rating background level at night, as determined at the nearest noise sensitive receiver as assessed by acoustic investigation. b) The results of any acoustic investigation undertaken in relation to Conditions O13.3(a)(i) and O13.3(a) (ii) must be provided by the licensee when requested by an authorised officer of the EPA. c) An acoustic investigation referred to in Conditions O13.3(a)(i) and O13.3(a)(ii) is not required if there are no noise sensitive receivers impacted by the activities.	Requirements are aligned with the Sydney Metro CNVS and this NVMP Out of Hours Works Protocol to be applied – refer Section 7.7
Management of noise impacts from railway maintenance		
O13.4	Where maintenance activities are undertaken, including outside of the hours specified in Condition O13.1, noise impacts must be managed in accordance with the recommendations in the Interim Construction Noise Guideline (DECCW, 2009), as updated from time to time. The licensee is required to:	Requirements are aligned with the Sydney

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EPL Clause	Requirement / Measure	Document Reference
	a) identify noise sensitive receivers that may be affected; b) identify hours of work for the proposed activities; c) identify noise impacts at noise sensitive receivers; d) select and apply reasonable and feasible work practices to minimise noise impacts; and e) notify the identified noise sensitive receivers at least 5 days prior to the commencement of maintenance activities undertaken outside of the hours specified in Condition O13.1, except where the licensee first becomes aware of the need to undertake those maintenance activities less than 5 days prior to the proposed commencement date, in which case the notification must be provided as soon as practicable after becoming aware of the need to undertake the maintenance activities.	Metro CNVS and this NVMP Out of Hours Works Protocol to be applied – refer Section 7.7
Management of noise impacts from railway maintenance		
O13.5	When requested by an authorised officer of the EPA, the licensee must provide the following information regarding any proposed maintenance activities on the Sydney Trains Network: a) dates and times of the proposed maintenance activity; b) location of the proposed maintenance activity; c) type(s) of work to be performed in conducting the proposed maintenance activity; d) plant and equipment to be used; and e) contact name and telephone number of a person who will be on site during the activity and who is authorised by the licensee to take action, including the cessation of the activity or any part of it, if so directed by the EPA. A contact person must be contactable 24 hours a day via the supplied telephone number(s) during the whole of the period that the activity takes place outside the hours specified in Condition O13.1.	Section 8.5 Covered in Sydney Metro procedures for interaction with NSW government agencies.
O13.6	When requested by an authorised officer of the EPA, the licensee must provide written reasons that demonstrate that maintenance activities undertaken outside of the hours specified in Condition O13.1 comply with the licence.	Section 8.5 Covered in Sydney Metro procedures for interaction with NSW government agencies.

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Appendix B – Land Use Survey

Map of Receiver Catchment Areas (refer to CNVIS Appendix D)

Appendix C – Indicative work sites

Refer to Noise Contour Map within CNVIS (Appendix D of this Plan)

Appendix D – CNVIS

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REPORT

SOUTHWEST METRO CONVERSION AND STATION WORKS – PACKAGE 3

BANKSTOWN, NSW

CONSTRUCTION NOISE AND VIBRATION IMPACT STATEMENT

RWDI # 2509908

16 June 2025

SUBMITTED TO

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DOCUMENT CONTROL

Version	Status	Date	Prepared By	Reviewed By
A	Draft	23 July 2024	Claire Graham-White	Ben Lawrence
B	Final	13 August 2024	Claire Graham-White	Ben Lawrence
C	Final	22 August 2024	Claire Graham-White	Ben Lawrence
D	Draft Addition of Yagoona Setdown works	11 March 2025	Claire Graham-White	Ben Lawrence
E	Final	13 March 2025	Claire Graham-White	Ben Lawrence
F	Final Minor updates from Land Use survey	13 June 2025	Claire Graham-White	Ben Lawrence

NOTE

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GLOSSARY OF ACOUSTIC TERMS

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph below, are here defined.

Maximum Noise Level (L_{Amax}) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

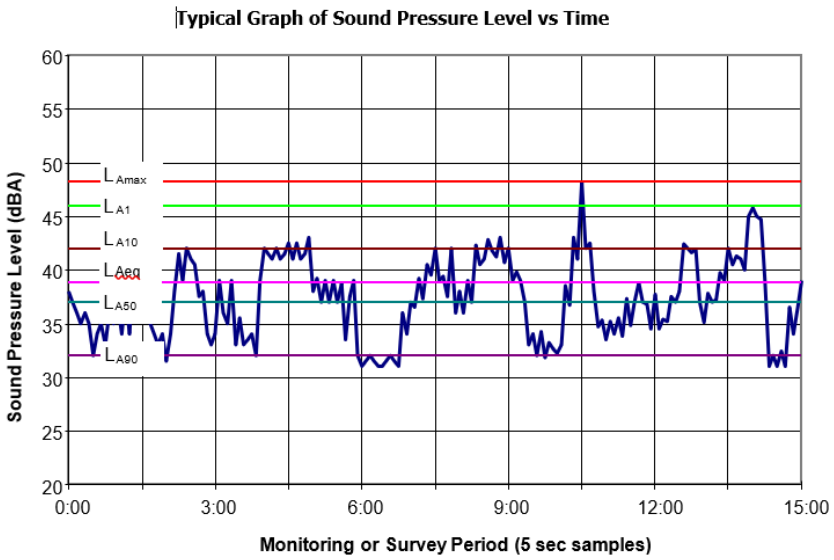
L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level (L_{A90}) for each period.

RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.



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1 INTRODUCTION

Sydney Metro City & Southwest is a new 30km metro line extending from the end of Sydney Metro Northwest at Chatswood under Sydney Harbour, through new CBD stations and southwest to Bankstown. It is due to open in 2025 with the capacity to run a metro train every four minutes each way through the centre of Sydney. The Sydney Metro City & Southwest comprises of two components;

- Chatswood to Sydenham project
- Sydenham to Bankstown upgrade, now known as Southwest Metro (SWM)

As part of the Southwest Metro project, it is proposed to carry out construction works between Sydenham and Bankstown Stations, with supporting works occurring up to Yagoona Station. These works are known as Southwest Metro Conversion and Station Works – Package 3 (SWM3). The works will be undertaken by John Holland & Laing O'Rourke joint venture (JHLOR).

This Construction Noise and Vibration Impact Statement (CNVIS) relating to the SWM3 has been prepared for JHLOR.

This CNVIS has been prepared in compliance with Condition of Approval (CoA) E27 outlined in the Conditions of Approval for Sydney Metro Sydenham to Bankstown Upgrade, (SSI 8256).

The assessment has been conducted in accordance with the Construction Noise and Vibration Management Plan (CNVMP) and the following noise and vibration guidelines.

- *Interim Construction Noise Guideline (DECC, 2009) – ICNG*
- *Sydney Metro City & Southwest Construction Noise and Vibration Strategy (2017) – CNVS*
- *NSW Industrial Noise Policy (NSW EPA, 2000) – INP*
- *Transport for NSW Construction Noise and Vibration Strategy – April 2018 (TfNSW 2018)*
- *The Sydney Metro Construction Environmental Management Framework v3.1 – CEMF*
- *Assessing Vibration: A Technical Guideline (DEC, 2006) (for human exposure)*
- *BS 7385 Part 2 -1993 "Evaluation and measurement for vibration in buildings Part 2" (as applicable to Australian conditions)*
- *German Standard DIN 4150-3: Structural Vibration – effects of vibration on structures*

2 SITE DESCRIPTION

The SWM3 works will be undertaken within the rail corridor between Sydenham and Bankstown, extending as far as the Yagoona Set down Area.

The area surrounding the site is predominately residential, with commercial premises surrounding the stations, discussed in more detail in the following sections. The site extends east to Sydenham Station and west to Yagoona Station.

Nearby sensitive receivers have been divided into 17 different noise catchment areas (NCAs). The defined noise catchment areas are consistent with those defined in the Environmental Impact Statement (EIS) for this project (*Sydney Metro City & Southwest Sydenham to Bankstown, Technical Paper 2 - Noise and Vibration Assessment, Report Number 610.15897-R02*). In addition to these NCAs, an additional NCA has been introduced within Revision D of this report, to capture the works occurring around Yagoona station.

The project NCAs are presented in **Figure 2-1** and **Figure 2-2**.. An updated land use survey of the whole line was introduced in conjunction with revision E of this report. Updated land uses for all NCAs are included in Appendix A of this report.

Figure 2-1 Project site and surrounding area (NCA 01 to NCA 06, NCA 14 to NCA 16)

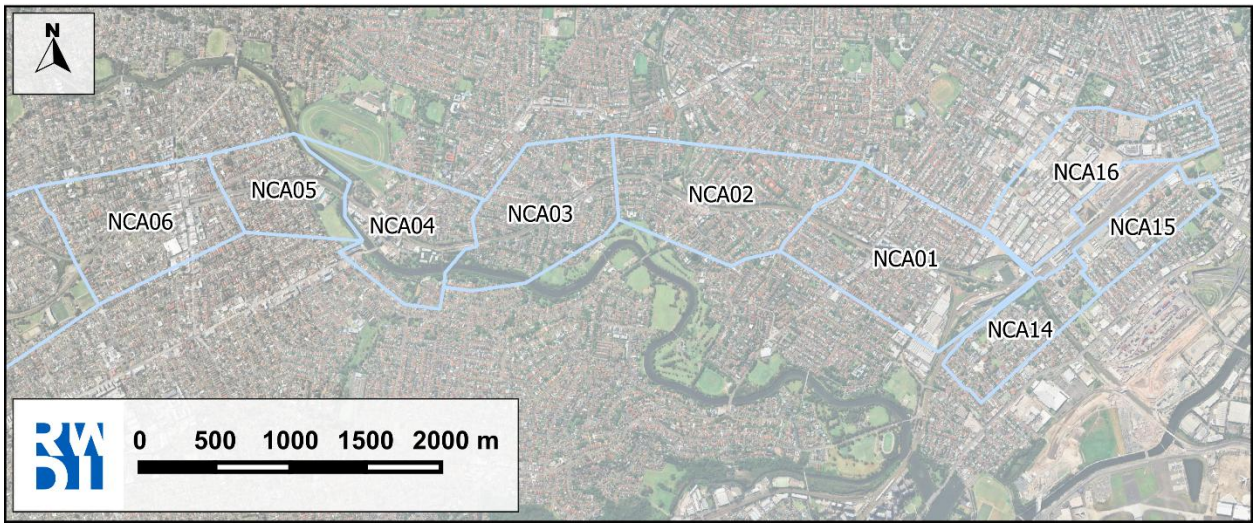
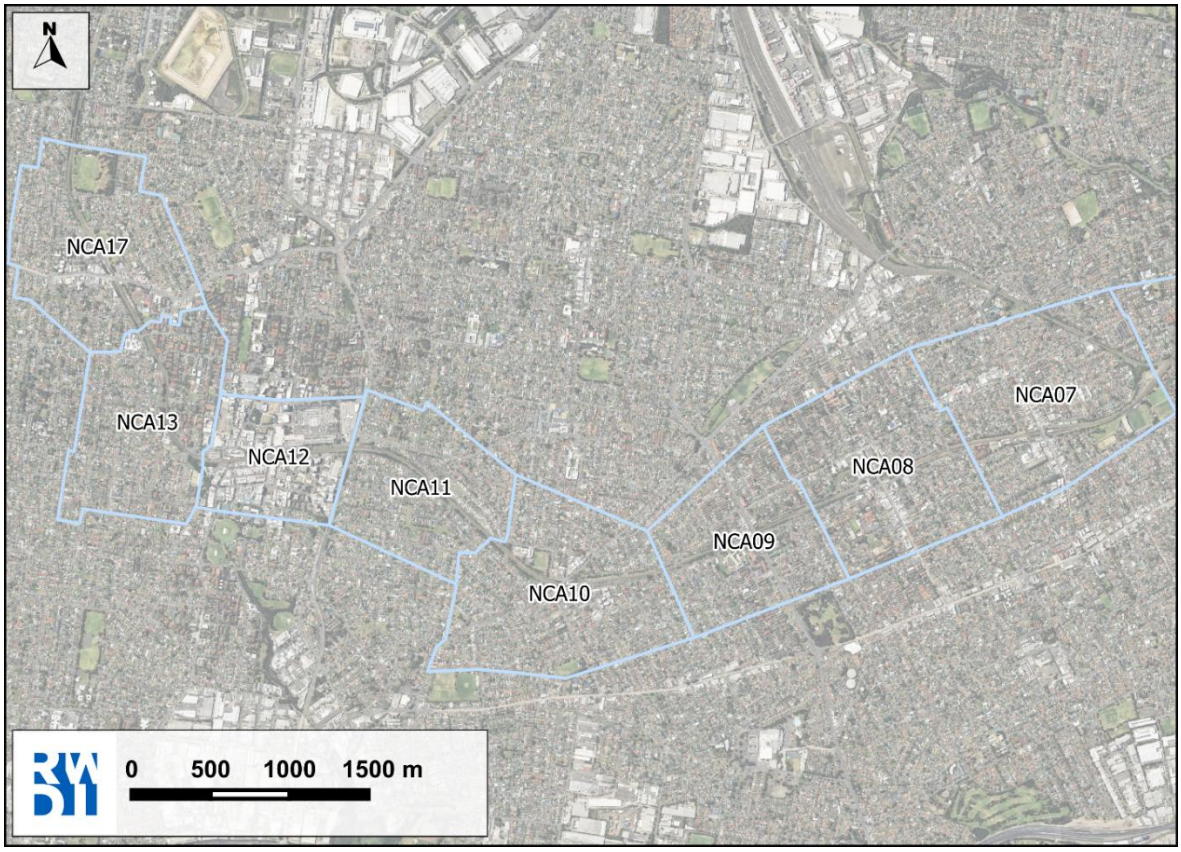


Figure 2-2 Project site and surrounding area (NCA 07 to NCA 13, NCA 17)



2.1 Residential Receivers

Residential premises make up the majority of all the receivers surrounding these works, on both the north and south sides of the rail line. With the exception of NCA 12, residential receivers are located directly adjacent to the rail corridor in all noise catchment areas.

2.2 Commercial and Industrial Receivers

Most commercial receivers in the vicinity of these works are located along the roads surrounding the stations. There is a concentration of these receivers along Beamish Street, Campsie in NCA 06, along Canterbury Road, Canterbury in NCA 04, along Illawarra Road, Marrickville in NCA 01, along Burwood Road, Burwood in NCA 07, along Haldon Street, Lakemba in NCA 08 and along Punchbowl Road, Punchbowl in NCA 10. At the eastern end of NCA 01 in Marrickville there are more commercial properties. NCA 12 in Bankstown is almost entirely made up of commercial receivers. S

There are a small number of industrial receivers located in NCA 01, NCA 04 and NCA 07.

Due to the high density of these areas, particularly around the stations, a large number of the commercial properties are mixed use. Typically, this results in commercial premises on the ground floor and residential above. However, in cases of so called 'shop top housing', both stories have been assumed to be commercial except for addresses which were specifically advised to include residences

These commercial areas also typically contain a range of businesses, many of which are classified as other sensitive receivers as outlined in the following section.

2.3 Other Sensitive Receivers

As detailed in the CNVS, other types of sensitive receivers should be classified separately. The other sensitive receivers, as defined in the CNVS, that have been identified are presented in Table 2-1.

Many buildings in high density areas are mixed use, resulting in multiple types of receiver at the one address. This list is to be updated as the project progresses, and work methodologies are finalised.

Multi-purpose community centres have been assessed as standard commercial premises.

Table 2-1 Other sensitive receivers

Receiver ID	Receiver Type	Receiver Address
NCA 06_Caf_6058	Café/Bar/Restaurant	11 Amy Street, Campsie
NCA 06_Caf_6053	Café/Bar/Restaurant	115 Clissold Parade, Campsie
NCA 06_Caf_6050	Café/Bar/Restaurant	140-142 Beamish Street, Campsie
NCA 06_Caf_6052	Café/Bar/Restaurant	148a Beamish Street, Campsie
NCA 06_Caf_6054	Café/Bar/Restaurant	152 Beamish Street, Campsie
NCA 06_Caf_6051	Café/Bar/Restaurant	161-163 Beamish Street, Campsie
NCA 04_Caf_6059	Café/Bar/Restaurant	171-173 Canterbury Road, Canterbury
NCA 06_Caf_6056	Café/Bar/Restaurant	174 Beamish Street, Campsie
NCA 06_Caf_6055	Café/Bar/Restaurant	193 Beamish Street, Campsie
NCA 06_Caf_6055	Café/Bar/Restaurant	195 Beamish Street, Campsie
NCA 03_Caf_6061	Café/Bar/Restaurant	20 Crinan Street, Hurlstone Park
NCA 04_Caf_4315	Café/Bar/Restaurant	208 Canterbury Road, Canterbury
NCA 02_Caf_1647	Café/Bar/Restaurant	237 Wardell Road, Dulwich Hill
NCA 02_Caf_4700	Café/Bar/Restaurant	245 Wardell Road, Dulwich Hill
NCA 03_Caf_6060	Café/Bar/Restaurant	25 Floss Street, Hurlstone Park
NCA 02_Caf_6062	Café/Bar/Restaurant	255-257 Wardell Road, Marrickville
NCA 04_Caf_4315	Café/Bar/Restaurant	30 Tincombe Street, Canterbury
NCA 12_Caf_5410	Café/Bar/Restaurant	10 Fetherstone St, Bankstown
NCA 17_Caf_1114	Café/Bar/Restaurant	500 Hume Highway, Yagoona
NCA 17_Caf_2104	Café/Bar/Restaurant	558 Hume Highway, Yagoona
NCA 08_CCC_6037	Childcare Centre	108-112 Haldon Street, Lakemba
NCA 06_CCC_1811	Childcare Centre	12 Campsie Street, Campsie
NCA 03_CCC_2114	Childcare Centre	12-14 Smith Avenue, Hurlstone Park

Receiver ID	Receiver Type	Receiver Address
NCA 10_CCC_7037	Childcare Centre	17 Broadway, Punchbowl
NCA 08_CCC_5156	Childcare Centre	180 Lakemba Street, Lakemba
NCA 06_CCC_6000	Childcare Centre	2 Carrington Street, Campsie
NCA 10_CCC_6708	Childcare Centre	21 Dudley Street, Punchbowl
NCA 07_CCC_7012	Childcare Centre	24-25 Redman Parade, Belmore
NCA 06_CCC_1615	Childcare Centre	3 Harold Street, Campsie
NCA 01_CCC_2803	Childcare Centre	356 Victoria Road, Marrickville
NCA 10_CCC_6039	Childcare Centre	42 Urunga Parade, Punchbowl
NCA 08_CCC_8214	Childcare Centre	48-50 Taylor Street, Lakemba
NCA 03_CCC_5024	Childcare Centre	66 Garnet Street, Hurlstone Park
NCA 06_CCC_4644	Childcare Centre	70 Campsie Street, Campsie
NCA 10_CCC_5938	Childcare Centre	23 Arthur Street, Punchbowl
NCA 10_CCC_5985	Childcare Centre	70 South Terrace, Punchbowl
NCA 10_CCC_5051	Childcare Centre	748 Punchbowl Road, Punchbowl
NCA 07_CCC_7759	Childcare Centre	8 Leylands Parade, Belmore
NCA 17_CCC_1014	Childcare Centre	19 Church Road, Yagoona
NCA 17_CCC_2102	Childcare Centre	562 Hume Highway, Yagoona
NCA 17_CCC_2105	Childcare Centre	556 Hume Highway, Yagoona
NCA 06_EDU_1956	Education	1 Harold Street, Campsie
NCA 09_EDU_6288	Education	102-112 King Georges Road, Wiley Park
NCA 06_EDU_1481	Education	12 Harold Street, Campsie
NCA 06_Edu_1965	Education	14 Duke Street, Campsie
NCA 12_EDU_6893	Education	18 East Terrace, Bankstown
NCA 02_EDU_4373	Education	194-210 Wardell Road, Marrickville
NCA 09_EDU_6154	Education	1a Hillcrest Street, Wiley Park
NCA 09_EDU_6153	Education	1b Hillcrest Street, Wiley Park
NCA 13_EDU_6861	Education	2 Winspear Avenue, Bankstown
NCA 01_EDU_1155	Education	200 Livingstone Road, Marrickville
NCA 06_EDU_1100	Education	22 Harold Street, Campsie
NCA 07_EDU_6512	Education	26-30 Etela Street, Belmore
NCA 10_EDU_5772	Education	29-47 Rossmore Avenue, Punchbowl
NCA 06_Edu_4266	Education	3 Harold Street, Campsie
NCA 07_EDU_7102	Education	31-33 Isabel Street, Belmore

Receiver ID	Receiver Type	Receiver Address
NCA 08_EDU_7740	Education	33-35 Croydon Street, Lakemba
NCA 01_EDU_1133	Education	334 Illawarra Road, Marrickville
NCA 08_EDU_6451	Education	37-49 Croydon Street, Lakemba
NCA 13_EDU_6860	Education	4 Winspear Avenue, Bankstown
NCA 01_Edu_2827	Education	53 Francis Street, Marrickville
NCA 10_EDU_6117	Education	54 Kelly Street, Punchbowl
NCA 12_EDU_7029	Education	6 East Terrace, Bankstown
NCA 09_EDU_6492	Education	95 King Georges Road, Wiley Park
NCA 09_EDU_6080	Education	97-101 King Georges Road, Wiley Park
NCA 17_EDU_1295	Education	425 Hume Highway, Yagoona (Primary school)
NCA 17_EDU_1625	Education	182 Cooper Road, Yagoona
NCA 17_EDU_2096	Education	425 Hume Hwy, Yagoona (Pre School)
NCA 01_Med_1102	Medical	397 Illawarra Road, Marrickville
NCA 01_Med_2171	Medical	372 Illawarra Road, Marrickville
NCA 06_Med_4625	Medical	10 Amy Street, Campsie
NCA 06_Med_1188	Medical	110 Clissold Parade, Campsie
NCA 04_Med_4568	Medical	129 Canterbury Road, Canterbury
NCA 06_Med_3444	Medical	12a Campsie Street, Campsie
NCA 06_Med_1604	Medical	147 Beamish Street, Campsie
NCA 06_Med_4765	Medical	154 Beamish Street, Campsie
NCA 06_Med_1081	Medical	17 Anglo Road, Campsie
NCA 06_Med_4446	Medical	180 Beamish Street, Campsie
NCA 03_Med_4628	Medical	19 Crinan Street, Hurlstone Park
NCA 06_Med_4652	Medical	20-24 Ninth Avenue, Campsie
NCA 06_Med_4414	Medical	2-16 Anglo Road, Campsie
NCA 03_Med_4778	Medical	23 Crinan Street, Hurlstone Park
NCA 02_Med_1086	Medical	241 Wardell Road, Dulwich Hill
NCA 06_Med_1190	Medical	247-249 Beamish Street, Campsie
NCA 06_Med_1092	Medical	261 Beamish Street, Campsie
NCA 08_MED_7832	Medical	53 Railway Pde, Lakemba
NCA 08_MED_8142	Medical	27-31 Railway Parade, Lakemba

Receiver ID	Receiver Type	Receiver Address
NCA 01_Med_2182	Medical	315-317 Illawarra Road, Marrickville
NCA 01_Med_2171	Medical	376 Illawarra Road, Marrickville
NCA 01_Med_3638	Medical	385 Illawarra Road, Marrickville
NCA 01_Med_1102	Medical	397 Illawarra Road, Marrickville
NCA 06_Med_4446	Medical	42-42a North Parade, Campsie
NCA 06_Med_4400	Medical	48 South Parade, Campsie
NCA 06_Med_2104	Medical	7 Duke Street, Campsie
NCA 10_MED_7070	Medical	759 Punchbowl Road, Punchbowl
NCA 17_MED_1024	Medical	457 Hume Highway, Yagoona
NCA 17_MED_1024	Medical	457 Hume Highway, Yagoona
NCA 17_MED_1024	Medical	457 Hume Highway, Yagoona
NCA 17_MED_1024	Medical	457 Hume Highway, Yagoona
NCA 10_POW_6870	Place of Worship	1 Catherine Street, Punchbowl
NCA 10_POW_6463	Place of Worship	11-15 Broadway, Punchbowl
NCA 09_POW_7169	Place of Worship	114-118 King Georges Road, Wiley Park
NCA 08_POW_5779	Place of Worship	154-158 Lakemba Street, Lakemba
NCA 10_POW_6196	Place of Worship	19 Myall Street, Punchbowl
NCA 10_POW_6044	Place of Worship	20 Arthur Street, Punchbowl
NCA 08_POW_7427	Place of Worship	20 Ernest Street, Lakemba
NCA 02_PoW_1130	Place of Worship	205 Livingstone Road, Marrickville
NCA 10_POW_7430	Place of Worship	25 Kelly Street, Punchbowl
NCA 06_PoW_1144	Place of Worship	26 Anglo Road, Campsie
NCA 10_POW_5771	Place of Worship	29-47 Rossmore Avenue, Punchbowl
NCA 07_POW_7103	Place of Worship	31-33 Isabel Street, Belmore
NCA 06_PoW_1411	Place of Worship	34 North Parade, Campsie
NCA 01_PoW_1106	Place of Worship	389 Illawarra Road, Marrickville
NCA 02_PoW_2504	Place of Worship	43 Robert Street, Marrickville
NCA 13_POW_7662	Place of Worship	4-6 Weigand Avenue, Bankstown
NCA 02_PoW_2504	Place of Worship	47 Robert Street, Marrickville
NCA 07_POW_6348	Place of Worship	50-52 Etela Street, Belmore
NCA 09_POW_8212	Place of Worship	63 Railway Parade, Lakemba
NCA 03_PoW_2022	Place of Worship	67a Duntroon Street, Hurlstone Park
NCA 08_POW_7681	Place of Worship	69-75 Haldon Street, Lakemba

Receiver ID	Receiver Type	Receiver Address
NCA 06_PoW_1087	Place of Worship	7 Evaline Street, Campsie
NCA 17_PoW_1909	Place of Worship	151 Highland Avenue, Yagoona

2.4 Heritage

Where there is a risk that the SWM3 works could result in vibration impacts to heritage significant fabric due to the close proximity of vibration intensive plant (such as hammering out redundant Sydney Trains infrastructure adjacent to platforms and station buildings within station curtilages), it is recommended that vibration monitoring is undertaken in accordance with the Construction Noise and Vibration Management Sub-plan.

A list of the heritage items that are located within or adjacent to the SWM3 project boundary and expected work areas is provided in Table 2-2. It is noted that the register listing details for some items have changed since the EIS and SPIR assessments were prepared due to changes to Local Government Area boundaries and government agency registers, such as the Transport Asset Holding Entity (formerly Railcorp) Section 170 Heritage and Conservation Register. The current item details are provided. For further information on heritage items refer to the SWM3 Construction Heritage Management Plan.

Table 2-2 Heritage listed Items in and near the SWM3 project area

Item	Listings	Significance
Sewage Pumping Station 271	• State Heritage Register (SHR) (01342) • Sydney Water s170 Heritage and Conservation Register (4571727) • Inner West LEP 2022 (I1233)	State
Stone house, including interiors	• Inner West LEP 2022 (I1270)	Local
Marrickville Railway Station Group	• SHR (01186) • TAHE s170 Heritage and Conservation Register (4801091) • Inner West LEP 2022 (I1241)	State
South Dulwich Hill Heritage Conservation Area	• Inner West LEP 2022 (C107)	Local
Dulwich Hill Railway Station Group	• TAHE s170 Heritage and Conservation Register (4801909) • Inner West LEP 2022 (I1024)	State
Turpentine - Ironbark Forest Understory	• Inner West LEP 2022 (I1222)	Local
Hurlstone Park Railway Station Group	• TAHE s170 Heritage and Conservation Register (4802051) • Canterbury-Bankstown LEP 2023 (I175)	Local

Item	Listings	Significance
Hurlstone Park Railway Underbridge	• TAHE s170 Heritage and Conservation Register (4805737) • Canterbury-Bankstown LEP 2023 (I181)	Local
Old Sugarmill	• SHR (00290) • Canterbury-Bankstown LEP 2023 (I105)	State
Canterbury Railway Station Group	• SHR (01109) • TAHE s170 Heritage and Conservation Register (4801100) • Canterbury-Bankstown LEP 2023 (I90)	State
Inter-War Hotel (former Hotel Canterbury)	• Canterbury-Bankstown LEP 2023 (I91)	Local
Federation Post Office Building (former Canterbury Post Office)	• Canterbury-Bankstown LEP 2023 (I89)	Local
Electricity substation no. 275	• Ausgrid s170 Heritage and Conservation Register (3430425)	Local
Canterbury (Cooks River) Underbridge	• TAHE s170 Heritage and Conservation Register (4801568) • Canterbury-Bankstown LEP 2023 (I95)	Local
Canterbury (Cooks River/Charles St) Underbridge – Main Line	• TAHE s170 Heritage and Conservation Register (5062566)	Local
Campsie Railway Station Group	• TAHE s170 Heritage and Conservation Register (4801101) • Canterbury-Bankstown LEP 2023 (I63)	Local
Belmore Railway Station Group	• SHR (01081) • TAHE s170 Heritage and Conservation Register (4801084) • Canterbury-Bankstown LEP 2023 (I33)	State
Federation House (former station master's cottage)	• Canterbury-Bankstown LEP 2023 (I32)	Local
Post-war bus shelter and public lavatories	• Canterbury-Bankstown LEP 2023 (I51)	Local
Lakemba Railway Station Group	• TAHE s170 Heritage and Conservation Register (4801916) • Canterbury-Bankstown LEP 2023 (I208)	Local

Item	Listings	Significance
Wiley Park Railway Station Group	• TAHE s170 Heritage and Conservation Register (4801946) • Canterbury-Bankstown LEP 2023 (I236)	Local
Lakemba Water Pumping Station (WP0003)	• Sydney Water s170 Heritage and Conservation Register (4570136) • Canterbury-Bankstown LEP 2023 (I235)	Local
Punchbowl Railway Station Group	• TAHE s170 Heritage and Conservation Register (4802067) • Canterbury-Bankstown LEP 2023 (I226)	Local
Bankstown Railway Station Group	• TAHE s170 Heritage Inventory Register (4802067) • Canterbury-Bankstown LEP 2023 (I12)	Local
Bankstown Parcels Office (former)	• Canterbury-Bankstown LEP 2023 (I11)	Local
Shop	• Canterbury-Bankstown LEP 2023 (I13)	Local

None of these structures have been reported as structurally unsound.

3 SUMMARY OF CONSTRUCTION WORKS

Construction works associated with this project are expected to run from September 2024 to May 2026. As all works will occur within an operational rail corridor and in order to allow for the continued operation of the Sydney rail network, they will often take place during possessions overnight and on weekends.

The construction periods as defined in the CNVS are presented in Table 4-2, below in section 4. Construction works for this project will occur throughout all of these periods.

For this assessment a number of scenarios have been assessed. These scenarios have been chosen to capture each of the main construction activities and to predict the typical and worst-case noise impacts on surrounding receivers. The construction scenarios that have been assessed are presented in Table 3-1, along with the proposed equipment and noise levels.

The scenarios will use relatively noisy equipment and will occur close to sensitive receivers. In addition, these works will often occur outside of normal construction hours, when the noise impact is greatest. The locations along the project site the works will occur is also presented in the Tables below.

The worst-case activities during each relevant time period, considering both the *ICNG* and *CNVS,* have been identified and form the focus of this assessment. On this basis, it is critical to note that a worst case 15-minute noise level is predicted and that during the period of work noise levels are likely to be lower for most of the time.

Table 3-1 Summary of works and sound power levels

Scenario	Description	Location	Work Period	Main Equipment Used	Typical L_W	
					$L_{Aeq,15min}$	L_{Amax}
S1A	Bankstown Station and Precinct Works	Bankstown Station	Standard and OOH	24t Excavator x 2	109	124
				Concrete saw	116	
				CFA Piling Rig	108	
				Concrete Truck	107	
				Concrete Pump	102	
				Concrete vibrator	107	
				delivery trucks x2	110	
				2t tipper	101	
				Crane Truck x2	108	
				Vibratory Roller	105	
				Generators x2	108	
				Lighting towers x4	99	

Scenario	Description	Location	Work Period	Main Equipment Used	Typical L_W	
					$L_{Aeq,15min}$	L_{Amax}
S1B		Track between Bankstown Station and Marion Street	Standard and OOH	24t Excavator x 2	109	118
				Crane Truck x2	108	
				Vibratory Roller	105	
				Generators x2	108	
				2t tipper x2	104	
				Vacuum truck x2	110	
				Lighting Towers x4	99	
				Ballast Regulator	118	
S2	Southwest Station Work	All stations between Marrickville and Punchbowl (inclusion)	Standard and OOH	Jackhammers	114	124
				CFA Piling Rig	108	
				concrete truck	107	
				concrete pump	102	
				Concrete vibrator	107	
				24t excavator	106	
				Delivery trucks x2	110	
				2t tipper	101	
				120t crane	101	
S3	Southwest Corridor Works	Entire Alignment	Standard and OOH	24t Excavator x 2	109	124
				Crane Truck x2	108	
				CFA Piling Rig	108	
				concrete truck	107	
				concrete pump	102	
				compaction equipment	110	
				chainsaw	114	
S4A	Asset Upgrades – Track Rectification	Sydenham Station	Standard and OOH	24t Excavator x 2	109	118
				Crane Truck x2	108	
				Rail Tamper	115	
				Ballast Regulator	118	

Scenario	Description	Location	Work Period	Main Equipment Used	Typical L_W	
					$L_{Aeq,15min}$	L_{Amax}
				Grinders	107	
				Vacuum truck	107	
S4B	Asset upgrades – Bridge upgrades	+/- 50m of Various Bridge Locations	Standard and OOH	24t Excavator x 2	109	118
				Crane Truck x2	108	
				Rail Tamper	115	
				Ballast Regulator	118	
				grinders	107	
				Vacuum truck	107	
				2t tipper x2	104	
S4C	Asset upgrades – Civil assets	Entire Alignment	Standard and OOH	24t Excavator x 2	109	118
				Crane Truck x2	108	
				Rail Tamper	115	
				Ballast Regulator	118	
				grinders	107	
				Vacuum truck	107	
				2t tipper x2	104	
S5	Final Conversions	Entire Alignment	Standard and OOH	24t Excavator x 2	109	118
				Crane Truck x2	108	
				Rail Tamper	115	
				Ballast Regulator	118	
				grinders	107	
				Vacuum truck	107	
				2t tipper x2	104	
S6	ARTC Works	Punchbowl Station	Standard and OOH	24t Excavator x 2	109	118
				Crane Truck x2	108	
				2t tipper x2	104	
S7	Utility works	Entire Alignment	Standard and OOH	24t Excavator x 2	109	118
				Crane Truck x2	108	
				2t tipper x2	104	

Scenario	Description	Location	Work Period	Main Equipment Used	Typical L_W	
					$L_{Aeq,15min}$	L_{Amax}
				Jack Hammer	114	
				Vacuum truck	107	
				Watercart	109	
				Concrete Saw	113	
S8	Property works	Punchbowl Station	Standard and OOH	NA, Land Acquisition		
S9	Demolition of Punchbowl Candy Shop and Parcel Office, Canterbury Signalling Building		Standard and OOH	24t Excavator x 2	109	118
				Rollers x2	108	
				Front End Loader	112	
				Crane Truck x2	108	
				Jack Hammer	114	
				Concrete Saw	113	
				2t tipper x2	104	
S10A	Temporary site compound removal including Canterbury and North Terrace Road Bankstown	Close St Canterbury, North Terrace, Bankstown	Standard and OOH	24t excavator	106	118
				Concrete truck	102	
				Concrete pump	102	
				Crane truck	105	
				EWP	100	
				Dump truck	107	
				24t excavator with hammer	119	
S10B		Ancillary Facilities	NA, covered in post approval			
S11	Temporary Works		Standard and OOH	Geotechnical Drill Rig	103	118
				24t Excavator	106	
				Lighting Towers x2	96	
				Watercart	109	
				Concrete Truck	107	
				Vibratory roller	105	

Scenario	Description	Location	Work Period	Main Equipment Used	Typical L_W	
					$L_{Aeq,15min}$	L_{Amax}
S12A	Site preparation including flooding ballast	Yagoona Setdown	Standard	24t Excavator x 2	106	118
				FEL x2	112	
				Trucks, 2 per 15 minutes	107	
S12B	Assembly of track segments	Yagoona Setdown	Standard	FEL x2	112	118
				Trucks, 2 per 15 minutes	107	
				5 Impact Drivers	104	
S12C	Relocation of track sections from Yagoona set down to Bankstown station	Yagoona Setdown to Bankstown Station	Standard and OOH	PEM LEM	105	114
				24t Excavator x 2	106	

Note: No modifying factor adjustments for annoying characteristics has been applied to the scenarios above. This will be accounted for on a case-by-case basis when planning OOH activities using the PredicTool system.

4 NOISE MANAGEMENT LEVELS

4.1 Unattended Noise Monitoring

Unattended noise monitoring was conducted from the 26th of February to the 10th of March 10, 2025 to capture updated ambient noise levels in the new NCA 17. Results of the monitoring has been used to establish Noise Management Levels as per the ICNG. The noise monitor was installed close to 30 Church Road, as shown in .The unattended noise measurements were conducted using a noise monitor which was programmed to measure A-weighted, statistical noise levels stored at 15-minute intervals on fast response mode. The noise monitors were calibrated at the beginning and end of the monitoring period, with no significant drift being observed.

The measured background noise levels at the unattended noise monitoring locations are presented in Table 4-1. Refer to **Appendix B** for a graphs of the unattended noise monitoring data.

The unattended noise monitoring data has been analysed in conjunction with weather data obtained from the nearest weather station. Any noise measurement data that has been adversely affected by inclement weather as defined by the EPA Noise Policy for Industry (i.e., periods where average wind speeds exceed 5 m/s and periods that are rain affected) have been excluded in determining the existing noise levels on site.

Table 4-1 Unattended Noise Measurements – Background (L_{90}) Noise Levels

Noise Monitor Location	Time of Day	Rating Background Noise Level $L_{90(period)}$ (dBA)
L1	Day (7 am – 6 pm)	43
	Evening (6pm – 10 pm)	44
	Night (10 pm – 7 am)	39

4.2 Construction Hours

As per Condition L5.1 of the EPL, construction is permitted between the hours of 7.00am and 6.00pm Monday to Friday, and 8.00am and 6.00pm Saturday. CoA E19 permits construction during the same hours. For works within the rail corridor, and subsequently the boundary of the EPL, the EPL takes precedence. Construction is therefore not permitted outside the hours specified in the EPL unless an Out of Hours Work approval is obtained, as per CoA E25, or the works meet the requirements of CoA E20 as below.

CoA E20 Notwithstanding Conditions E19 and E24 Work may be undertaken outside the hours specified in the following circumstances:

a) for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or

b) where it is required in an emergency to avoid injury or the loss of life, to avoid damage or loss of property or to prevent environmental harm; or

c) where different Construction hours are permitted or required under an EPL in force in respect of the CSSI; or

d) Work approved under an Out-of-Hours Work Protocol for Work not subject to an EPL as required by Condition E25; or

e) Construction that causes $L_{Aeq(15\ minute)}$ noise levels:

i. no more than 5 dB(A) above the rating background level at any residence in accordance with the *Interim Construction Noise Guideline (DECC, 2009),* and

ii. no more than the 'Noise affected' noise management levels specified in Table 3 of the *Interim Construction Noise Guideline (DECC, 2009)* at other sensitive land uses, and

iii. continuous or impulsive vibration values, measured at the most affected residence are no more than the maximum values for human exposure to vibration, specified in Table 2.2 of *Assessing Vibration: a technical guideline (DEC, 2006),* and

iv. intermittent vibration values measured at the most affected residence are no more than the maximum values for human exposure to vibration, specified in Table 2.4 of *Assessing Vibration: a technical guideline (DEC, 2006)*; or

f) where a negotiated agreement has been reached with a substantial majority of sensitive receivers who are within the vicinity of and may be potentially affected by the particular Construction, and the noise management levels and/or limit for ground-borne noise and vibration (human comfort) cannot be achieved. All agreements must be in writing and a copy forwarded to the Planning Secretary at least one (1) week before the commencement of activities.

The CNVS presents a methodology for determining numerical limits – or Noise Management Levels (NMLs) – for the impacts of construction noise on residences and other land uses according to the time period during which the noise occurs. This methodology was derived from the *ICNG* but has been refined for the Sydney Metro project.

4.3 Airborne Construction Noise

Noise Management Levels (NMLs) for residential land uses are presented in Table 4-2.

Table 4-2 Residential noise management levels

Time of Day	Management Level $L_{Aeq,15min}$	How to Apply
Recommended Standard Hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm	Noise affected RBL + 10dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq(15min)}$ is greater than the noise affected level, the proponent would apply all feasible and reasonable work practices to minimise noise. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.

Time of Day	Management Level $L_{Aeq,15min}$	How to Apply
No work on Sundays or Public Holidays	Highly noise affected 75dB	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the proponent would consider very carefully if there is any other feasible and reasonable way to reduce noise to below this level. If no quieter work method is feasible and reasonable, and the works proceed, the proponent would communicate with the impacted residents by clearly explaining the duration and noise level of the works, and by describing any respite periods that will be provided.
Outside Recommended Standard Hours	Noise affected RBL + 5dB	A strong justification would typically be required for works outside the recommended standard hours. The proponent would apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5dBA above the noise affected level, the proponent would negotiate with the community. For guidance on negotiating agreements see section 7.2.2 of the ICNG.

The NMLs for other land uses as outlined in the CNVS, applicable to this project are presented in Table 4-3.

Table 4-3 Non-residential noise management levels

Land Use	Noise Management Level
Commercial premises	External noise level $L_{Aeq(15min)}$ 70dB
Industrial premises	External noise level $L_{Aeq(15min)}$ 75dB
Classrooms at schools and other educational institutions	Internal noise level $L_{Aeq(15min)}$ 45dB
Hospital wards and operating theatres (applied to all medical buildings)	Internal noise level $L_{Aeq(15min)}$ 45dB
Places of worship	Internal noise level $L_{Aeq(15min)}$ 45dB
Active recreation areas (such as parks and sports grounds or playgrounds)	External noise level $L_{Aeq(15min)}$ 65dB

Land Use	Noise Management Level
Passive recreation areas (such as outdoor grounds used for teaching, outdoor cafes or restaurants)	External noise level $L_{Aeq(15min)}$ 60dB
Child care centres	External noise level $L_{Aeq(1hr)}$ 55dB Internal noise level $L_{Aeq(1hr)}$ 40dB
Hotel – bars and lounges (day and evening period)	Internal noise level $L_{Aeq(15min)}$ 50dB
Hotel – sleeping areas (night period)	Internal noise level $L_{Aeq(15min)}$ 40dB
Cafés, bars and restaurants	Internal noise level $L_{Aeq(15min)}$ 50dB
Libraries	Internal noise level $L_{Aeq(15min)}$ 45dB
Recording Studios	Internal noise level $L_{Aeq(15min)}$ 25dB
Theatres / Auditoriums	Internal noise level $L_{Aeq(15min)}$ 30dB

The noise management levels for residential, commercial and industrial receivers are applicable to external areas of the premises. When assessing other sensitive non-residential receivers with internal noise criteria, such as education facility, place of worship or medical centre, a 10dB reduction through a partially open window can be assumed, as detailed in the ICNG and CNVMP. This allows for predictions to external areas of the premises.

Based on the background ambient noise levels previously conducted for the project, the Noise Management Levels presented in Table 4-4 have been established. In compliance with NPfI, the NML for the evening period at NCA 02 and NCA 17 has been reduced to match the NML during the day period.

Table 4-4 Project noise management levels – $L_{Aeq,15min}$

Receiver Type	Standard Hours (RBL +10dB)	Outside Recommended Standard Hours (RBL +5dB)		
	Day	Day (Saturday & Sunday)	Evening	Night
Residential NCA 01	48	43	43	38
Residential NCA 02	48	43	43	38
Residential NCA 03	48	43	43	39
Residential NCA 04	50	45	45	40
Residential NCA 05	46	41	41	37
Residential NCA 06	55	50	47	40
Residential NCA 07	51	46	46	40
Residential NCA 08	57	52	52	46
Residential NCA 09	54	49	49	41

Receiver Type	Standard Hours (RBL +10dB)	Outside Recommended Standard Hours (RBL +5dB)		
	Day	Day (Saturday & Sunday)	Evening	Night
Residential NCA 10	57	52	52	46
Residential NCA 11	57	52	52	44
Residential NCA 12	64	59	56	47
Residential NCA 13	52	47	47	44
Residential NCA 14	51	46	46	45
Residential NCA 15	61	56	54	47
Residential NCA 16	62	57	48	43
Residential NCA 17	53	48	48	44

4.4 High Impact Noise

CoA-E24 places further restrictions on the hours that 'high noise impact' generating activities may occur, except as permitted by an EPL. Construction works and activities with the potential to generate high noise impact will be scheduled to occur between the hours of;

- 8:00am to 6:00pm Mondays to Fridays, inclusive;
- 8:00am to 1:00pm Saturdays; and
- In continuous blocks not exceeding three hours each with a minimum respite from those activities and Works of not less than one hour between each block.

EPL Condition L5.4 states: "With regard to construction activities any high noise impact generating works must only be undertaken:

a) between the hours of 8:00am and 10:00pm Monday to Friday;

b) between the hours of 8:00am and 1:00pm Saturdays and Sundays; and

c) where the high noise impact generating works are likely to impact the same noise sensitive receivers, in blocks of no more than 3 hours, with at least a 1 hour respite between each block of work."

As such, works within the corridor resulting in high impact noise at surrounding receivers will be undertaken in accordance with the hours stipulated in EPL Condition L5.4. High impact noise generating works outside the rail corridor will be undertaken in accordance with the hours stipulated in CoA E24. If works resulting in high impact noise are mitigation by offers of alternative accommodation or if occupants are not otherwise present for any reason, high impact works can proceed beyond the hours stipulated.

4.5 Sleep Disturbance

Section 12.2 of the Sydney Metro City and Southwest – Sydenham to Bankstown Upgrade Environmental Impact Statement (EIS) states "The appropriate screening criterion for sleep disturbance is a maximum level of 15 dB above the RBL, during the night time period (10pm to 7am). Where this criterion is met, sleep disturbance is unlikely for the majority of people, but where it is not met, a more detailed analysis is required."

The CNVS provides further assessment of sleep disturbance, indicating that one or two events per night, with maximum internal noise levels of 65-70dBA, are not likely to affect health and wellbeing significantly.

Sleep disturbance rating background levels and screening criteria are presented in Table 4-5.

Table 4-5 Sleep Disturbance Rating Background Levels and Screening Criteria

NCA	Area	Night RBL 10pm-7am	Sleep Disturbance Screening Criterion L_{AMAX}
NCA 01	Marrickville	33	48
NCA 02	Dulwich Hill	33	48
NCA 03	Hurlstone Park	34	49
NCA 04	Canterbury	35	50
NCA 05	Canterbury	32	47
NCA 06	Campsie	35	50
NCA 07	Belmore	35	50
NCA 08	Lakemba	41	56
NCA 09	Wiley Park	36	51
NCA 10	Punchbowl	41	56
NCA 11	Bankstown	39	54
NCA 12	Bankstown	42	57
NCA 13	Bankstown	39	54
NCA 14	Sydenham	40	55
NCA 15	Sydenham	42	57
NCA 16	Sydenham	38	53
NCA 17	Yagoona	39	54

4.6 Construction Traffic Noise

As described in the CNVMP and the CNVS there are no specific traffic noise criteria relating to construction work. Criteria are therefore adopted from Road Noise Policy (RNP) published by the EPA.

The CNVS states that construction traffic noise management levels are set 2dB above the existing road traffic noise levels during the day and night periods. Where the road traffic noise levels are predicted to increase by more than 2dB as a result of construction traffic, consideration is to be given to reasonable and feasible mitigation measures. In considering these mitigation measures, consideration would also be given to the actual noise levels associated with the construction traffic and whether or not these levels comply with the criteria in the RNP. These criteria are presented in Table 4-6.

Table 4-6 Road traffic noise criteria

Road Type	Period	Criteria
Freeway Arterial Sub Arterial	Day	$L_{Aeq(15\ hour)}$ 60dB
	Night	$L_{Aeq(9\ hour)}$ 55dB
Local	Day	$L_{Aeq(15\ hour)}$ 55dB
	Night	$L_{Aeq(9\ hour)}$ 50dB

5 PREDICTION & ASSESSMENT OF NOISE LEVELS

5.1 Method of Predictions

Site related noise emissions were modelled using the CadnaA noise prediction software. To complete this, a representative 3-D model within the software was constructed of the site and surrounding receivers.

Factors that are addressed in the modelling are:

- source sound level emissions and locations;
- screening effects from buildings
- receiver locations;
- ground topography;
- noise attenuation due to geometric spreading; and
- atmospheric absorption and ground effects.

Detailed topographic information has been sourced from NSW Government – Land & Property Information and used in our acoustic model.

The modelling software allows for ground effects (assigned as 50% hard ground on this project), air absorption, distance attenuation and shielding from the terrain as well as buildings. A 10m x 10m grid has been used to generate contours for predictions.

5.2 Standard Mitigation Measures

As identified in the Construction Noise and Vibration Management Plan, the most practical approach to minimise noise impact on surrounding receivers is to implement common sense noise management measures. These measures outlined in the CNVMP and summarised below have been considered during the prediction of noise impacts in this CNVIS. These SMM are to be implemented whenever possible to ensure that actual noise impacts do not exceed the predicted levels.

The following Standard Mitigation Measures (SMM) for site noise have been discussed in the CNVMP and should be implemented where practicable.

- The layout of construction sites will aim to minimise airborne noise impacts to surrounding receivers.
- Residential grade mufflers would be fitted to all mobile plant.
- Selection of low noise / vibration generating equipment for use on site, when a range of equipment types is available.
- Scheduling respite – three hours ‘on’ and one hour ‘off’ for activities identified as high noise / vibration intensive activities, as quantified at sensitive receivers.
- Where there is flexibility as to where equipment can be located or operated, ensure that the equipment is located as far as practicable from nearby residential receivers.
- Avoid loading and unloading of trucks at locations on the site which are close to residential receivers.
- Construction equipment and trucks on site are to be fitted with non-tonal reversing alarms (also known as “quackers”). This approach will extend to hire equipment including EWP that will be fitted with non-tonal booms.

- The mitigation measures outlined within Section 7 of the CNVS are to be applied. These include;
    - Construction hours would be in accordance with the *ICNG*, project approvals and the EPL, except where otherwise specified in an approved noise management plan.
    - When working adjacent to schools, medical facilities and childcare centres, particularly noisy activities would be scheduled outside normal working hours, where feasible and reasonable.
    - When working adjacent to churches and places of worship particularly noisy activities would be scheduled outside services, where feasible and reasonable.
    - Avoiding the coincidence of noisy plant working simultaneously close together and adjacent to sensitive receivers will result in reduced noise emissions.
    - Where feasible and reasonable, the offset distance between noisy plant items and nearby noise sensitive receivers would be as great as possible.
    - Regular compliance checks on the noise emissions of all plant and machinery used for the project would indicate whether noise emissions from plant items were higher than predicted. This also identifies defective silencing equipment on the items of plant.
    - Ongoing noise monitoring during construction at sensitive receivers during critical periods (i.e. times when noise emissions are expected to be at their highest – e.g. piling and hammering) to identify and assist in managing high risk noise events.
    - Where feasible and reasonable heavy vehicle movements would be limited to daytime hours.
    - The implementation of procedures to maximise the night time onsite spoil storage capacity where spoil is produced between the hours of 10.00pm and 7.00am.

Further Standard Mitigation Measures have been discussed in the CNVMP and are summarised below.

- Not Scheduling Work during the Night – It is understood that most of the works must be completed during a scheduled possession and therefore works will be undertaken for extended periods of time. All planning is to be undertaken to allocate the noisiest works during the less sensitive day period, followed by the evening period. For night works, the period before midnight is generally considered less sensitive than after midnight.
- Environmental Inductions – All personnel inducted onto the project should be trained in order to raise their awareness of potential noise problems. This includes identifying noise sensitive receivers. As a result of this, operators should increase their use of techniques to minimise noise emission.
- Cumulative Impacts – Consultation with other construction projects within the vicinity to mitigate cumulative impacts from multiple work fronts should be undertaken. This will include coordinating works to provide respite for receivers, coordinating work locations to mitigate cumulative impacts and coordinating communications to receivers. The most notable other works in the vicinity of these works are the Sydenham Station and Junction (SSJ) project, the Line Wide works and the South West Metro Main Works. Other potential works include Sydney Trains maintenance works, Inner West Council works and City of Canterbury Bankstown works.
- Community Consultation – Regular consultation with the surrounding community has been identified as a major factor in controlling the negative reaction to the inevitable noise emanating from the construction site. Notifications to the community will include work hours, activities and plant and contact details for complaints and enquiries.

5.3 Predicted Construction Noise Levels

Predicted worst case noise levels at the worst affected receiver within each NCA for each construction scenario, as well as the applicable NML, are presented in the following tables. Previously predicted noise contours for scenarios S1a to S11 are provided in **Appendix C**. Predicted noise contours for scenarios S12a, S12b, and S12c have been presented in **Appendix D** for the relevant NCAs only.

Works for all scenarios are expected to occur outside standard working hours. The OOH works are likely to occur during daytime, evening and night time. Predicted L_{Amax} noise levels considering sleep disturbance are also presented for these scenarios, except for Yagoona setdown works, as no works are proposed during night-time.

Noise levels shaded light blue indicate exceedances above the applicable NML or sleep disturbance criteria.

Table 5-1 Predicted worst-case noise levels for all Scenarios, $L_{Aeq,15minutes}$

	Std Hours	OOH			Predicted Worst Case Noise Levels $L_{Aeq,15minutes}$															
	Day	Day	Eve	Night	S1A	S1B	S2	S3	S4A	S4B	S4C	S5	S6	S7	S9	S10A	S11	S12A	S12B	S12C
NCA 01	48	43	43	38	-	-	**77**	**92**	**52**	**78**	**86**	**86**	**86**	**86**	-	-	**86**	-	-	-
NCA 02	48	43	43	38	-	-	**72**	**90**	32	**73**	**84**	**84**	**86**	**84**	27	29	**84**	-	-	-
NCA 03	48	43	43	39	-	-	**76**	**90**	-	**77**	**84**	**84**	**83**	**84**	**45**	**47**	**84**	-	-	-
NCA 04	50	45	45	40	-	-	**72**	**91**	-	**77**	**85**	**85**	**87**	**85**	**73**	**75**	**85**	-	-	-
NCA 05	46	41	41	37	-	-	**48**	**83**	-	**71**	**77**	**77**	**77**	**77**	**41**	**38**	**77**	-	-	-
NCA 06	55	50	47	40	-	-	**69**	**88**	-	**78**	**82**	**82**	**82**	**82**	24	32	**82**	-	-	-
NCA 07	51	46	46	40	-	-	**69**	**90**	-	35	**84**	**84**	**66**	**84**	-	-	**84**	-	-	-
NCA 08	57	52	52	46	-	-	**68**	**83**	-	-	**77**	**77**	34	**77**	30	-	**77**	-	-	-
NCA 09	54	49	49	41	-	-	**70**	**86**	-	-	**80**	**80**	-	**80**	**45**	-	**80**	-	-	-
NCA 10	57	52	52	46	36	29	**66**	**81**	-	-	**75**	**75**	-	**75**	**63**	30	**75**	-	-	-
NCA 11	57	52	52	44	**54**	35	40	**90**	-	-	**84**	**84**	-	**84**	40	**52**	**84**	-	-	-
NCA 12	64	59	56	47	**68**	39	26	**81**	-	-	**75**	**75**	-	**75**	26	**64**	**75**	32	31	**60**
NCA 13	52	47	47	44	**50**	**64**	-	**91**	-	**55**	**85**	**85**	-	**85**	-	42	**85**	41	40	**60**
NCA 14	51	46	46	45	-	-	38	**88**	**78**	**85**	**82**	**82**	**52**	**82**	-	-	**82**	-	-	-
NCA 15	61	56	54	47	-	-	32	**85**	**56**	**69**	**79**	**79**	39	**79**	-	-	**79**	-	-	-
NCA 16	62	57	48	43	-	-	37	**76**	**69**	**70**	**70**	**70**	**53**	**70**	-	-	**70**	-	-	-
NCA 17	53	48	48	44	-	-	-	-	-	-	-	-	-	-	-	-	-	**79**	**79**	**57**

Table 5-2 Predicted worst-case noise levels for all Scenarios sleep disturbance, L_{AMax}

	Night	Predicted Worst Case Noise Levels L_{AMax}															
		S1A	S1B	S2	S3	S4A	S4B	S4C	S5	S6	S7	S9	S10A	S11	S12A	S12B	S12C
NCA 01	48	-	-	**87**	**102**	**62**	**78**	**86**	**86**	**95**	**90**	-	-	**95**	-	-	-
NCA 02	48	-	-	**82**	**100**	42	**73**	**84**	**84**	**95**	**88**	31	33	**93**	-	-	-
NCA 03	49	-	-	**86**	**100**	-	**77**	**84**	**84**	**92**	**88**	49	**51**	**93**	-	-	-
NCA 04	50	-	-	**82**	**101**	-	**77**	**85**	**85**	**96**	**89**	**77**	**79**	**94**	-	-	-
NCA 05	47	-	-	**58**	**93**	-	**71**	**77**	**77**	**86**	**81**	45	42	**86**	-	-	-
NCA 06	50	-	-	**79**	**98**	-	**78**	**82**	**82**	**91**	**86**	28	36	**91**	-	-	-
NCA 07	50	-	-	**79**	**100**	-	35	**84**	**84**	**75**	**88**	-	-	**93**	-	-	-
NCA 08	56	-	-	**78**	**93**	-	-	**77**	**77**	43	**81**	34	-	**86**	-	-	-
NCA 09	51	-	-	**80**	**96**	-	-	**80**	**80**	-	**84**	49	-	**89**	-	-	-
NCA 10	56	44	29	**76**	**91**	-	-	**75**	**75**	-	**79**	**67**	34	**84**	-	-	-
NCA 11	54	**62**	35	50	**100**	-	-	**84**	**84**	-	**88**	44	**56**	**93**	-	-	-
NCA 12	57	**76**	39	36	**91**	-	-	**75**	**75**	-	**79**	30	**68**	**84**	30	29	**87**
NCA 13	54	**58**	**64**	-	**101**	-	**55**	**85**	**85**	-	**89**	-	46	**94**	40	39	**81**
NCA 14	55	-	-	48	**98**	**88**	**85**	**82**	**82**	**61**	**86**	-	-	**91**	-	-	-
NCA 15	57	-	-	42	**95**	**66**	**69**	**79**	**79**	48	**83**	-	-	**88**	-	-	-
NCA 16	53	-	-	47	**86**	**79**	**70**	**70**	**70**	**62**	**74**	-	-	**79**	-	-	-
NCA 17	54	-	-	-	-	-	-	-	-	-	-	-	-	-	**80**	**80**	**78**

During Scenario 1 exceedances of the NML for residential receivers are confined to NCAs 11, 12 and 13 only. The Highly Noise Affected Management Level of $L_{Aeq(15min)}$ 75dBA is not predicted to be exceeded. A similar outcome is predicted for Scenarios 9 and 10A.

Some of the line wide scenarios (those that potentially happen across the entire alignment: S3, S4B, S4C, S5, and S7) are expected to produce higher noise levels, up to 92dBA in some circumstances.

During works at the Yagoona set down, exceedances of the Highly Noise Affected Level are predicted of up to 4 dB are predicted during site preparation and pre-build works, at the worst case located receivers within NCA 17. No exceedances of the Highly Noise Affected Level are predicted at childcare centres within NCA 17. The worst affected child care centre, located at 19 Church Road, Yagoona, may experience construction noise levels up to $L_{Aeq(15min)}$ 73dBA.

During installation works (Scenario 12C), exceedances of the NML are predicted in NCAs 12, 13, and 17 depending on whether works are conducted within standard hours or OOHs, with no exceedances to the Highly Noise Affected Level.

5.4 Additional Mitigation Measures

Given the exceedances of the residential NML's, this section focuses on assessing the impact to the residential receivers in further detail.

The Sydney Metro City & Southwest Construction Noise and Vibration Strategy provides Additional Mitigation Measures (AMM) that are to be assessed when all Standard Mitigation Measures have been considered and there is still potential to exceed the NML.

The AMM from the CNVS are presented in Table 5-3. The period and corresponding exceedance of the NML that the CNVS applies each measure to is presented in Table 5-4.

Table 5-3 Additional mitigation measures

Measure	Abbreviation
Alternative accommodation	AA
Monitoring	M
Individual briefings	IB
Letterbox drops	LB
Project specific respite offer	RO
Phone calls	PC
Specific notifications	SN

Table 5-4 Additional noise mitigation measures matrix

Time Period		Mitigation Measures			
		Predicted $L_{Aeq,15min}$ Noise Level above Background (RBL)			
		0 to 10dB	10 to 20dB	20 to 30dB	>30dB
Standard	Mon-Fri (7am-6pm)	-	-	LB, M	LB, M
	Sat (8am-1pm)				
	Sun / Pub Hol (Nil)				
OOHW Period 1	Mon-Fri (6pm-10pm)	-	LB	LB, M	M, IB, LB, RO, PC, SN
	Sat (1pm-10pm)				
	Sun / Pub Hol (8am-6pm)				
OOHW Period 2	Mon-Fri (10pm-7am)	LB	LB, M	M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN
	Sat (10pm-8am)				
	Sun / Pub Hol (6pm-7am)				

Based on the predictions summarised in the tables above, additional mitigation will be required to be considered for works during all time periods. **Table 5-5** summarises the AMM required for each scenario. These measures assume that OOH works occur only during the Sunday/Public Holiday daytime period.

It should be noted that the additional mitigation measures discussed above only apply at the worst affected receiver. Implementation of an evaluation process for each out of hours activity, such as the PredicTool system proposed for this project, should be used to identify all receivers requiring additional mitigation. This is discussed further in the CNVMP.

Table 5-5 Recommended additional noise mitigation measures

NCA	S1A	S1B	S2	S3	S4A	S4B&C	S5	S6	S7	S9	S10A	S11	S12A	S12B	S12C
NCA 01	-	-	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	LB,M	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	-	-	AA, M, IB, LB, PC, RO, SN	-	-	-
NCA 02	-	-	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	-	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	-	-	AA, M, IB, LB, PC, RO, SN	-	-	-
NCA 03	-	-	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	-	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	LB,M	LB,M	AA, M, IB, LB, PC, RO, SN	-	-	-
NCA 04	-	-	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	-	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	-	-	-
NCA 05	-	-	LB,M	AA, M, IB, LB, PC, RO, SN	-	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	LB	LB	AA, M, IB, LB, PC, RO, SN	-	-	-
NCA 06	-	-	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	-	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	-	-	AA, M, IB, LB, PC, RO, SN	-	-	-
NCA 07	-	-	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	-	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	-	-	AA, M, IB, LB, PC, RO, SN	-	-	-

NCA	S1A	S1B	S2	S3	S4A	S4B&C	S5	S6	S7	S9	S10A	S11	S12A	S12B	S12C
NCA 08	-	-	M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	-	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	-	AA, M, IB, LB, PC, RO, SN	-	-	AA, M, IB, LB, PC, RO, SN	-	-	-
NCA 09	-	-	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	-	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	-	AA, M, IB, LB, PC, RO, SN	LB	-	AA, M, IB, LB, PC, RO, SN	-	-	-
NCA 10	-	-	LB,M	AA, M, IB, LB, PC, RO, SN	-	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	-	AA, M, IB, LB, PC, RO, SN	LB,M	-	AA, M, IB, LB, PC, RO, SN	-	-	-
NCA 11	LB,M	-	LB	AA, M, IB, LB, PC, RO, SN	-	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	-	AA, M, IB, LB, PC, RO, SN	LB	LB,M	AA, M, IB, LB, PC, RO, SN	-	-	-
NCA 12	M, IB, LB, PC, RO, SN	-	-	AA, M, IB, LB, PC, RO, SN	-	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	-	AA, M, IB, LB, PC, RO, SN	-	LB,M	AA, M, IB, LB, PC, RO, SN	-	-	-
NCA 13	LB,M	LB,M	-	AA, M, IB, LB, PC, RO, SN	-	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	-	AA, M, IB, LB, PC, RO, SN	-	LB	AA, M, IB, LB, PC, RO, SN	-	-	LB
NCA 14	-	-	-	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	LB,M	AA, M, IB, LB, PC, RO, SN	-	-	AA, M, IB, LB, PC, RO, SN	-	-	-
NCA 15	-	-	-	AA, M, IB, LB, PC, RO, SN	LB,M	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	-	AA, M, IB, LB, PC, RO, SN	-	-	AA, M, IB, LB, PC, RO, SN	-	-	-

NCA	S1A	S1B	S2	S3	S4A	S4B&C	S5	S6	S7	S9	S10A	S11	S12A	S12B	S12C
NCA 16	-	-	-	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN	LB,M	AA, M, IB, LB, PC, RO, SN	-	-	AA, M, IB, LB, PC, RO, SN	-	-	-
NCA 17	-	-	-	-	-	-	-	-	-	-	-	-	M, IB, LB, RO,PC, SN	M, IB, LB, RO, PC, SN	LB

5.5 Construction Traffic Noise Assessment

As detailed in the CNVMP, deliveries to site and removal of material from site is to be restricted to standard construction hours, unless otherwise approved. Access to the site will use the access points specified in the Construction Traffic Management Plan. These will consist of existing Sydney Trains access gates and any new gates that need to be constructed to access the corridor.

Access gates to the rail corridor are at the following locations:

- Access 1 (via Fraser Park Football Club interior road off Marrickville Road, Marrickville)
- Access 2 (via Victoria Road, Marrickville)
- Access 3 (via Unnamed Lane off Warburton Street, opposite Wooley Lane, Marrickville)
- Access 4 (via Randall Street, Marrickville)
- Access 5 (via Kays Avenue East, Marrickville)
- Access 6 (via Ewart Lane, Dulwich Hill) – light vehicles only
- Access 7 (via Ewart Street east of Terrace Road, Dulwich Hill)
- Access 8 (via Ewart Street west of Terrace Road, Dulwich Hill)
- Access 9 (via The Greenway onto Ness Avenue, Dulwich Hill)
- Access 10 (via The Parade Dulwich Hill)
- Access 11 (via Floss Street, Hurlstone Park)
- Access 12 (via Railway Street, Hurlstone Park)
- Access 13 & 13a (via Foord Avenue, Hurlstone Park)
- Access 14 (via Keir Avenue, Hurlstone Park)
- Access 15 (via Hurlstone Avenue, Hurlstone Park)
- Access 16 (via Hutton Street, Hurlstone Park)
- Access 17 (via Hutton Street at Sugar House Road, Hurlstone Park)
- Access 18 (via rail service road near Church Street footbridge, Hurlstone Park)
- Access 19 (via Charles Street, Canterbury)
- Access 20 (via Broughton Street, Canterbury)
- Access 21 (via Wairoa Street and Cooks River Path, Canterbury)
- Access 22 (via South Parade opposite Wonga Street, Canterbury)
- Access 23 (via South Parade opposite Park Street, Campsie)
- Access 24 (via South Parade opposite Duke Street, Campsie)
- Access 25 (via North Parade, opposite Browning Street)
- Access 26 (via Wilfred Ave, opposite Assets St, Campsie)
- Access 27 (via Lilian Street, Campsie)
- Access 28 (via Loftus Street, Campsie)
- Access 29 (via Redman Parade, Belmore)
- Access 30 (via Belmore Station Carpark at Tobruk Ave, Belmore)
- Access 31 (via Railway Parade, Belmore)
- Access 32 (via Bridge Road, Belmore)
- Access 33 (via The Boulevard, Lakemba)
- Access 34 (via Railway Parade, opposite Croydon Street North, Lakemba)
- Access 35 (via The Boulevard, opposite Croydon St, Lakemba)

- Access 36 (via Railway Parade, opposite Ernest Street North, Lakemba)
- Access 37 (via The Boulevard, opposite Kathleen St, Lakemba)
- Access 38 (via Shadforth St, Wiley Park)
- Access 39 (via The Boulevard St, Wiley Park)
- Access 40 (via Urunga Parade, opposite Defoe St, Wiley Park)
- Access 41 (via Urunga Parade, opposite Dudley St North, Punchbowl)
- Access 42 (via The Boulevard, opposite Dudley St, Punchbowl)
- Access 43 (via Breust Place, Punchbowl)
- Access 44 (via Stansfield Avenue, Punchbowl)
- Access 45 (now Gate 3 for BEW)
- Access 46 (via Depot Pl, Bankstown)
- BEW Gate 1: Located on the norther side of the corridor, adjacent to Bankstown Station car park. Access via North Terrace
- BEW Gate 2: Located on the southern side of the rail corridor, approx. 100m east of East Terrace. Access via South Terrace
- BEW Gate 3: Located on the southern side of the rail corridor, opposite Carnation Ave. Access via South Terrace
- BEW Gate 4: Located on the northern side of the rail corridor, opposite Wattle St. Access via North Terrace
- BEW Gate 5: Located on the northern side of the rail corridor, opposite Lady Cutler Ave. Access via North Terrace

It is noted that the above list of access gates is indicative and may change during the construction phase.

As per the road type definitions in the RNP, these primary site access roads are classified as either arterial or sub arterial. It is unlikely that construction traffic will be required to used local roads.

Analysis of the measured traffic noise levels at each monitoring location indicates that existing traffic noise in the area is high, and in some cases during the night period above the criteria specified in the RNP.

Based on the high existing traffic noise levels and the access routes being restricted to arterial and sub arterial road, impact from additional construction traffic is expected to be minimal.

6 VIBRATION GOALS & ASSESSMENT

6.1 Building Damage Vibration Goals

Vibration due to construction has the potential to cause damage, both cosmetic and structural, to surrounding buildings. In accordance with CoA E29 the *German Standard DIN 4150-3: Structural Vibration- effects of vibration on structures* is to be applied when assessing the potential for building damage.

The vibration guide values for building damage for typical buildings as outline in *DIN 4150-3-1999* are provided in Table 6-1.

Table 6-1 Vibration Guide Values for Building Damage – DIN 4150-3

Guideline values for velocity – mm/s (peak)				
Structure	At foundation at a frequency of			Top storey (horizontal)
	1 to 10 Hz	10 to 50 Hz	50 to 100 Hz[1]	All frequencies
Residential	5	5 to 15	15 to 20	15
Commercial/Industrial	20	20 to 40	40 to 50	40
Vibration Sensitive Structures such as Heritage Structures	3	3 to 8	8 to 10	8

These values are generally considered very conservative for Australian buildings. Alternative values for vibration goals are found in the *British Standard BS 7385-2:1993.* CoA E29 requires these vibration criteria be applied "as applicable to Australian Conditions". The building damage vibration goals from this standard are summarised in Table 6-2.

Table 6-2 Vibration Guide Values for Building Damage – BS 7385-2

Type of building	Peak Particle Velocity (PPV in mm/s) in the frequency range of predominant pulse	
	4 Hz to 15 Hz	15 Hz & above
Reinforced or framed structures Industrial and heavy commercial buildings	50mm/s at 4 Hz and above	
Unreinforced or light framed structures Residential or light commercial type buildings	15mm/s at 4 Hz increasing to 20mm/s at 15 Hz	20mm/s at 15 Hz increasing to 50mm/s at 40 Hz and above

The British Standard states that "A building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive."

Additionally, the CNVS provides screening criteria for construction activities that have the potential to cause building damage. These criteria, based on a conservative 50% of the *British Standard BS 7385-2:1993* levels, measured as Peak Component Particle Velocity (PCPV), are:

- Reinforced or framed structures: 25.0mm/s
- Unreinforced or light framed structures: 7.5mm/s

The CNVS suggests that heritage structures should not be assumed to be more sensitive to vibration sources and should be assessed by the same screening criteria, unless they are found to be structurally unsound after inspection. If a heritage structure is found to be structurally unsound, screening criteria of 2.5mm/s PCPV apply.

As per the CNVMP the screening criteria from the CNVS will be used for this assessment.

Many heritage listed structures have been identified as detailed in section 2.4. The majority of these are located within the corridor or associated with rail infrastructure. These structures have been designed with vibration in mind and have withstood many years of vibration activity from passing trains and other rail related maintenance activities. None of the structures listed have been identified as structurally unsound and the standard screening criteria should therefore apply.

Other vibration sensitive structures and utilities, such as medical facilities, underground pipelines and fibre optic cables are to be assessed on a case by case basis using limits provided by manufacturers and engineers.

As required by CoA E18 all vibration sensitive receivers have been identified. There are a number of medical facilities which were identified during the land use survey. Most exist within the commercial district surrounding Campsie Station, as well as one on Canterbury Road, Canterbury, two on Crinan Road, Campsie, four on Illawarra Road, Marrickville, one on Punchbowl Road, Punchbowl and one on Railway Parade, Lakemba. These facilities have all been identified as small general practices and dental practices however there is still potential for them to house vibration sensitive medical equipment.

As required in the CNVS, attended vibration monitoring of each specific item of vibration intensive plant is to be conducted before beginning construction works to establish a more accurate minimum working distance. CoA E30 also requires that a heritage specialist be consulted when installing equipment used for vibration, movement and noise monitoring around heritage listed structures.

Continuous vibration monitoring with audible and visual alarms is required by the CNVS at the nearest sensitive receiver when activities are to occur inside the safe working distances.

6.2 Human Comfort Vibration Goals

In accordance with Assessing vibration: A technical guide (DEC, 2006), human comfort levels relating to vibration from continuous, impulsive and intermittent sources are measured as a Vibration Dose Value (VDV).

In the context of impact to human comfort continuous, impulsive and intermittent sources are defined within Assessing Vibration: A Technical Guide (DEC NSW 2006) as:

- Continuous vibration continues uninterrupted for a defined period (usually throughout daytime and/or night time).
- Impulsive vibration is a rapid build up to a peak followed by a damped decay that may or may not involve several cycles of vibration (depending on frequency and damping). It can also consist of a sudden application of several cycles at approximately the same amplitude, providing that the duration is short, typically less than 2 seconds. Impulsive vibration will be experienced on no more than three occurrences in an assessment period.
- Intermittent vibration can be defined as interrupted periods of continuous (e.g. a drill) or repeated periods of impulsive vibration (e.g. a pile driver), or continuous vibration that varies significantly in magnitude. It may originate from impulse sources (e.g. pile drivers and forging presses) or repetitive sources (e.g. pavement breakers), or sources which operate intermittently, but which would produce continuous vibration if operated continuously (for example, intermittent machinery, railway trains and traffic passing by).

Table 6-3 indicates the preferred and maximum Vibration Dose Value for intermittent vibration.

Table 6-3 Vibration Dose Value goals

Place	Time	Vibration Dose ($m/s^{1.75}$)	
		Preferred	Maximum
Residences	Daytime	0.20	0.40
	Night time	0.13	0.26
Offices	Day or night time	0.40	0.80
Workshops	Day or night time	0.80	1.60

It is not always practical to measure VDV during construction works, as the calculation relies upon duration, intensity and characteristic frequency of the measured vibration events throughout a work day.

In some cases, it may be necessary to relate to an instantaneous measurement, such as Peak Particle Velocity (PPV). Appendix C of Assessing vibration: A technical guide (DEC, 2006) provides guidance on relating measurements of continuous and impulsive vibration to PPV. The criteria are included within Table 6-4.

Table 6-4 Criteria for exposure to continuous and impulsive vibration

Place	Time	Peak Particle Velocity (mm/s)	
		Preferred	Maximum
Continuous Vibration			
Residences	Day	0.28	0.56
	Night	0.20	0.40
Offices	Day or Night	0.56	1.1
Workshops	Day or Night	1.1	2.2
Impulsive Vibration			

Place	Time	Peak Particle Velocity (mm/s)	
		Preferred	Maximum
Residences	Day	8.6	17.0
	Night	2.8	5.6
Offices	Day or Night	18.0	36.0
Workshops	Day or Night	18.0	36.0

6.3 Mitigation

As required in the CNVS, attended vibration monitoring of each specific item of vibration intensive plant is to be conducted before beginning construction works to establish a more accurate minimum working distance.

Continuous vibration monitoring with audible and visual alarms is required by the CNVS at the nearest sensitive receiver when activities are to occur inside the safe working distances. Additional mitigation requirements when vibration is expected to exceed the criteria are provided in the CNVS and summarised in Table 6-5.

Table 6-5 Additional mitigation measures matrix – vibration

Time Period		Mitigation Measures
Standard	Mon-Fri (7.00am-6.00pm)	M, LB, RO
	Sat (8.00am-1.00pm)	
	Sun/Pub Hol (Nil)	
OOHW 1	Mon-Fri (6.00pm-10.00pm)	M, IB, LB, PC, RO, SN
	Sat (1.00pm-10.00pm)	
	Sun/Pub Hol (8.00am-6.00pm)	
OOHW 2	Mon-Fri (10.00pm-7.00am)	AA, M, IB, LB, PC, RO, SN
	Sat (10.00pm-8.00am)	
	Sun/Pub Hol (6.00pm-7.00am)	

6.4 Summary of Vibration Intensive Works

Plant with the potential for vibration impacts that will be used during this project include:

- Vibratory roller;
- Bored piling rig; and
- Excavators, particularly with hammer attachment.

Table 6-6 presents previously measured vibration levels at various distances for similar plant to what is proposed. The size of some of the plant proposed differs from plant previously measured and where this occurs the larger item of plant are presented. Table 20 in Appendix D of the Transport for NSW Construction

Noise and Vibration Strategy (2018) provides a list of recommended minimum working distances for vibration intensive plant. Relevant distances from this table are also presented below.

Table 6-6 Typical vibration emission from construction plant

Plant	PPV Vibration Level (mm/s) at Distance [1]					Recommended Minimum Working Distance[2]	
	5m	10m	20m	30m	40m	Building Damage	Human Comfort
Vibratory Roller (20t)	7	4.5	3	2.3	2	25m	100m
Vibratory Roller (7-13t)		3.6	2	0.9		15m	100m
Vibratory Roller (4-6t)						12m	40m
Bored Piling	-	0.2	<0.1	-	-	2m (nominal)	N/A
Hydraulic Hammer (1500kg hammer on 30t exc)	4.5	2.5	0.5	0.2	0.12	2m	73m

Note 1: Vibration levels are typical based on measured data mostly in Sydney sandstone and should be used as a guide only. Short-term higher levels can be experienced at commencement of some operations.

Note 2: Minimum working distances from TfNSW Construction Noise and Vibration Strategy.

6.5 Vibration Assessment

As discussed above and required in the CNVS, attended vibration measurements are required before any vibration intensive construction activities. The recommendations made below are based on the typical emissions presented in Table 6-6. Potential mitigation should be reassessed following the attended measurements to determine safe working distances under specific site conditions. Unless stated otherwise the assessment will be based on the screening criteria of 7.5mm/s for an unreinforced structure.

As mentioned in Section 2.4 and Section 6.1, no structures have been reported to be structurally unsound. The general vibration screening criteria of 7.5mm/s applies.

6.5.1 Vibratory Roller

Typical vibration levels from previous measurements of a large vibratory roller indicate that vibration levels are marginally below the screening criteria at distances of 5m. These measurements relate to a 20t roller, which is significantly larger than the proposed plant which range in size from 6t to 13t rollers. It is therefore expected that these values are very conservative.

TfNSW Construction Noise and Vibration Strategy provides recommended minimum working distances for various sized vibratory rollers. For a 13t vibratory roller the recommended minimum working distance for cosmetic building damage is 15m, while potential impacts on human comfort are possible within 100m.

Vibratory rollers are proposed to be used for the earthworks, track works and civil works stages of the project.

The roller will potentially work within 5m of receivers in NCA 02, 30m of receivers in NCA 03 and NCA 10, 55m of receivers in NCA 04, and 25m of receivers in NCA 05, NCA 06 and NCA 08. It is not predicted that the building damage screening criteria will be exceeded for any of these structures. There is however potential for impacts on human comfort at these distances.

It is recommended to monitor vibration throughout the duration of the works close to these receivers, as well as notify them of the upcoming construction works. Pending results from the detailed assessment of the plant to be used in the works, additional mitigation measures may be triggered.

The closest medical facility to the works location where a vibratory roller is proposed is approximately 70m in NCA 06 and 40m in NCA 10. The facility at 761 Punchbowl Road, Punchbowl is a surgical centre and potentially contains vibration sensitive equipment. This site should be investigated further to determine potential vibration impacts.

Vibration impacts are not expected at the other identified medical facilities. Furthermore, it is unlikely that many of these facilities house vibration-sensitive medical equipment.

Vibratory rollers up to 13t are expected to be required during the track works. These works could occur within 35m of commercial receivers to the south and 65m of residential receivers to the southeast. These works could therefore have a minor impact on human comfort at nearby receivers. There is a medical imaging centre located at 258 South Terrace, Bankstown. This facility is approximately 35m from the nearest and potentially contains vibration sensitive equipment. This site should be investigated further to determine potential vibration impacts.

6.5.2 Bored Piling

Typical vibration levels from previous measurements of bored piling indicate that vibration levels are insignificant at distances of 5m and greater. TfNSW Construction Noise and Vibration Strategy recommended minimum working distances for cosmetic building damage are lower than this at 2m. It is recommended that potential impacts on human comfort are not of concern at any distances.

Pile testing will involve a vibratory source to confirm the integrity of the new structure. It is understood that this will produce vibration levels no more than the vibratory roller discussed above.

6.5.3 Excavator with Hammer

Typical vibration levels from previous measurements of a large excavator with a hammer attachment indicate that vibration levels are well below the screening criteria at distances of 5m and greater. TfNSW Construction Noise and Vibration Strategy recommended minimum working distances for cosmetic building damage are higher than this at 2m. It is recommended that potential impacts on human comfort are possible within 73m of a large excavator with a hammer attachment.

It is proposed to only use a smaller 13t excavator for the demolition of existing ARTC infrastructure. Due to the size of the excavator and distance of closest works to a relevant receiver being a minimum of 10m away, it is not expected that any cosmetic building damage impacts are likely.

6.6 Ground-Borne Noise

Ground-borne or regenerated noise is noise generated by vibration transmitted through the ground into a structure that may lead to noise "regenerated" within a space in the building. The Construction Noise and Vibration Strategy provides criteria for both residential and commercial receivers, at various time periods. The ground-borne noise criteria are presented in Table 6-7.

Table 6-7 Ground-borne noise management levels

Period	Receiver	$L_{Aeq,15min}$ (Internal)
Day (7.00am-6.00pm)	Residential Commercial	45 50
Evening (6.00pm-10.00pm)	Residential	40
Day (10.00pm-7.00pm)	Residential	35

The CNVS states that these criteria are only applicable when ground-borne noise levels are higher than the airborne noise levels.

All the works previously identified with the potential to cause vibration impacts are surface works. Levels within receiver buildings are predicted to be very low, and below the ground-borne noise management levels. Importantly, in these cases noise impacts from airborne noise will be worse than ground-borne noise. A detailed ground-borne noise assessment is not required.

7 CONCLUSION

This report outlines the assessment of the potential for noise and vibration impacts that may result to surrounding receivers from the Southwest Metro Conversion and Station Works – Package 3 between Sydenham and Bankstown, up to the Yagoona set down area near Yagoona Station.

The impacts from the proposed works have been assessed against the Sydney Metro City & Southwest Construction Noise and Vibration Strategy requirements, the requirements of EPL 21147 and the *Conditions of Approval for Sydney Metro Sydenham to Bankstown Upgrade SSI 8256*.

A number of noise scenarios representing a range of the works that will occur during the construction stage of this project have been assessed. These scenarios were chosen to capture potential worst-case noise emissions for different surrounding receivers throughout different stages of the construction.

Potential exceedances of the noise management level have been predicted during the range of assessed scenarios that will occur during construction stages. Where an exceedance has been predicted, additional mitigation measures have been recommended in line with the recommendations in the Sydney Metro City & Southwest Construction Noise and Vibration Strategy and the associated Construction Noise and Vibration Management Plan. However, it is noted that the durations of the expected noise events are short, and should be assessed on a case by case basis.

The worst affected child care centre, located at 19 Church Road, Yagoona, may experience construction noise levels up to $L_{Aeq(15min)}$ 73dBA during scenario 12A. We note that project notification and verification monitoring is required for this receiver. Whilst this receiver is not considered to be highly noise affected, we recommend that this receiver is specifically engaged by the community liaison team to inform them of the potential high noise activities and help mitigate the potential for sleep disturbance.

A number of vibration intensive works have been identified. Initial predictions show that these works will not exceed the screening criteria levels. As per the CNVS, monitoring and further assessment of plant before operation has been recommended.

8 STATEMENT OF LIMITATIONS

This report entitled *Southwest Metro Conversion and Station Works – Package 3 – Construction Noise and Vibration Impact Statement* dated 13 March 2025 was prepared by RWDI Australia Pty Ltd ("RWDI") for Lang O'Rourke ("Client"). The findings and conclusions presented in this report have been prepared for the Client and are specific to the project described herein ("Project"). The conclusions and recommendations contained in this report are based on the information available to RWDI when this report was prepared. Because the contents of this report may not reflect the final design of the Project or subsequent changes made after the date of this report, RWDI recommends that it be retained by Client during the final stages of the project to verify that the results and recommendations provided in this report have been correctly interpreted in the final design of the Project.

The conclusions and recommendations contained in this report have also been made for the specific purpose(s) set out herein. Should the Client or any other third party utilize the report and/or implement the conclusions and recommendations contained therein for any other purpose or project without the involvement of RWDI, the Client or such third party assumes any and all risk of any and all consequences arising from such use and RWDI accepts no responsibility for any liability, loss, or damage of any kind suffered by Client or any other third party arising therefrom.

Finally, it is imperative that the Client and/or any party relying on the conclusions and recommendations in this report carefully review the stated assumptions contained herein and to understand the different factors which may impact the conclusions and recommendations provided.

APPENDIX A – LAND USE ALL NCAS



Legend

- Commercial/Business
- Community Use
- Conservation/National Park
- Industrial/Utilities
- Mixed Use
- Recreational/Open Space
- Residential
- Rural/Primary Production
- Special Use
- Transport/Infrastructure



PROJECT:

Sydenham to Bankstown Metro

PREPARED FOR:

S2B JHLORJV

TITLE:

Land Use Planning

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EXPORTED:	SHEET SIZE:
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N

NCA13

NCA12

0 200 400 600 800 m

Legend

- Commercial/Business
- Community Use
- Conservation/National Park
- Industrial/Utilities
- Mixed Use
- Recreational/Open Space
- Residential
- Rural/Primary Production
- Special Use
- Transport/Infrastructure



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N

NCA13

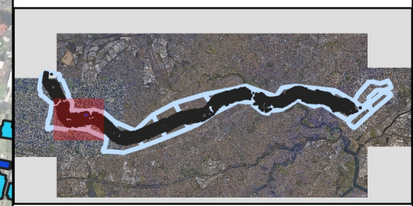
NCA12

NCA11

0 200 400 600 800 m

Legend

- Commercial/Business
- Community Use
- Conservation/National Park
- Industrial/Utilities
- Mixed Use
- Recreational/Open Space
- Residential
- Rural/Primary Production
- Special Use
- Transport/Infrastructure



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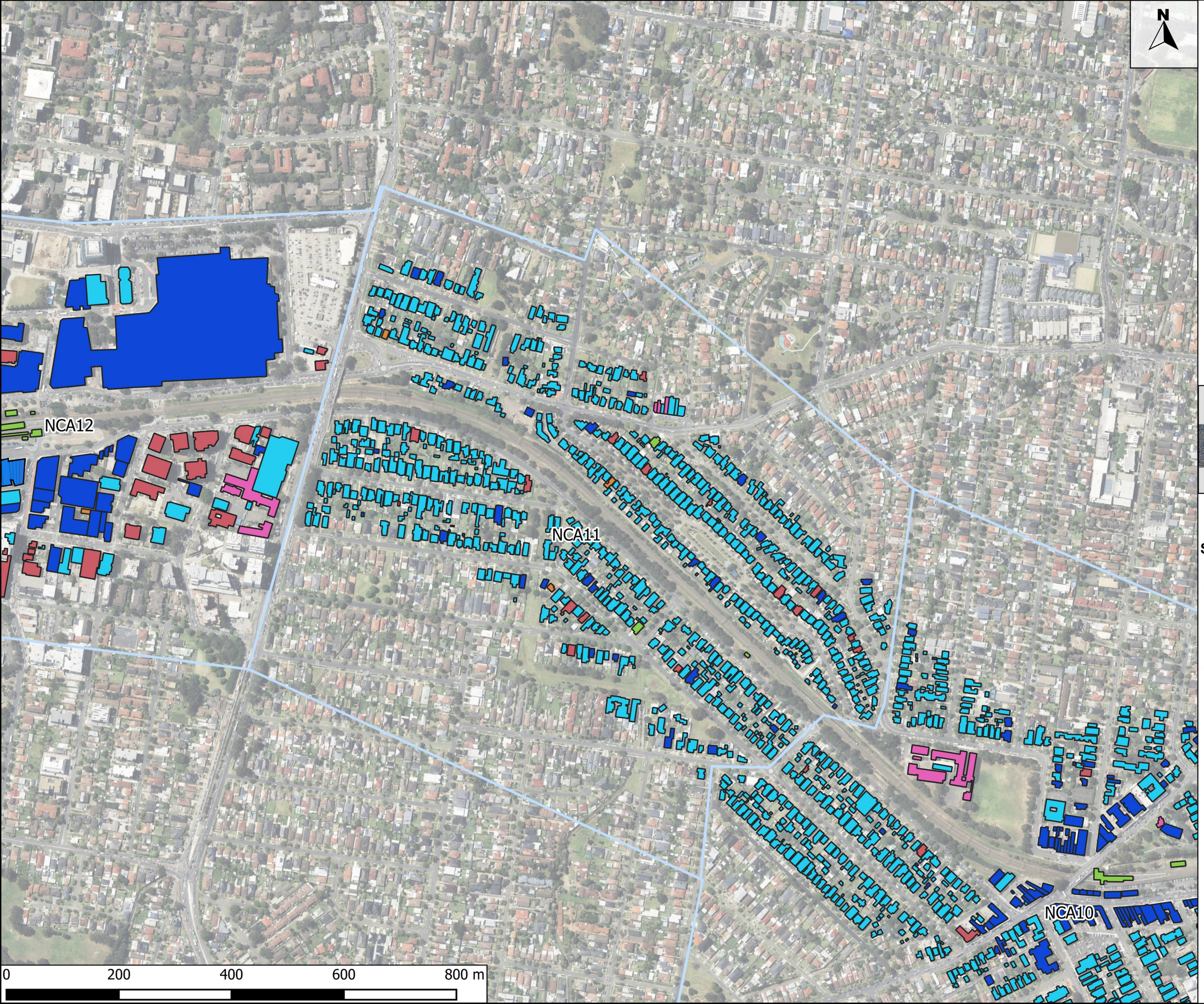
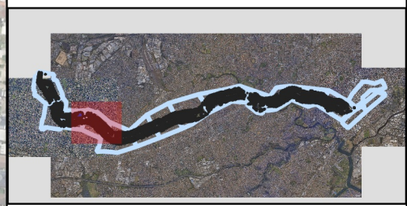


Legend

- Commercial/Business
- Community Use
- Conservation/National Park
- Industrial/Utilities
- Mixed Use
- Recreational/Open Space
- Residential
- Rural/Primary Production
- Special Use
- Transport/Infrastructure



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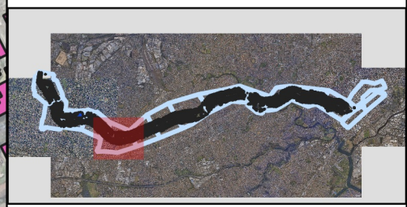
Legend

- Commercial/Business
- Community Use
- Conservation/National Park
- Industrial/Utilities
- Mixed Use
- Recreational/Open Space
- Residential
- Rural/Primary Production
- Special Use
- Transport/Infrastructure



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N

NCA08

NCA09

0 300 600 900 1,200 m

Legend

- Commercial/Business
- Community Use
- Conservation/National Park
- Industrial/Utilities
- Mixed Use
- Recreational/Open Space
- Residential
- Rural/Primary Production
- Special Use
- Transport/Infrastructure



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N

NCA08

NCA09

0 300 600 900 1,200 m

Legend

- Commercial/Business
- Community Use
- Conservation/National Park
- Industrial/Utilities
- Mixed Use
- Recreational/Open Space
- Residential
- Rural/Primary Production
- Special Use
- Transport/Infrastructure



PROJECT:

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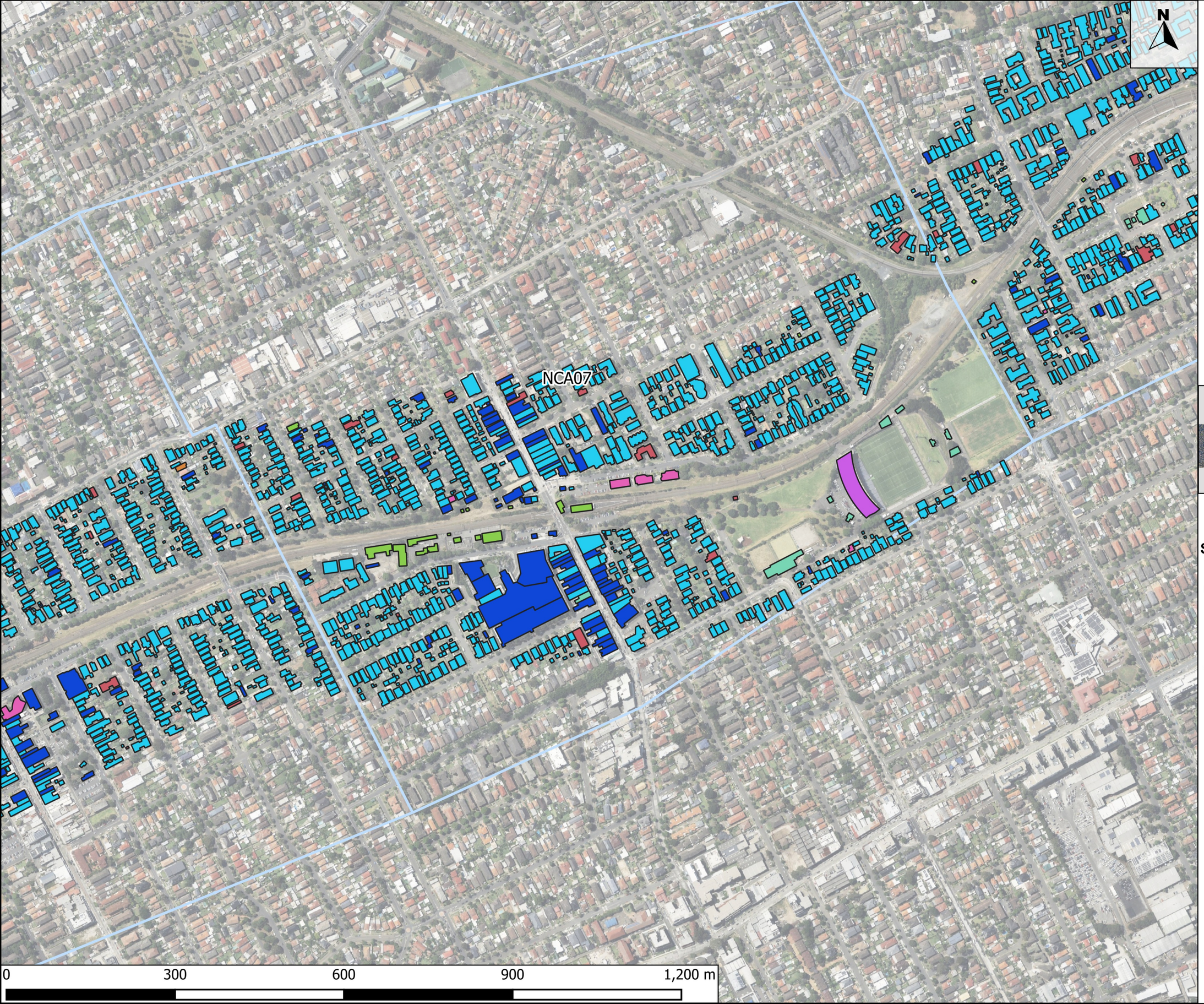
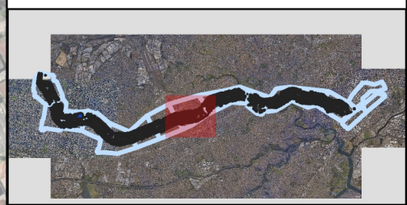


Legend

- Commercial/Business
- Community Use
- Conservation/National Park
- Industrial/Utilities
- Mixed Use
- Recreational/Open Space
- Residential
- Rural/Primary Production
- Special Use
- Transport/Infrastructure



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N

NCA05

NCA06

0 300 600 900 1,200 m

Legend

- Commercial/Business
- Community Use
- Conservation/National Park
- Industrial/Utilities
- Mixed Use
- Recreational/Open Space
- Residential
- Rural/Primary Production
- Special Use
- Transport/Infrastructure



PROJECT:

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N

NCA05

NCA04

0 300 600 900 1,200 m

Legend

- Commercial/Business
- Community Use
- Conservation/National Park
- Industrial/Utilities
- Mixed Use
- Recreational/Open Space
- Residential
- Rural/Primary Production
- Special Use
- Transport/Infrastructure



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Legend

- Commercial/Business
- Community Use
- Conservation/National Park
- Industrial/Utilities
- Mixed Use
- Recreational/Open Space
- Residential
- Rural/Primary Production
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- Transport/Infrastructure



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N

NCA02

NCA03

0 300 600 900 1,200 m

Legend

- Commercial/Business
- Community Use
- Conservation/National Park
- Industrial/Utilities
- Mixed Use
- Recreational/Open Space
- Residential
- Rural/Primary Production
- Special Use
- Transport/Infrastructure



PROJECT:

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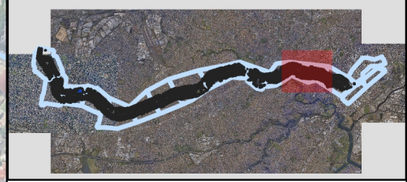
N

NCA02

0 300 600 900 1,200 m

Legend

- Commercial/Business
- Community Use
- Conservation/National Park
- Industrial/Utilities
- Mixed Use
- Recreational/Open Space
- Residential
- Rural/Primary Production
- Special Use
- Transport/Infrastructure



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N

Legend

- Commercial/Business
- Community Use
- Conservation/National Park
- Industrial/Utilities
- Mixed Use
- Recreational/Open Space
- Residential
- Rural/Primary Production
- Special Use
- Transport/Infrastructure

NCA01

NCA14

0 300 600 900 1,200 m

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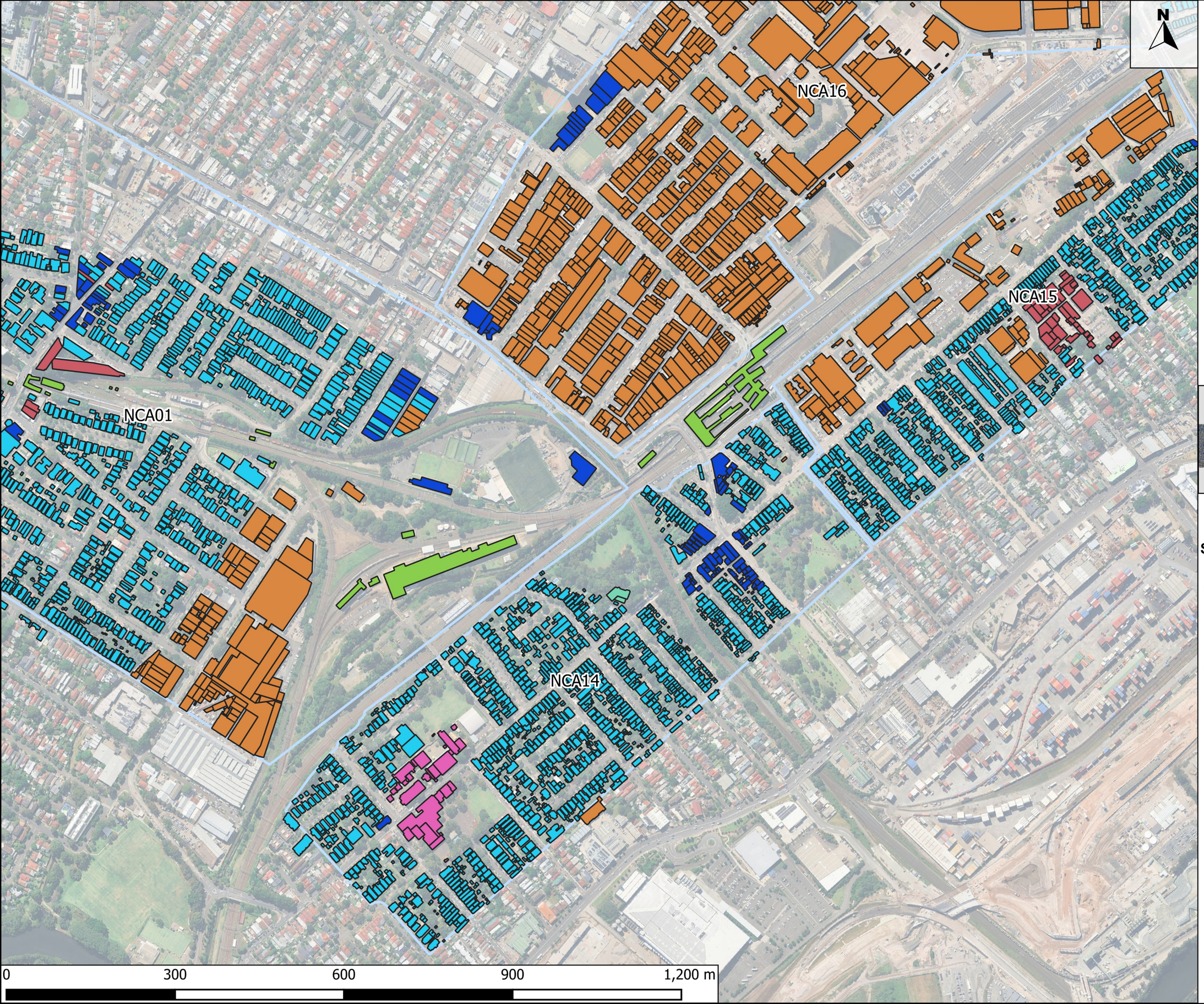

Legend

- Commercial/Business
- Community Use
- Conservation/National Park
- Industrial/Utilities
- Mixed Use
- Recreational/Open Space
- Residential
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Sydenham to Bankstown Metro

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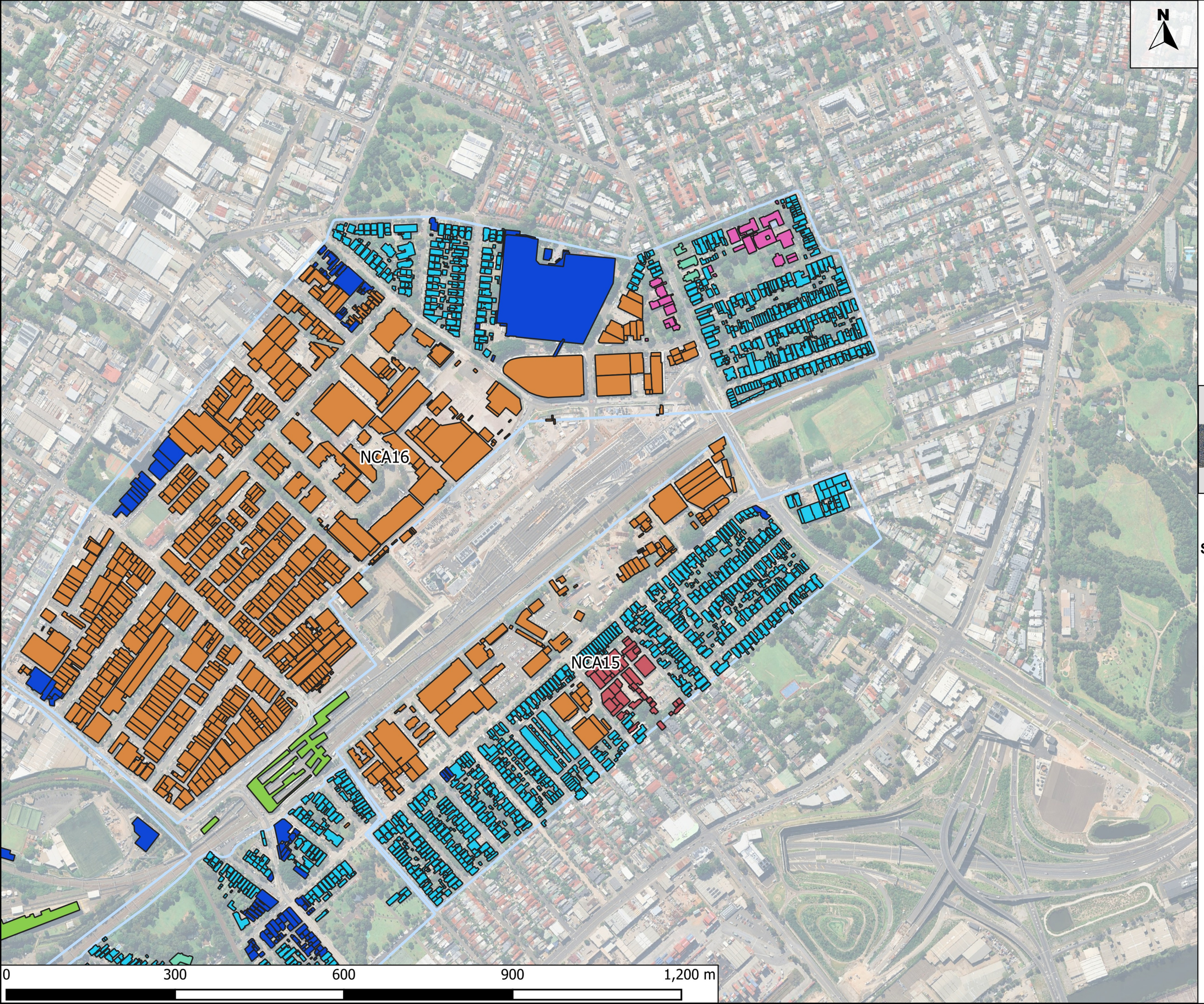

Legend

- Commercial/Business
- Community Use
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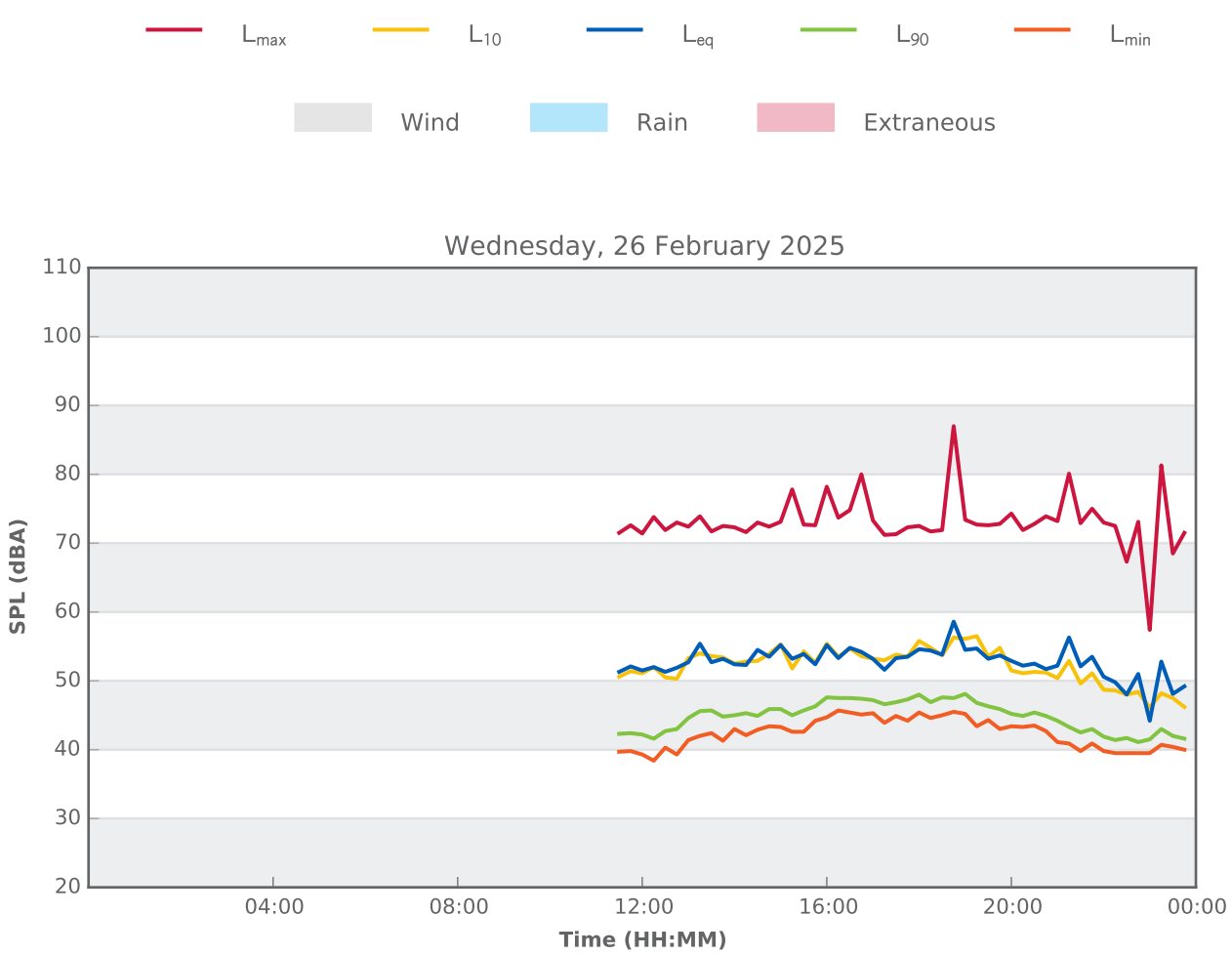
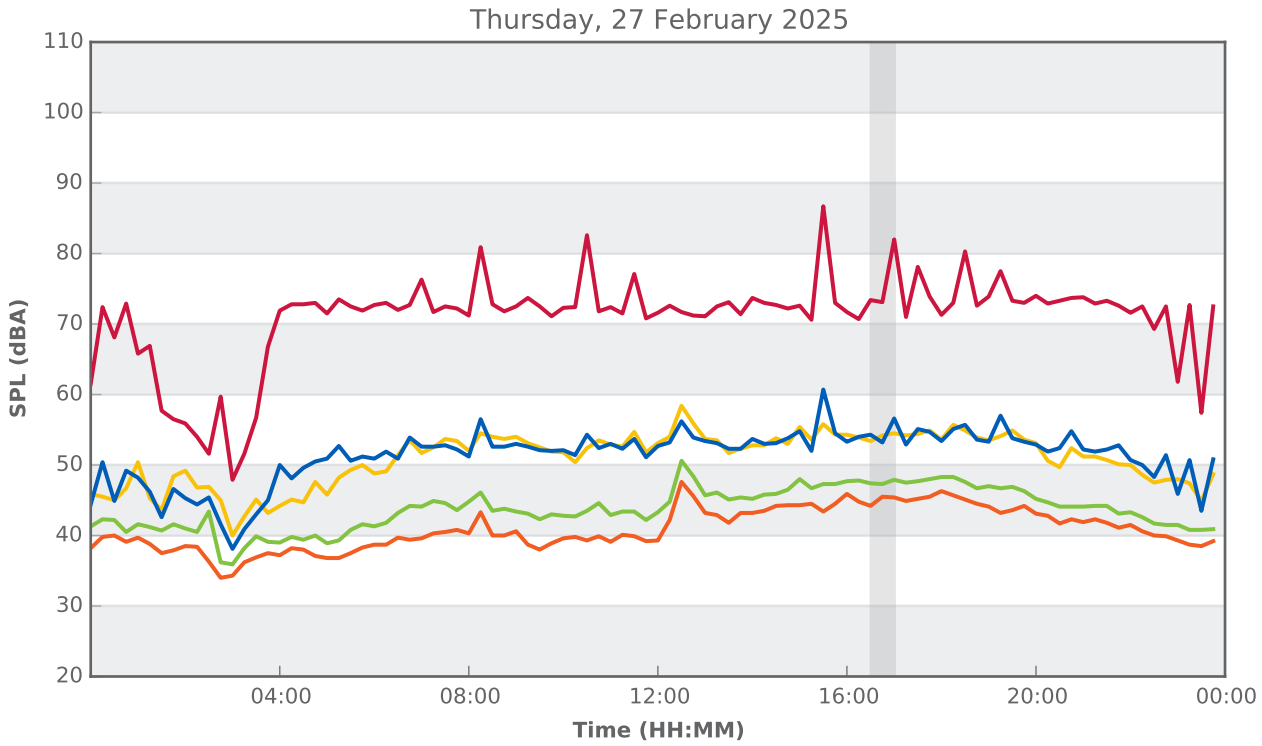
APPENDIX B – UNATTENDED NOISE MONITORING GRAPHS

APPENDIX A – UNATTENDED NOISE MONITORING GRAPHS

Behind 21 Church Road, Yagoona





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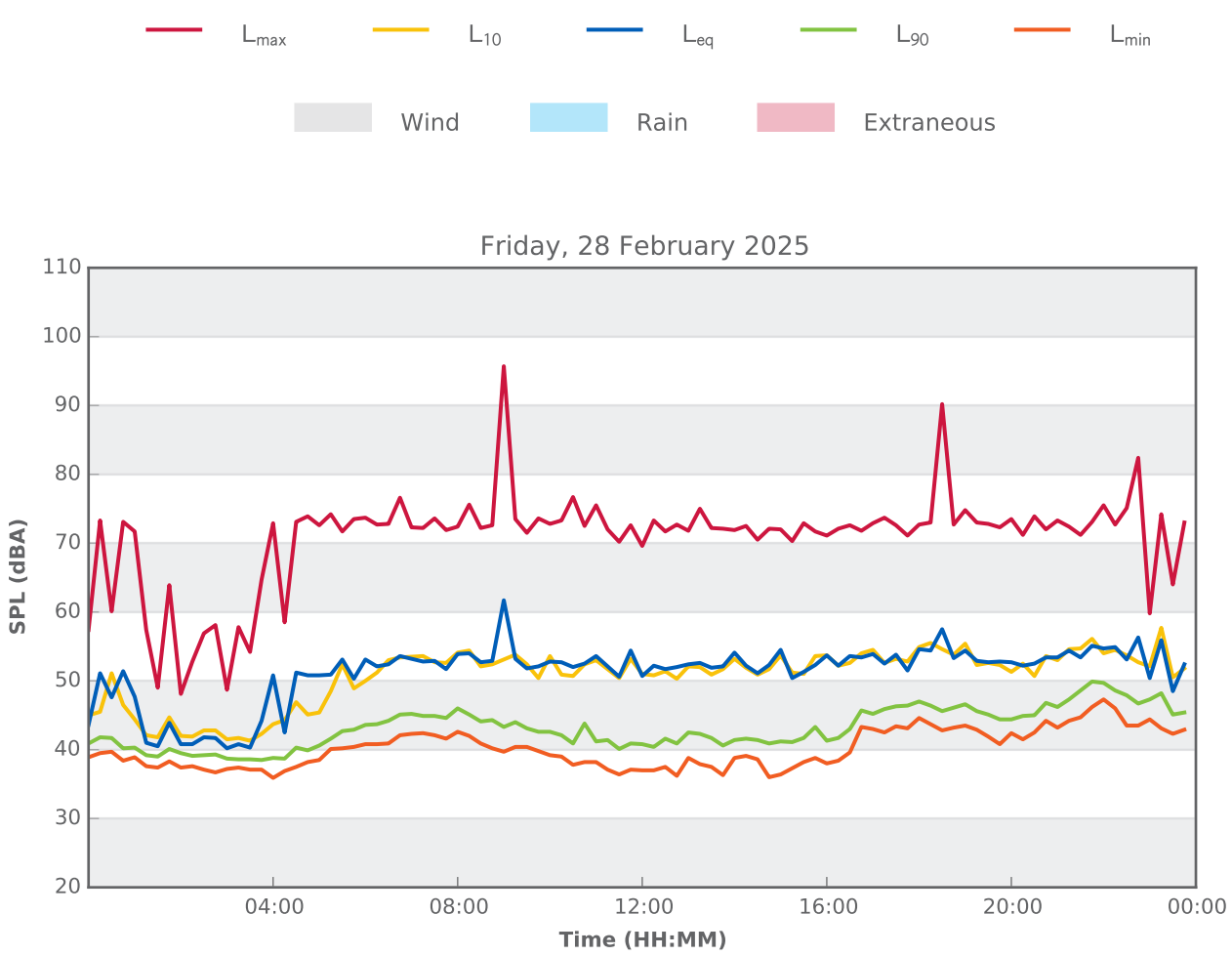

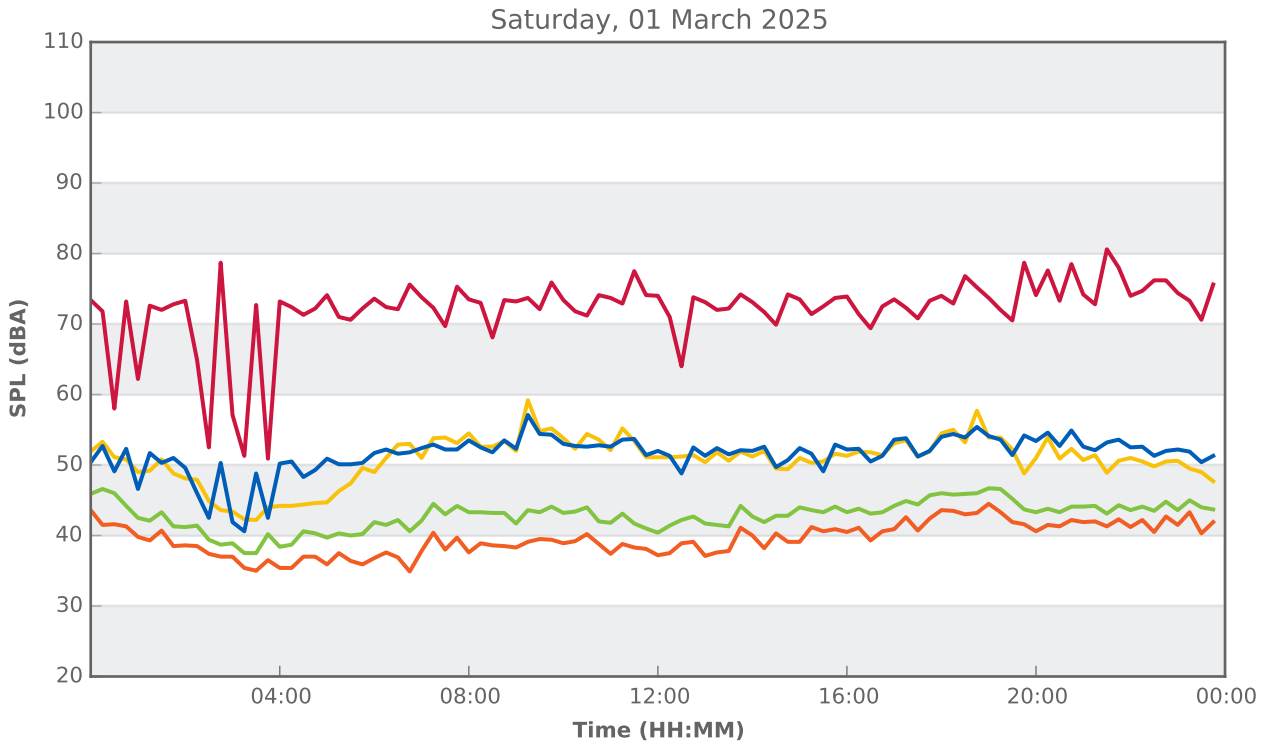

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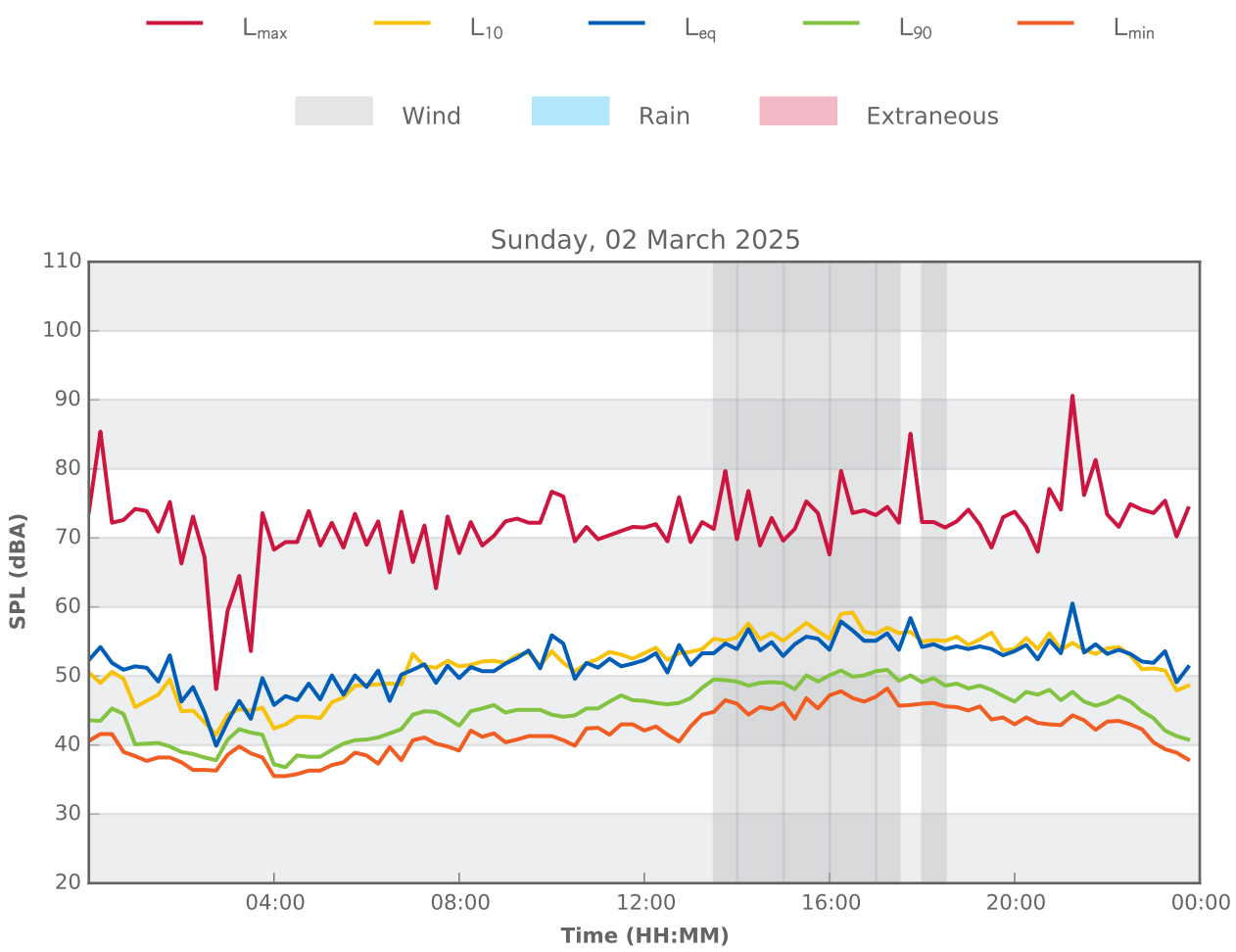

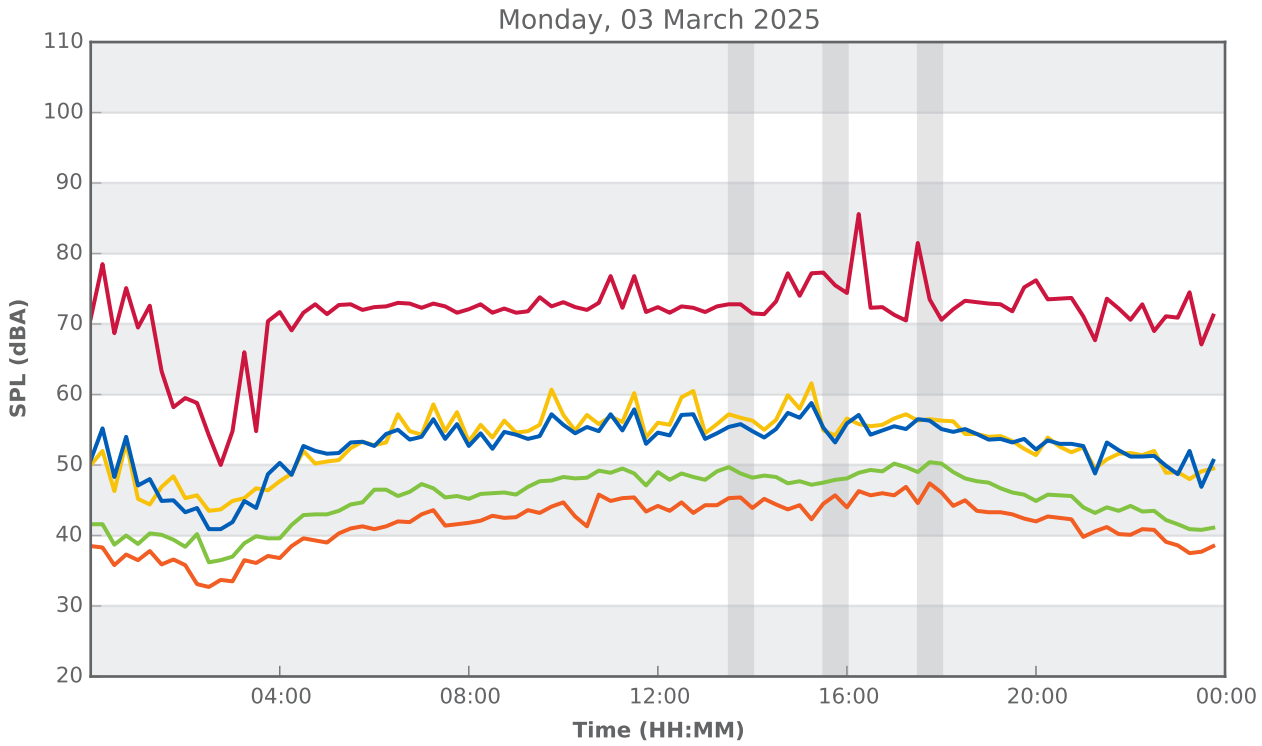

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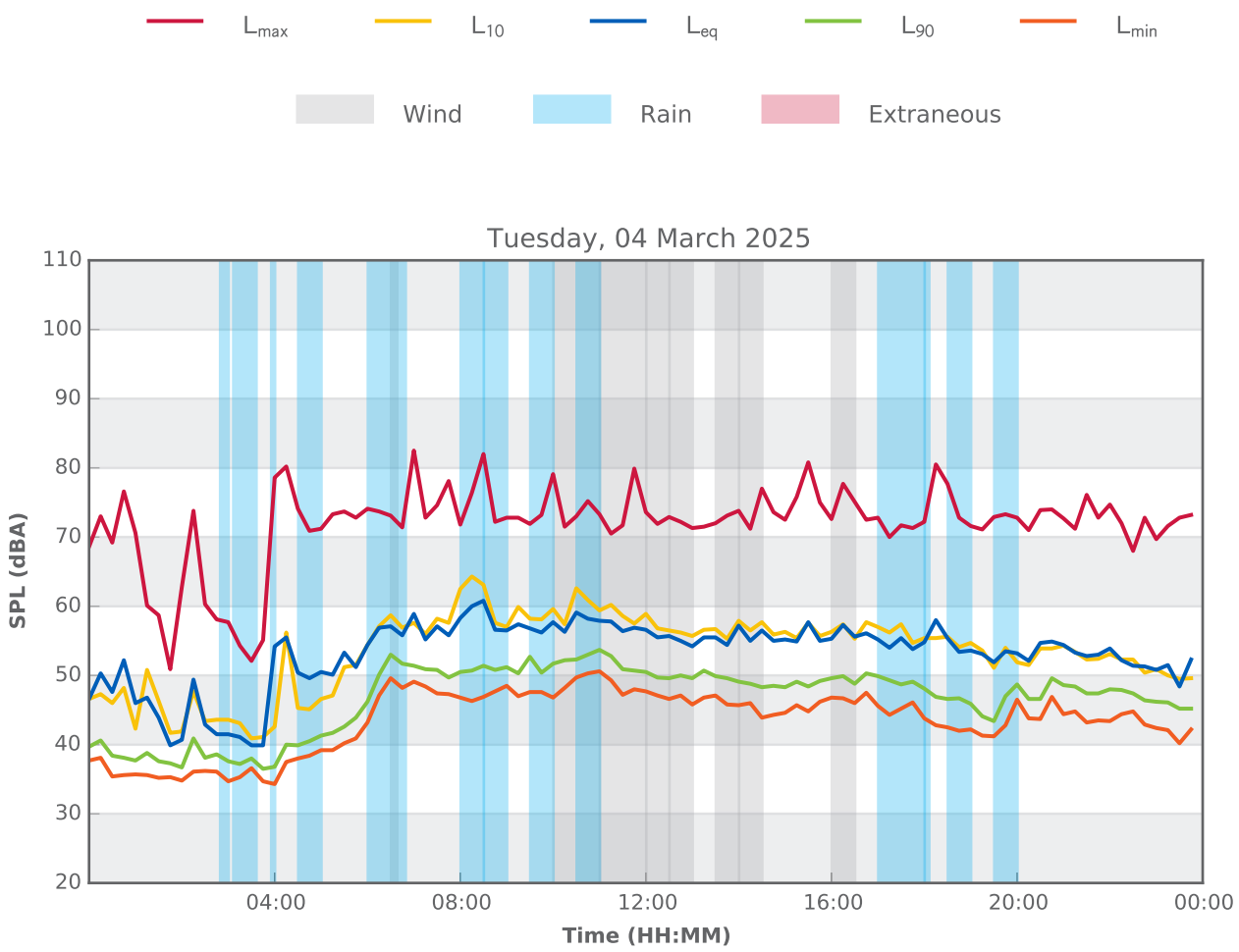

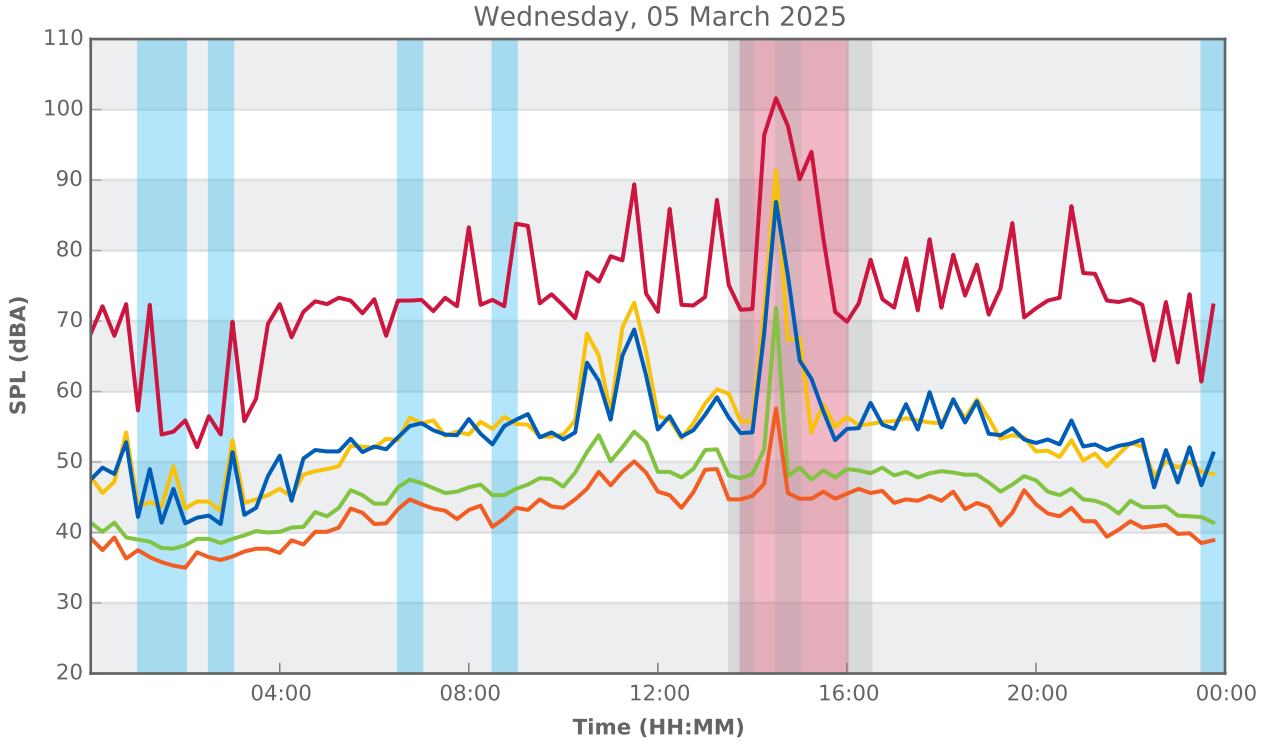

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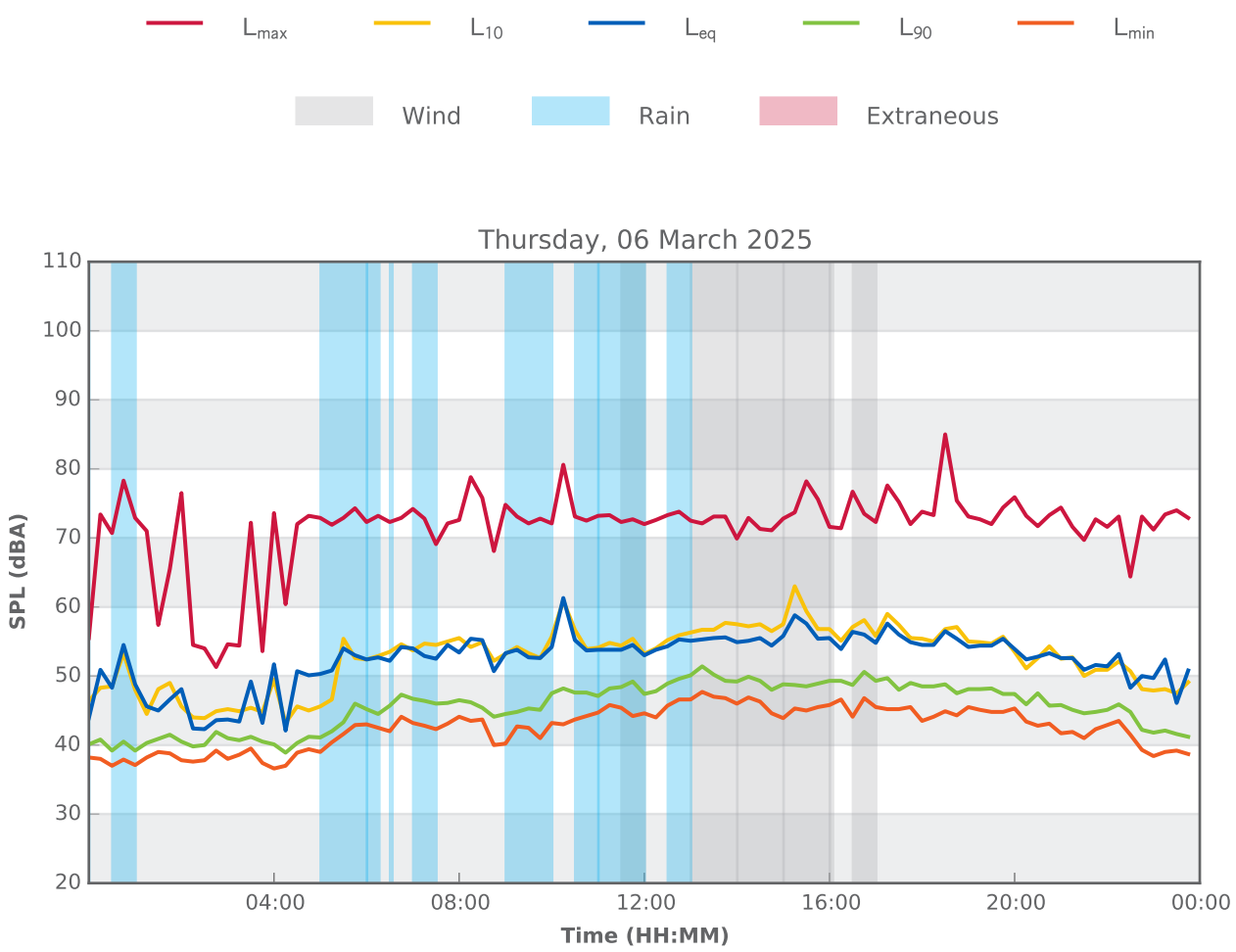

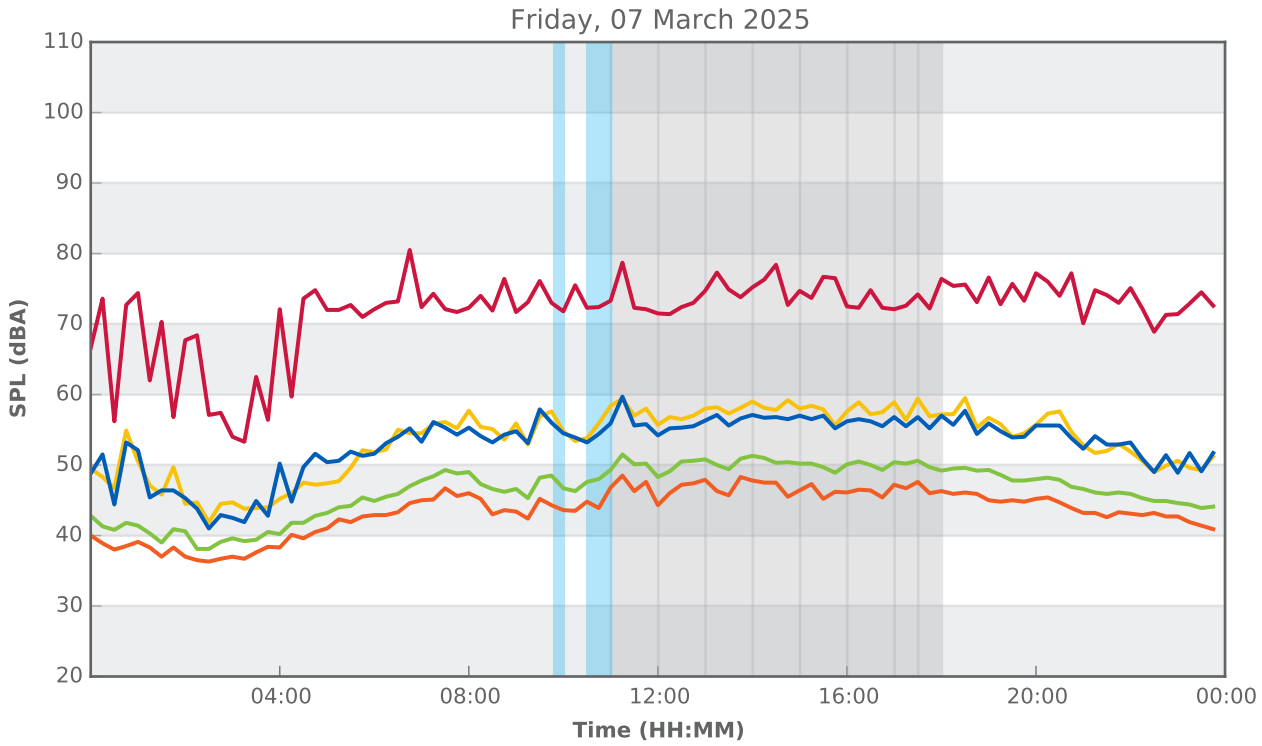

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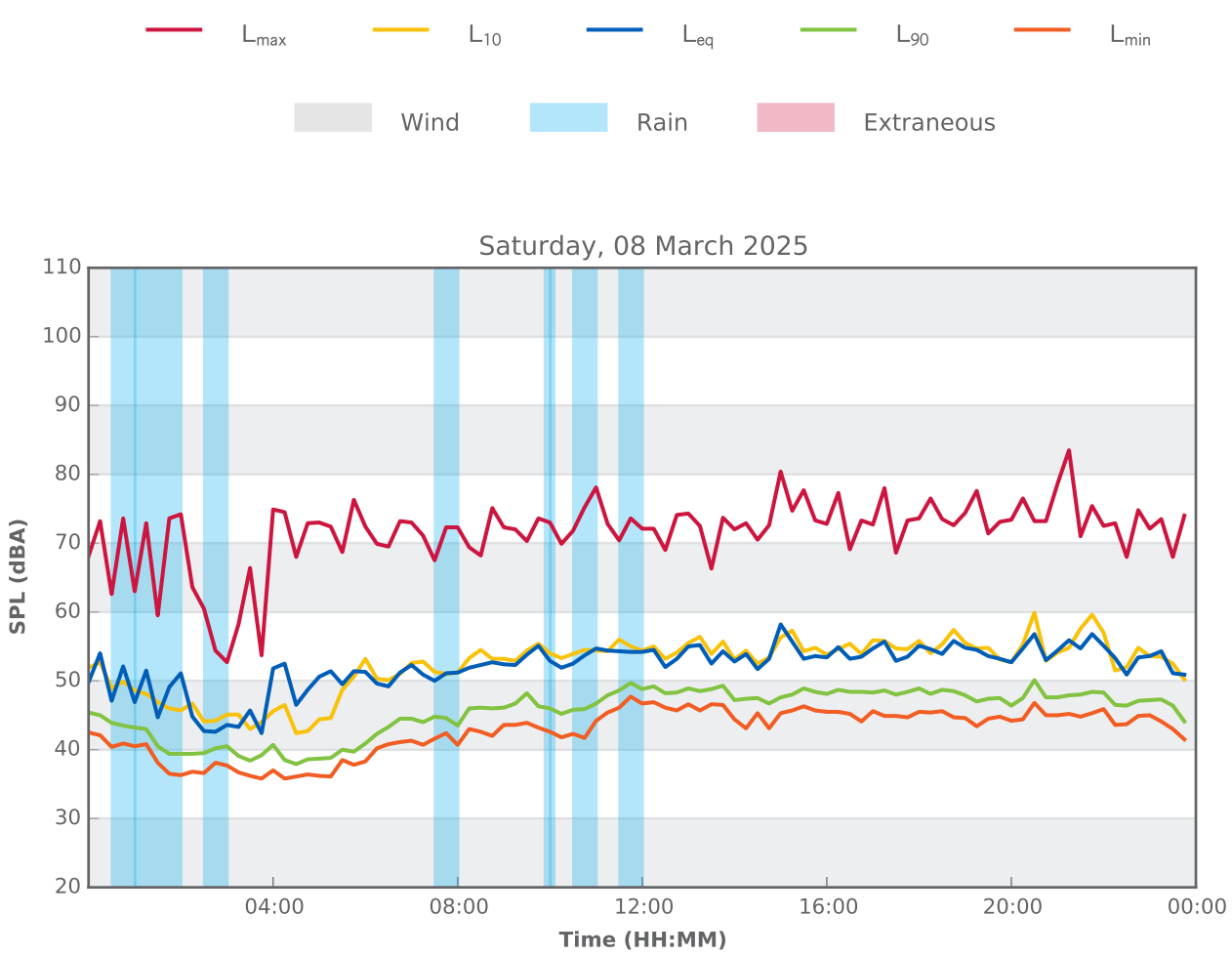
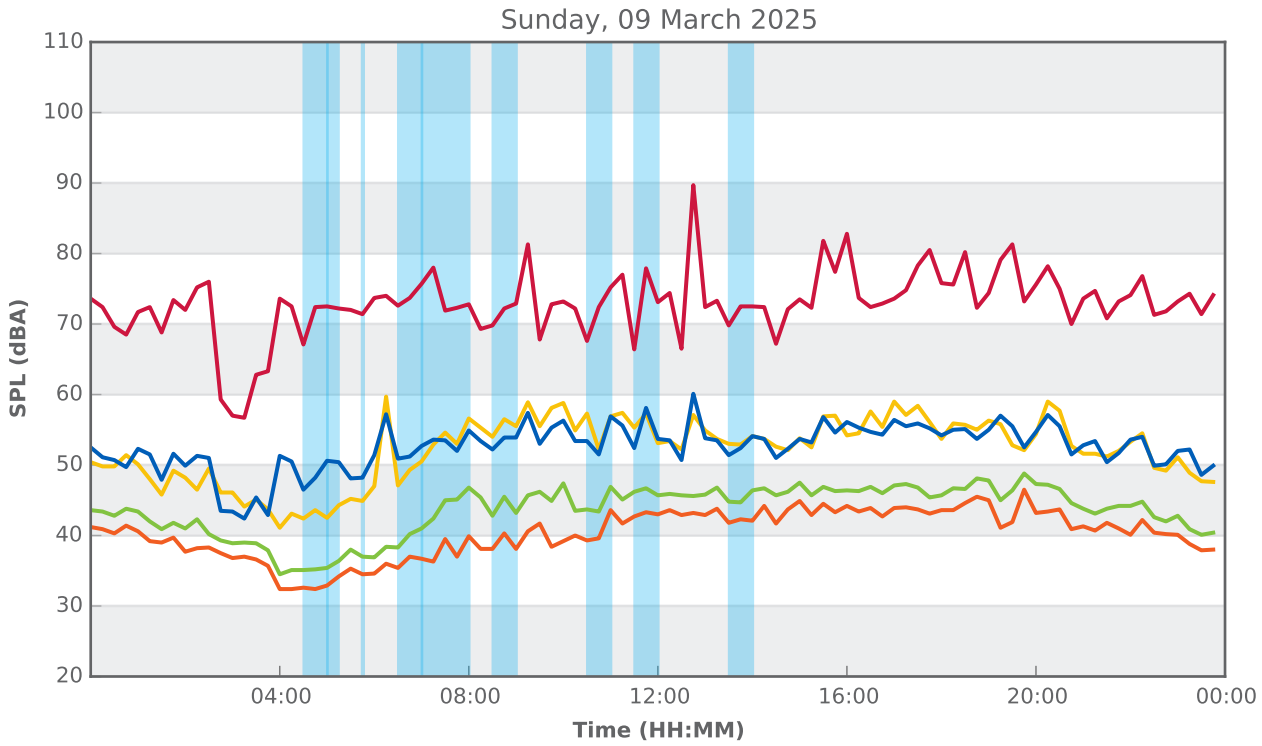
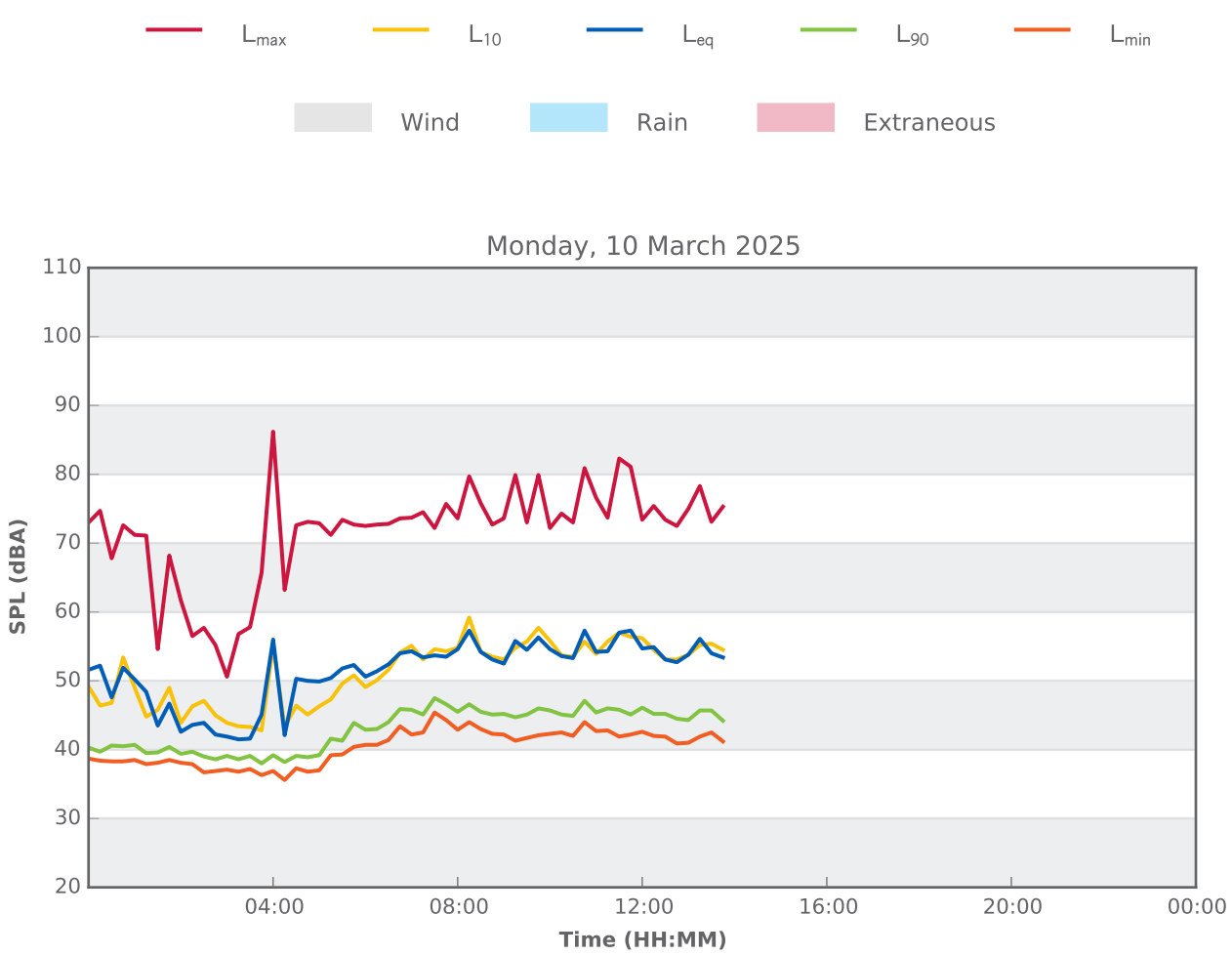
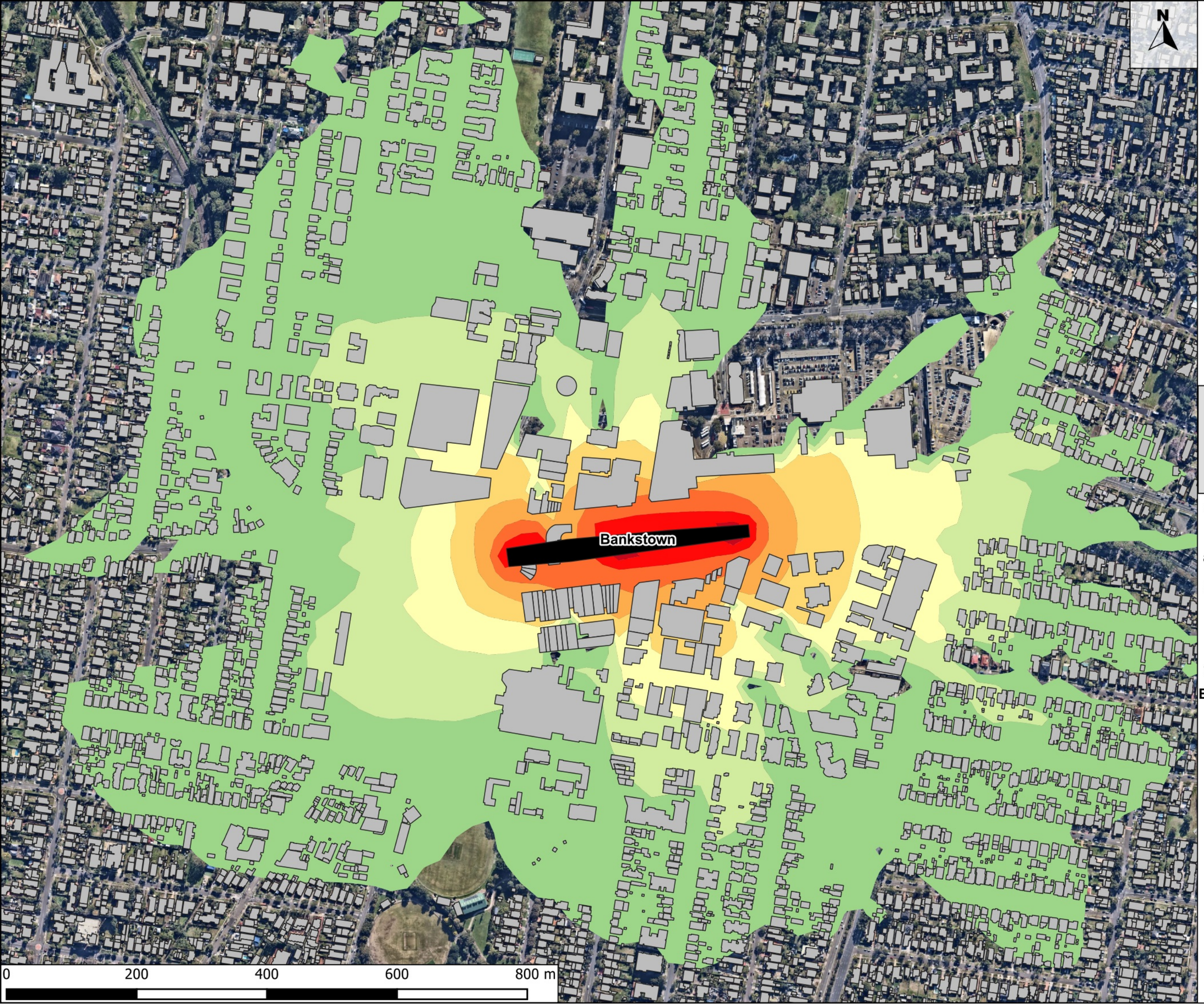




Behind 21 Church Road, Yagoona



APPENDIX C – CONSTRUCTION NOISE CONTOURS SCENARIOS S1A-S11

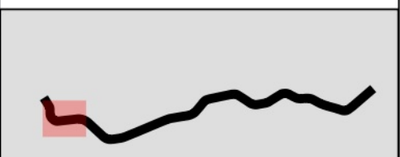


Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA



PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Bankstown Station and Precinct Works
Bankstown Station

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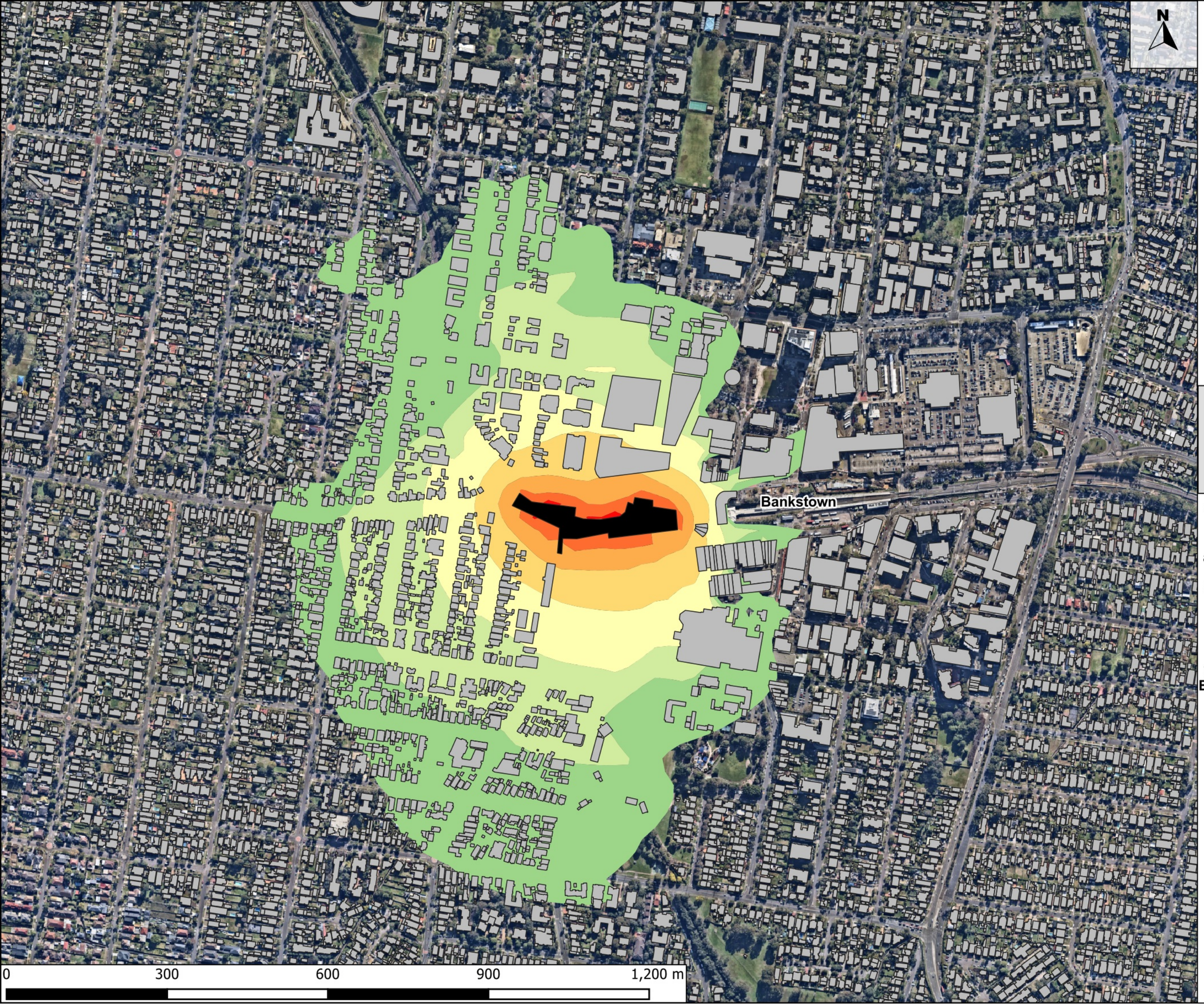
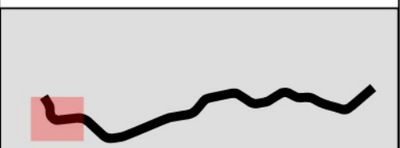


Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA



PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Bankstown Station and Precinct Works
Track between Bankstown Station and Marion Street

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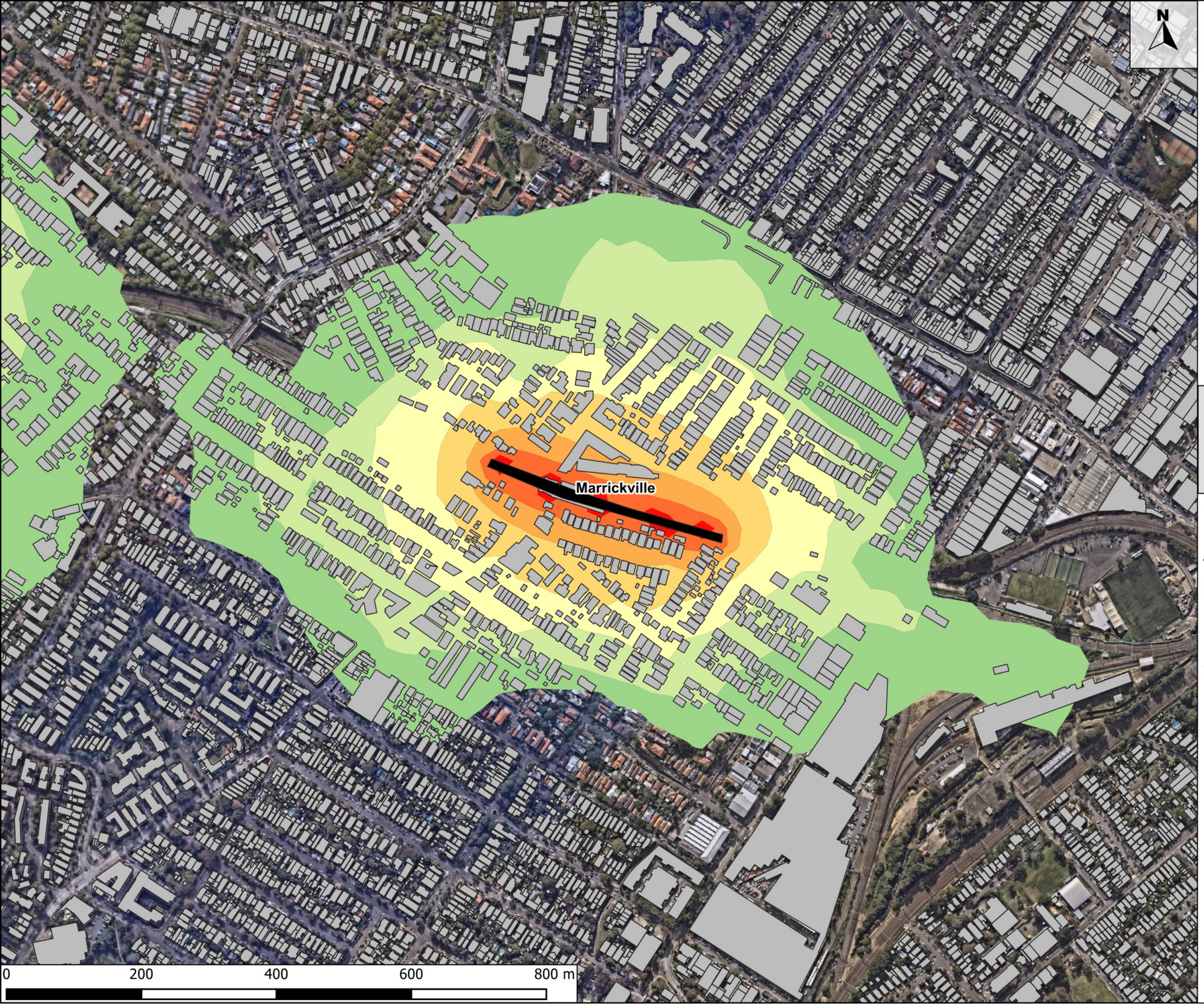
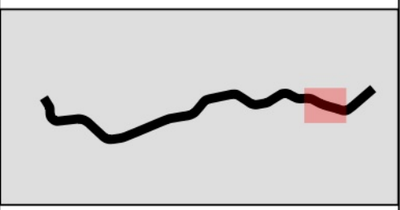


Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA



PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

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TITLE:

Southwest Station Work

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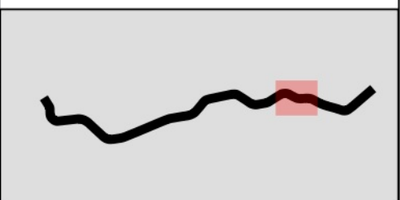
Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA



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N

Hurlstone Park

Dulwich Hill

0 200 400 600 800 m

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

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Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
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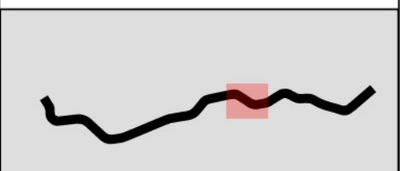
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA



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Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
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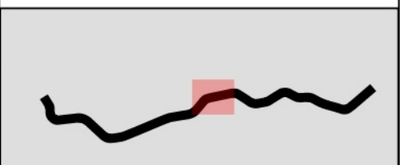

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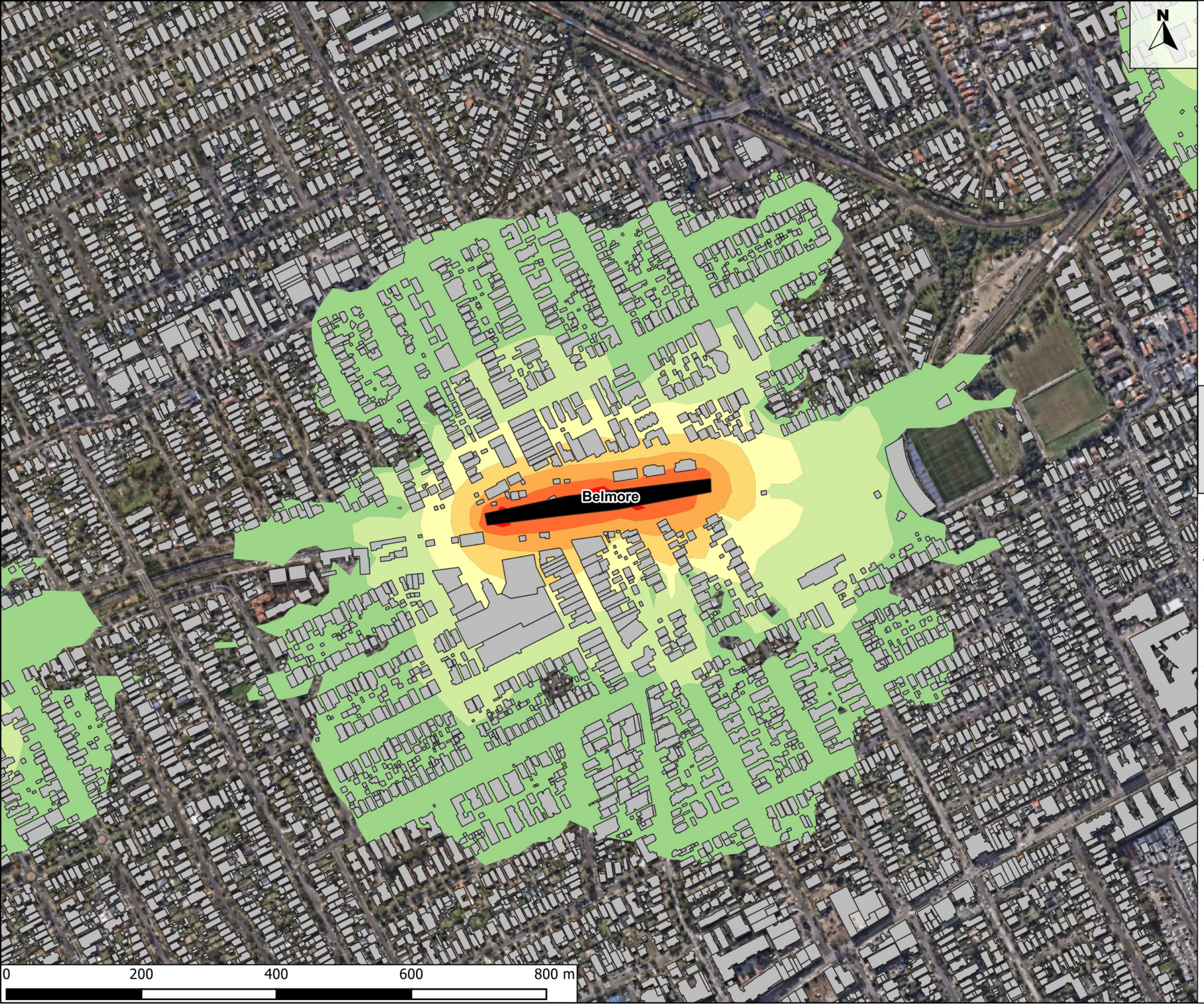

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Work Areas

Noise Contour

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- 50-55 dBA
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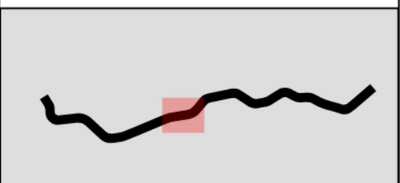
- 90-95 dBA
- >95 dBA



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Lakemba

Wiley Park

0 200 400 600 800 m

N

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
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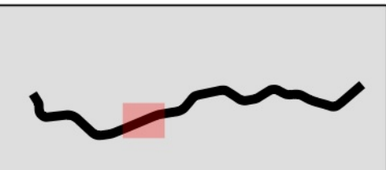
- 85-90 dBA
- 90-95 dBA
- >95 dBA



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N

Lakemba

Wiley Park

0 200 400 600 800 m

Legend

Work Areas

Noise Contour

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- 50-55 dBA
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- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
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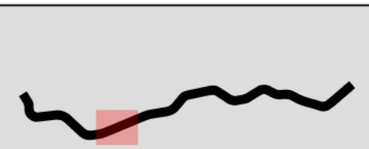
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA



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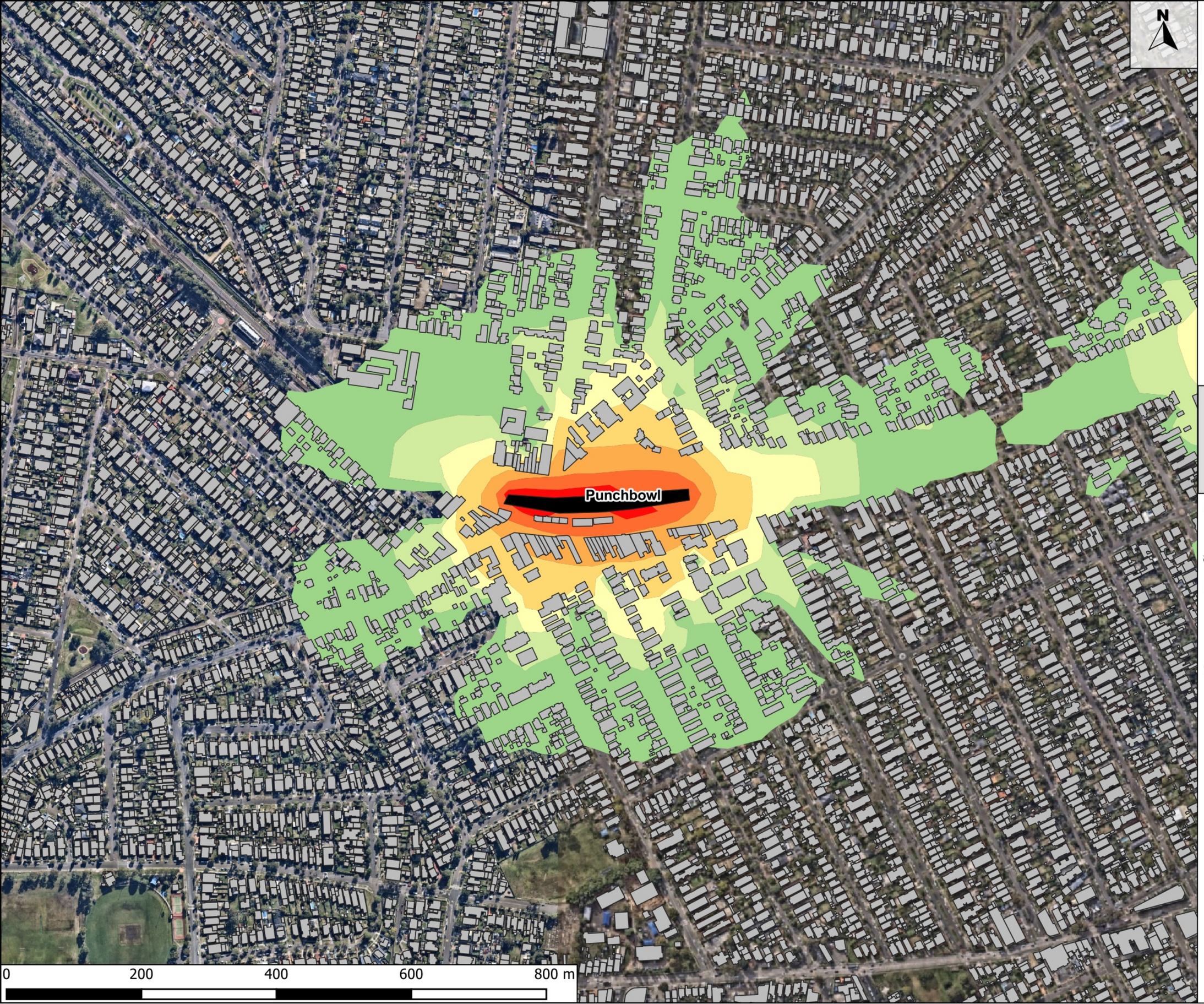

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Work Areas

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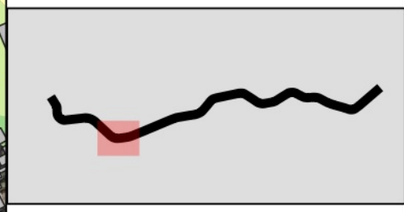

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N

Sydenham

0 300 600 900 1,200 m

Legend

Work Areas

Noise Contour

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- 65-70 dBA
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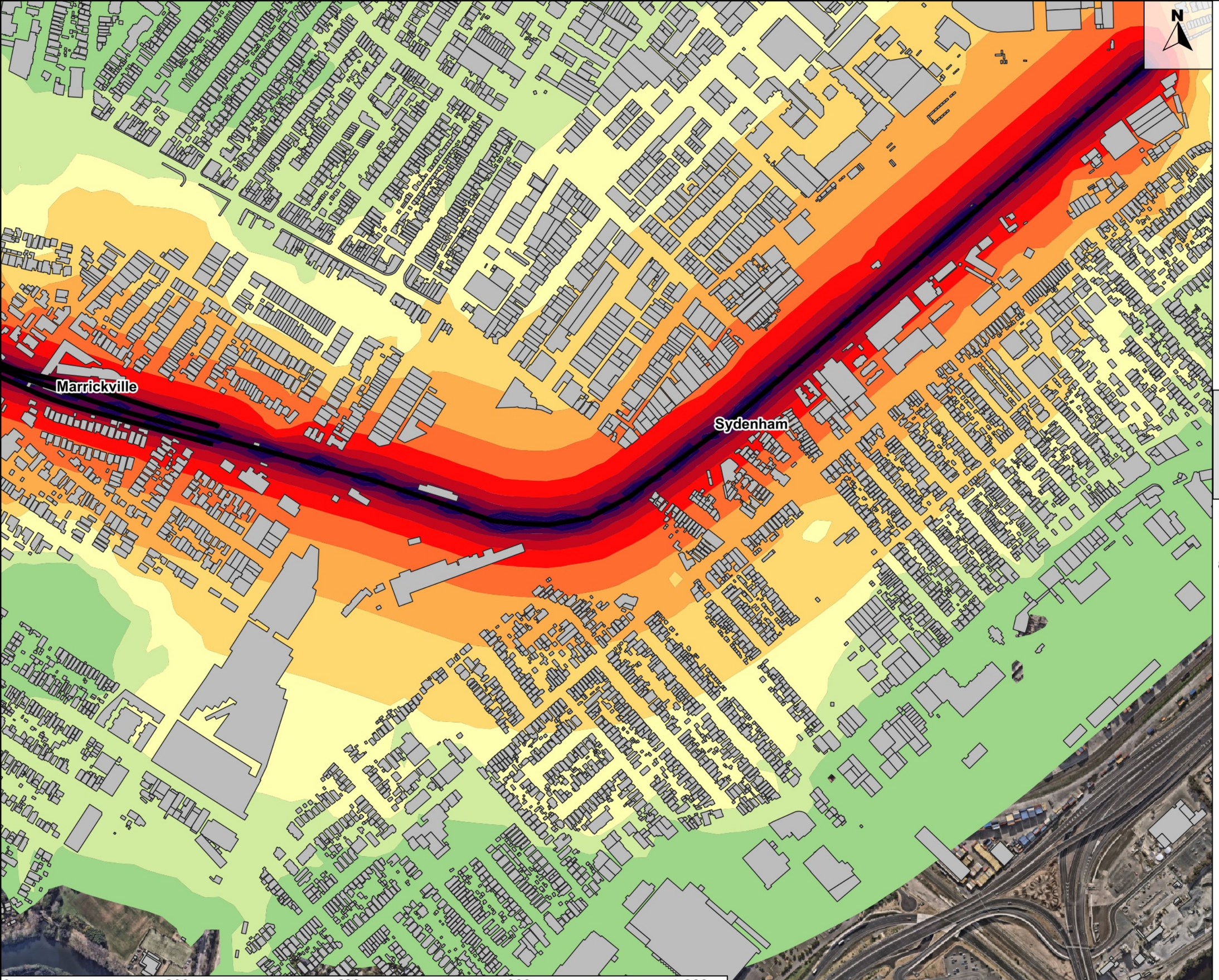

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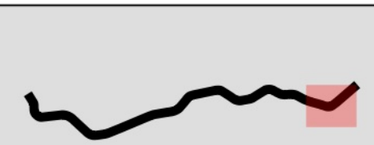

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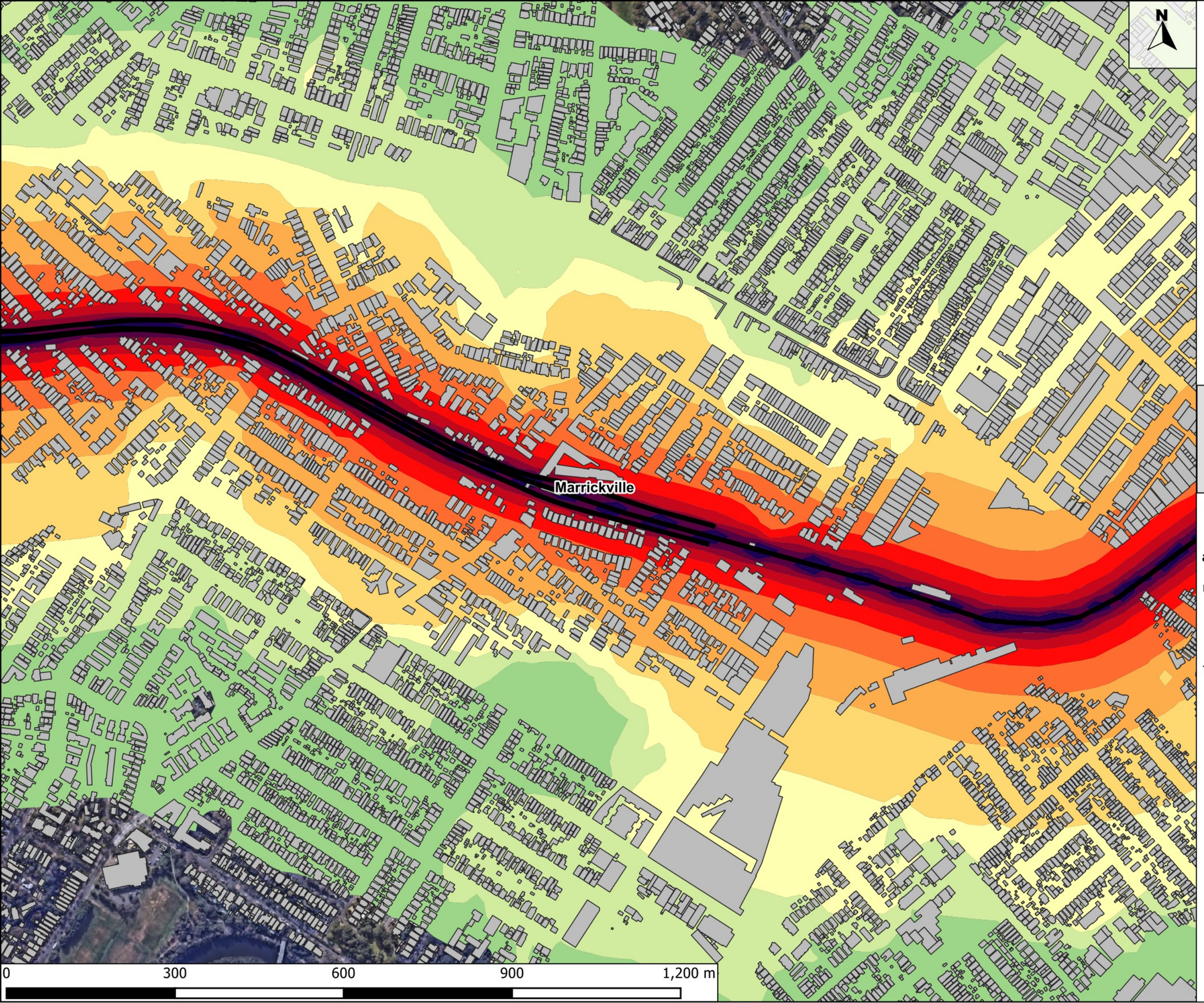

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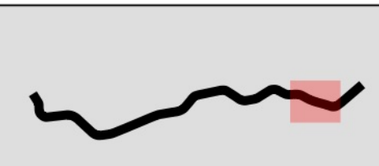

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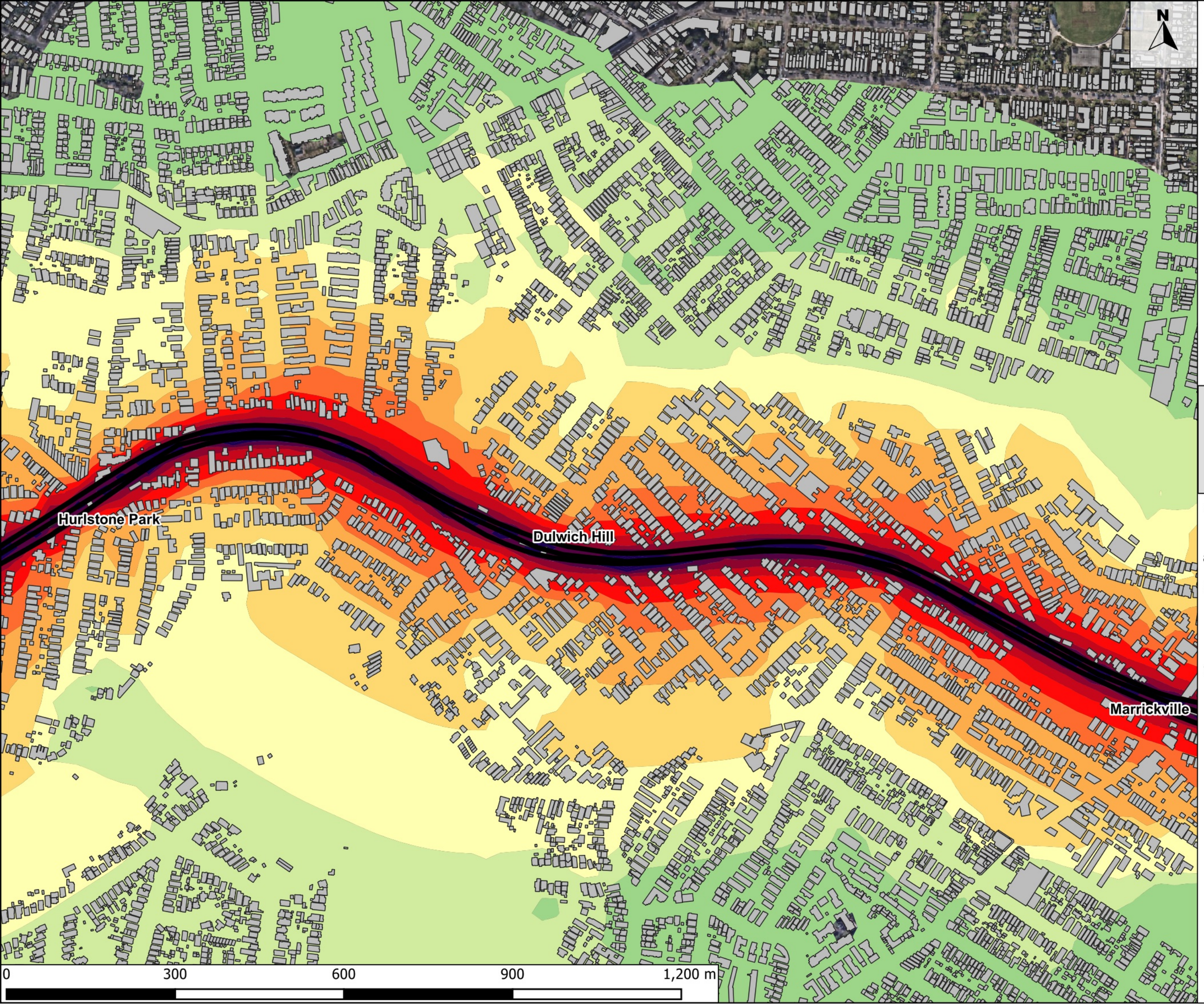

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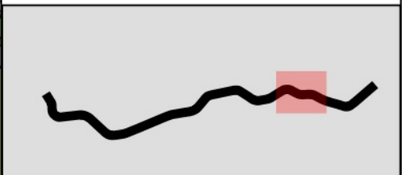

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Hurlstone Park

Dulwich Hill

0 300 600 900 1,200 m

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
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- 65-70 dBA
- 70-75 dBA
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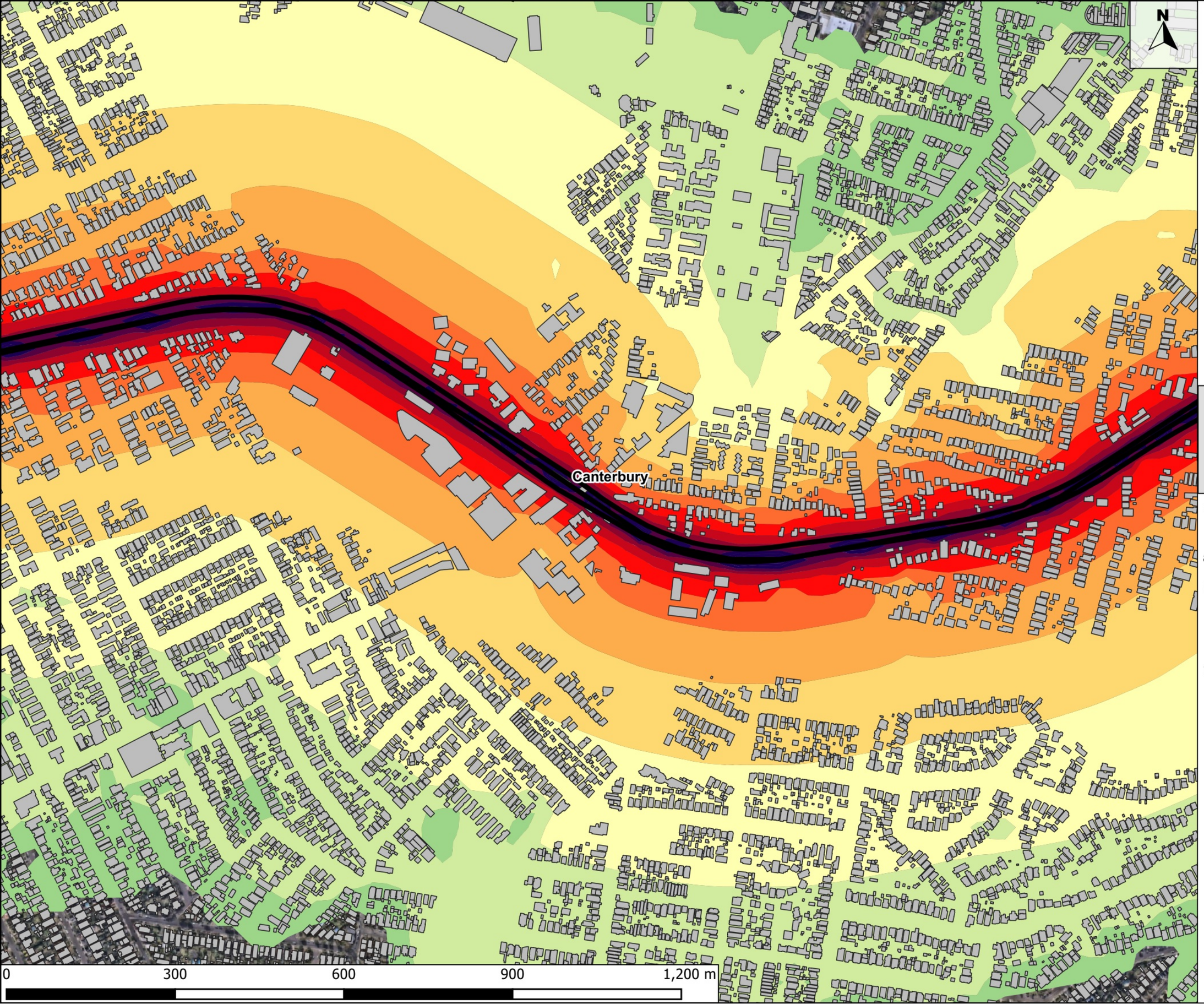

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Work Areas

Noise Contour

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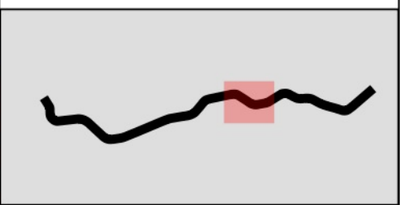

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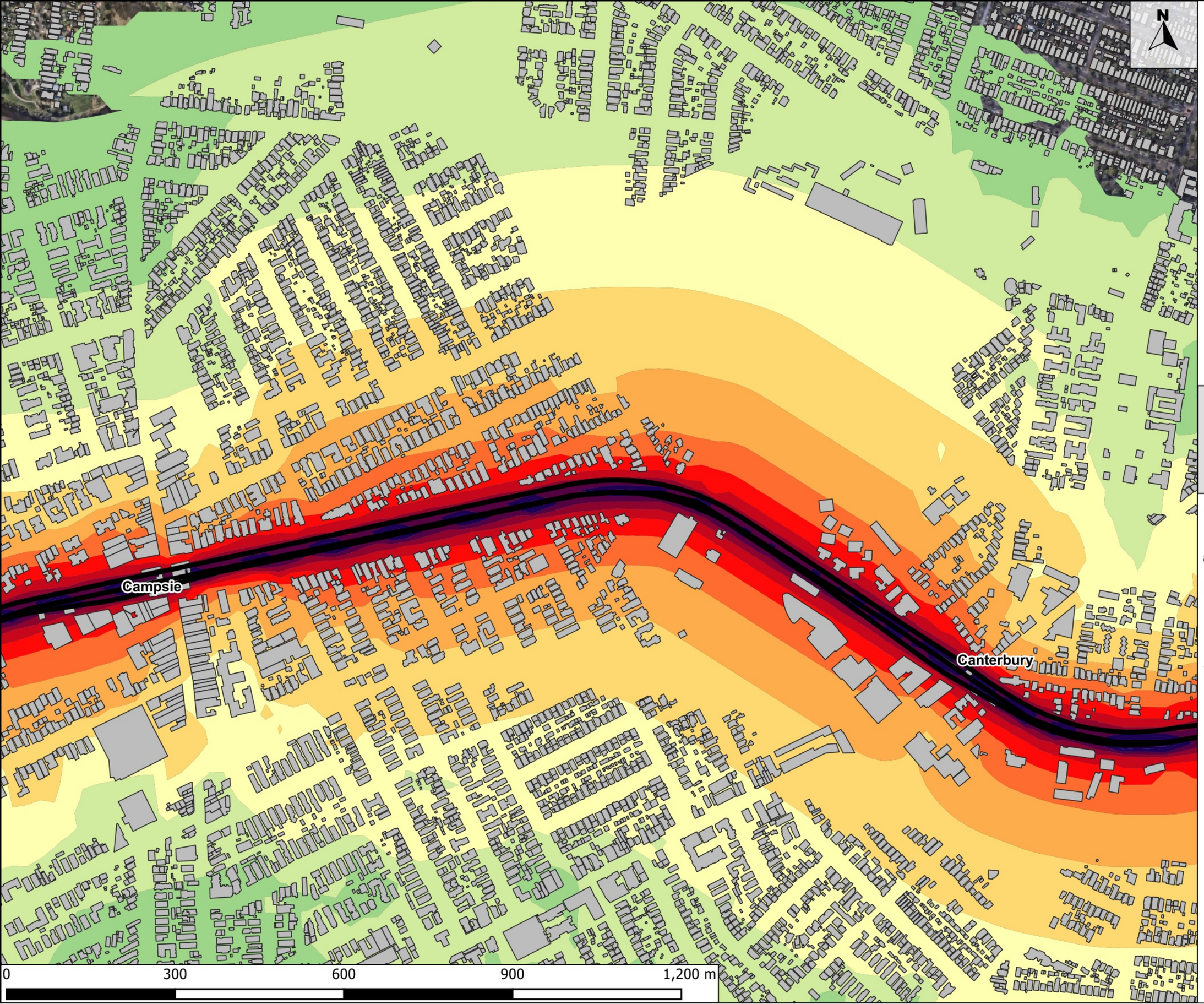

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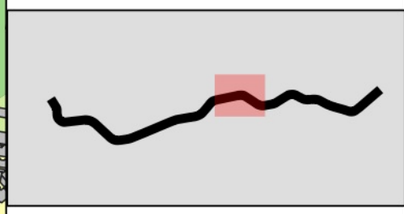

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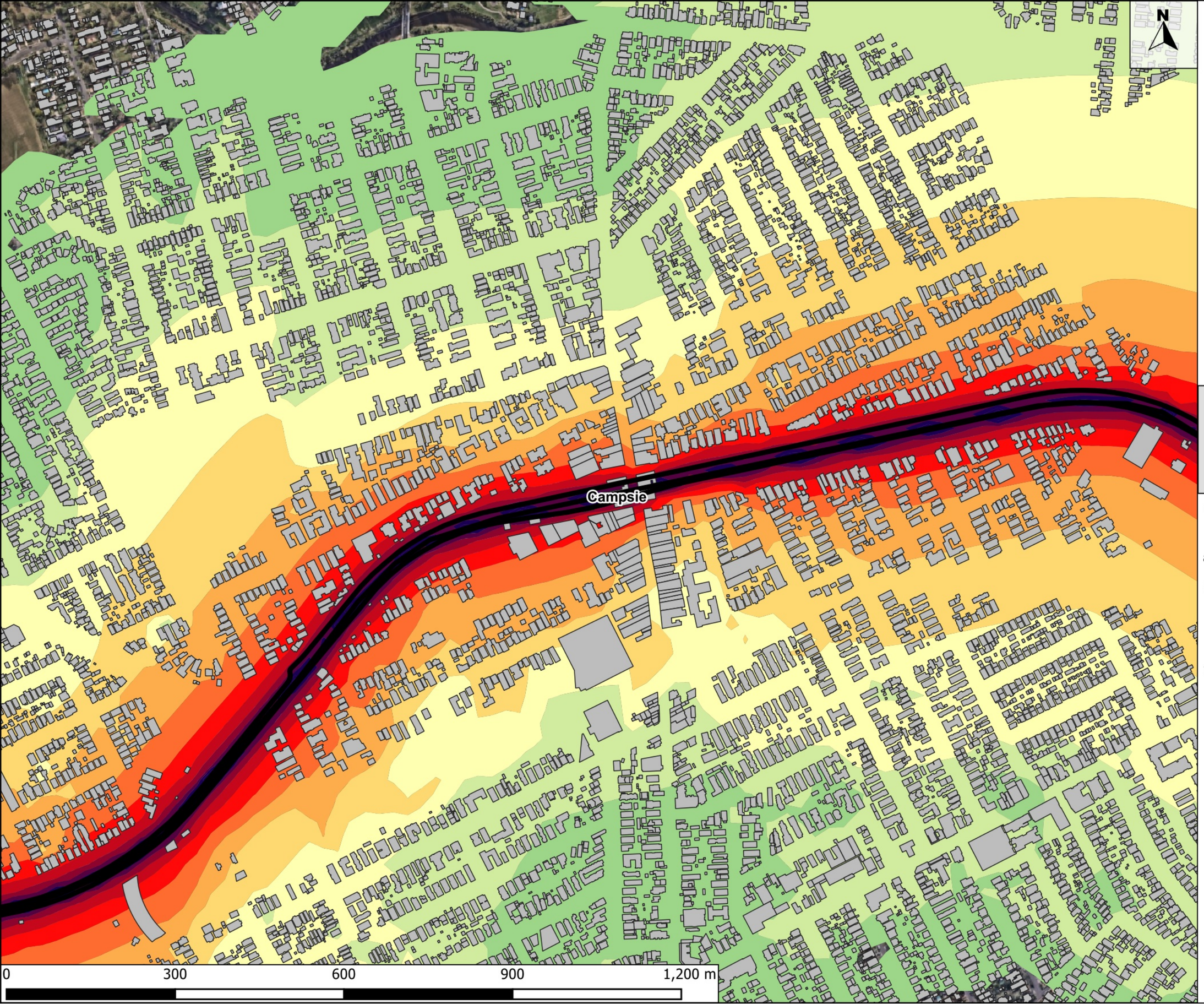

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Work Areas

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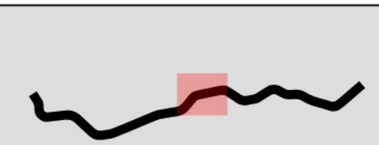

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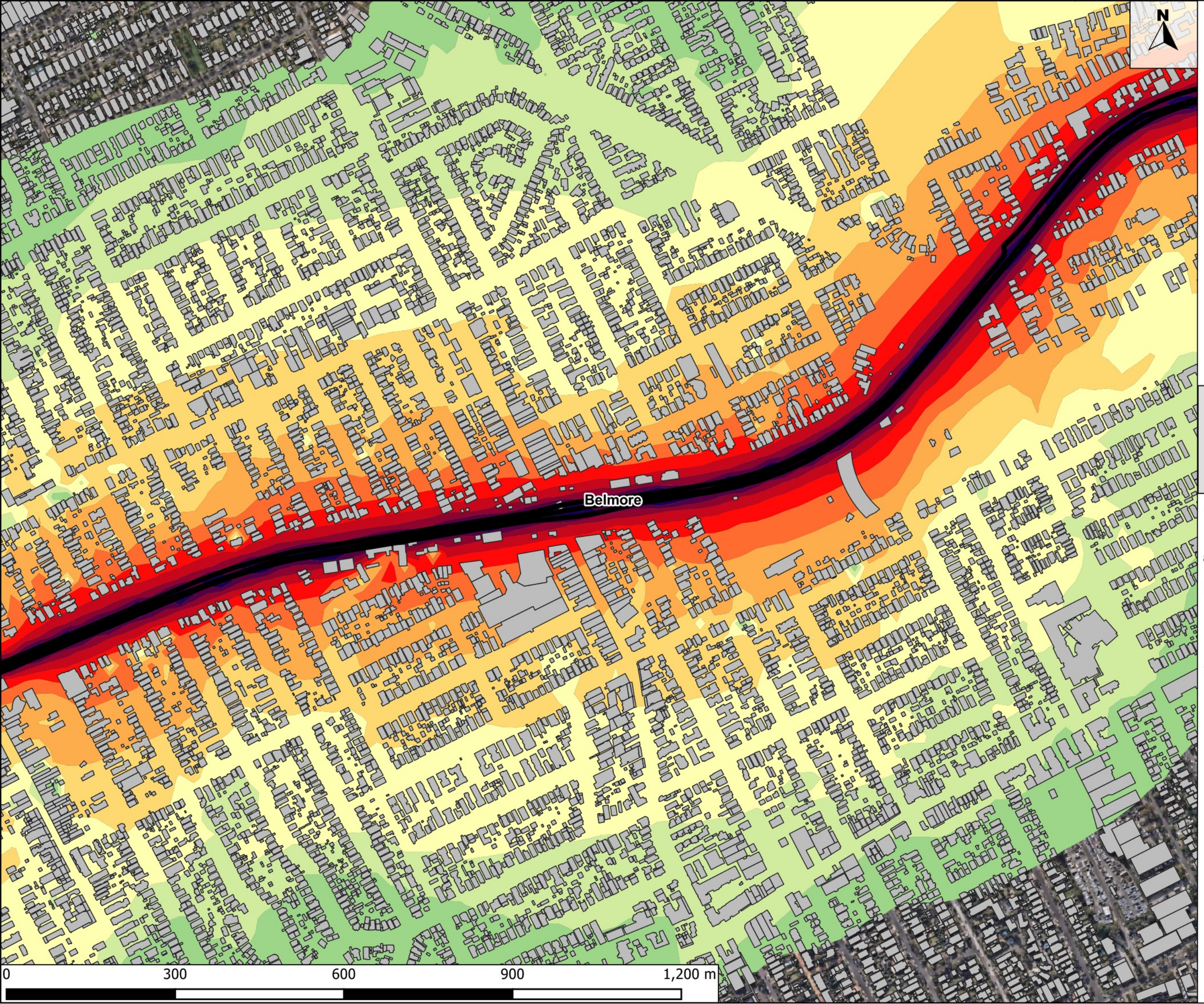

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Work Areas

Noise Contour

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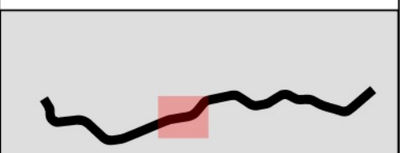

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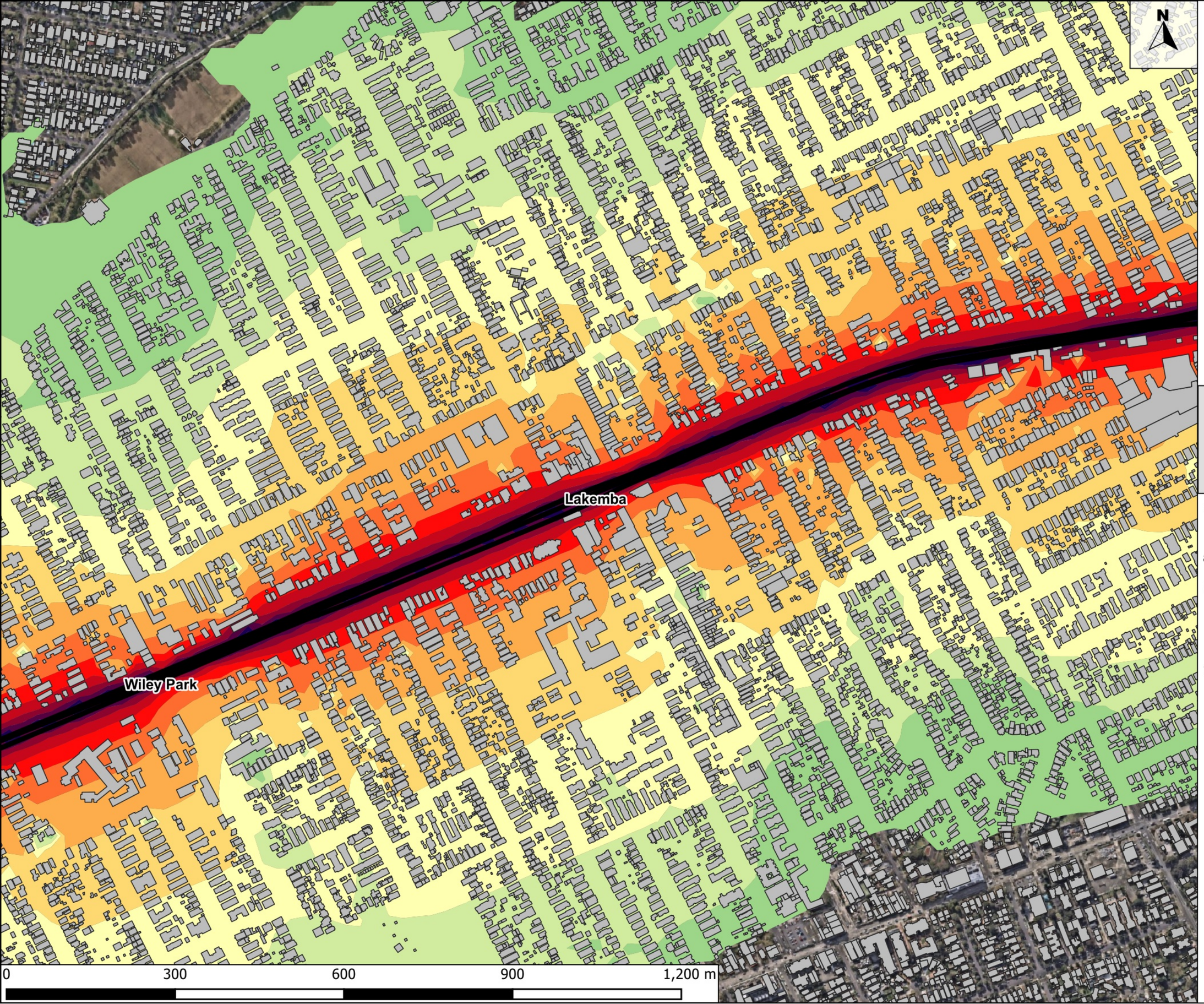

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Work Areas

Noise Contour

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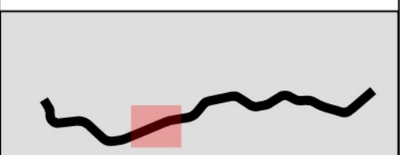

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Lakemba

Wiley Park

0 300 600 900 1,200 m

Legend

Work Areas

Noise Contour

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- 55-60 dBA
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- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
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- 90-95 dBA
- >95 dBA

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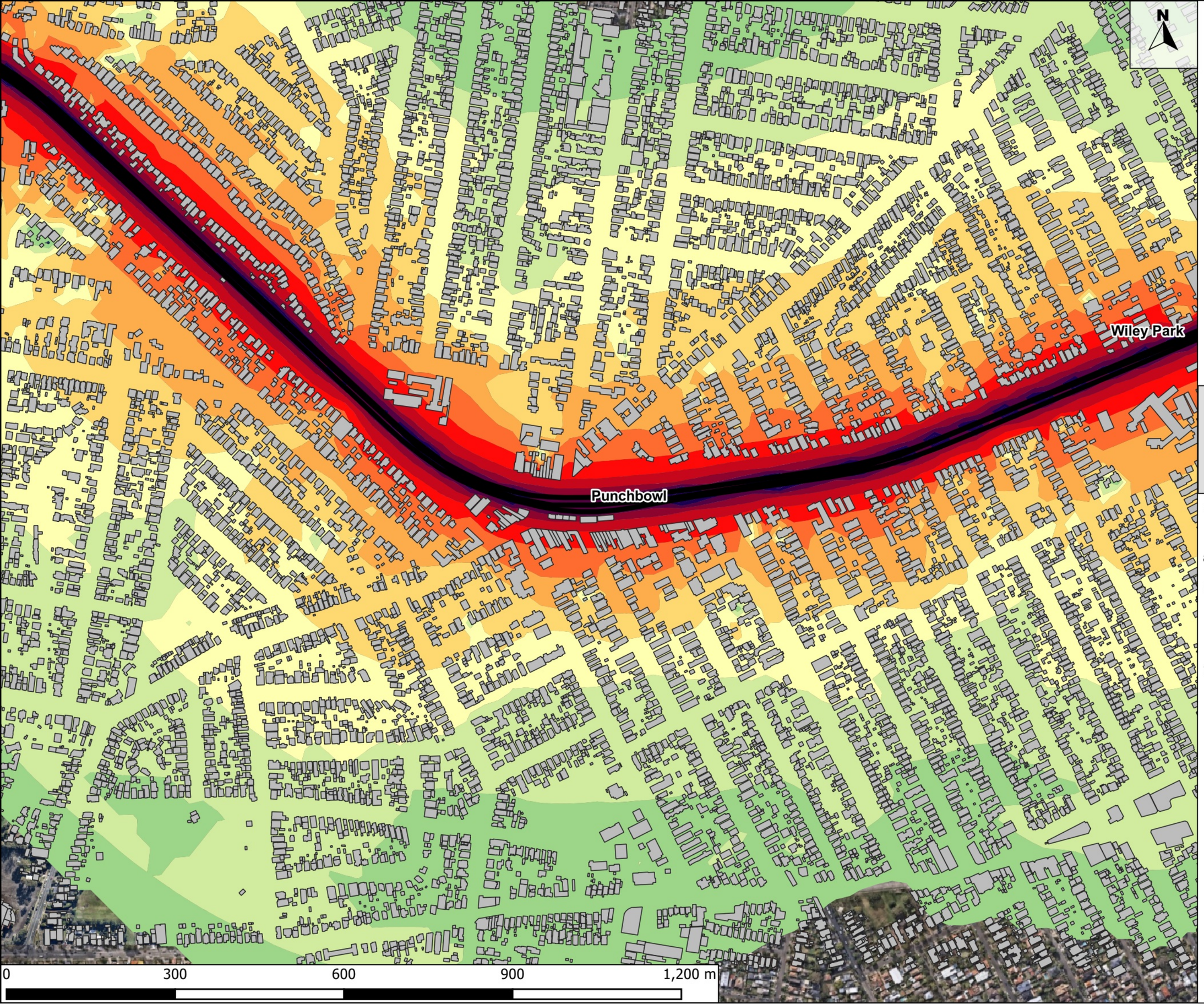

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Work Areas

Noise Contour

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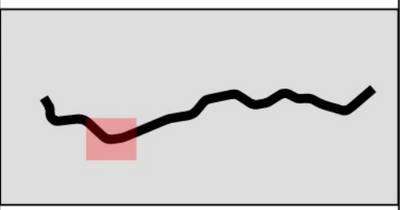

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Bankstown

Punchbowl

0 200 400 600 800 m

N

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA



PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Southwest Corridor Works

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Bankstown

0 200 400 600 800 m

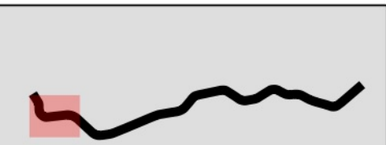
N

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA



PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Southwest Corridor Works

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N

Bankstown

0 200 400 600 800 m

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Southwest Corridor Works

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N

Marrickville

Sydenham

0 300 600 900 1,200 m

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Asset Upgrades – Track Rectification

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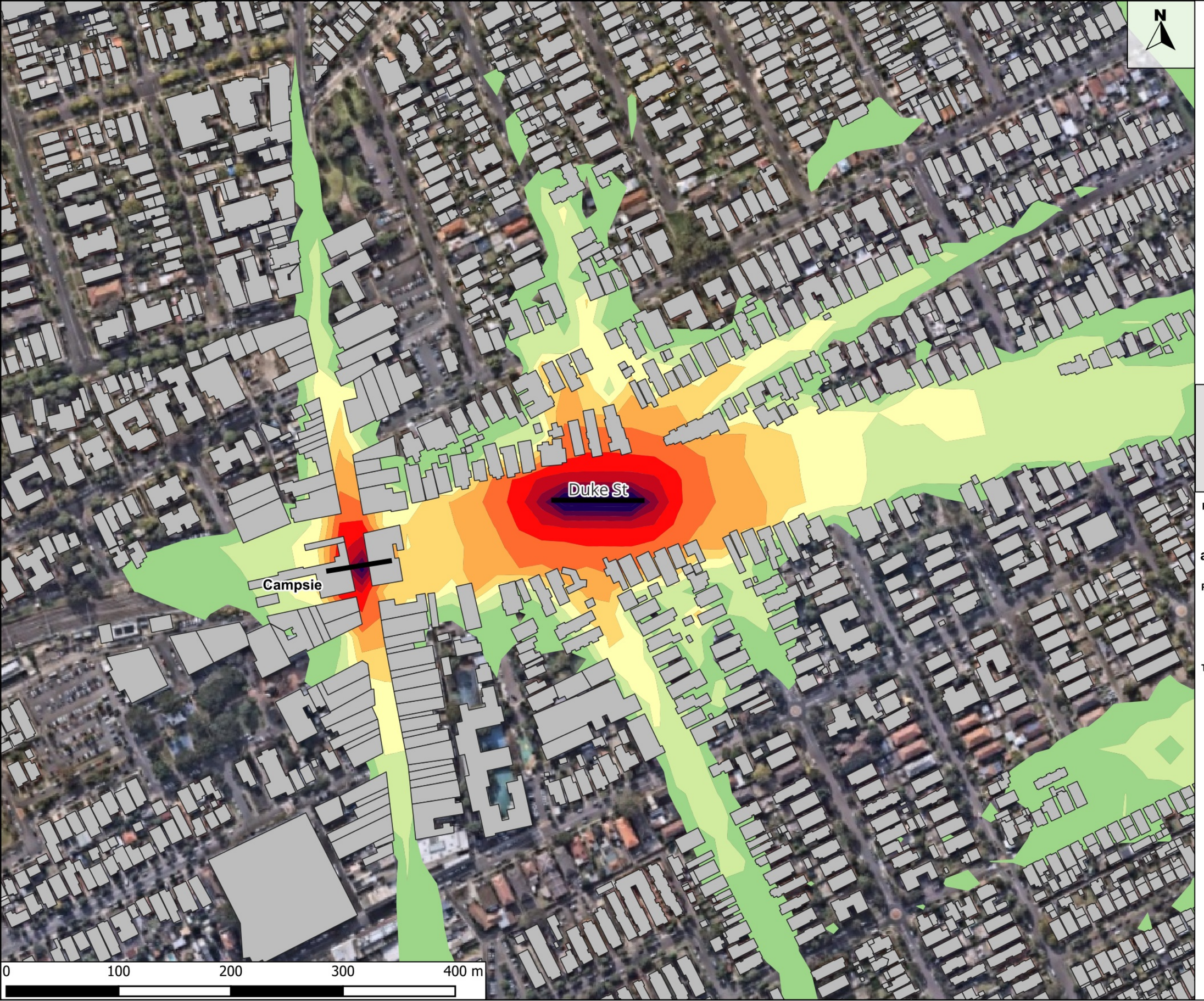

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Work Areas

Noise Contour

- <40 dBA
- 40-45 dBA
- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
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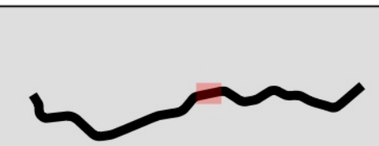
- >95 dBA



PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Asset upgrades – Bridge Upgrades
Duke St

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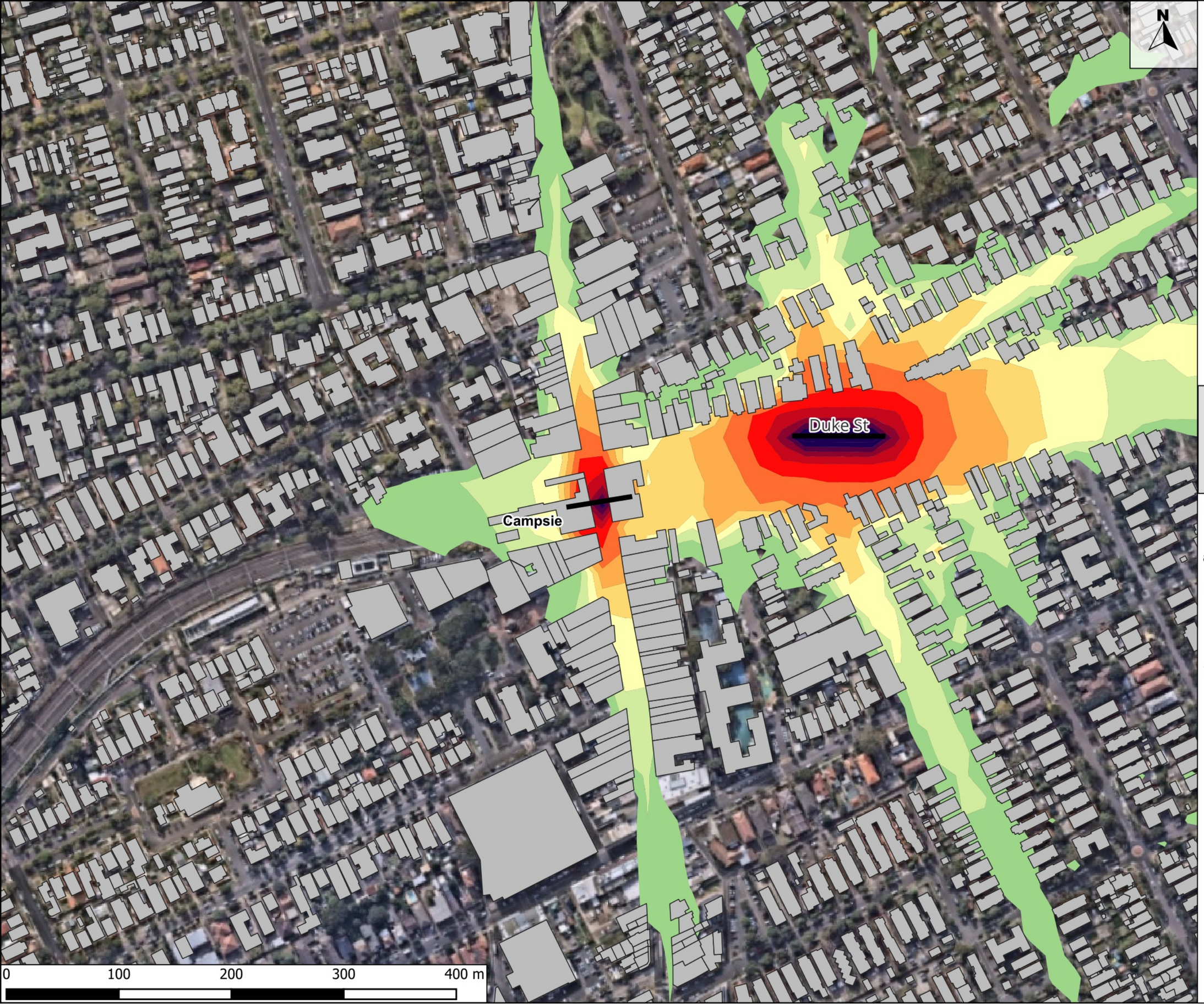

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Work Areas

Noise Contour

- <40 dBA
- 40-45 dBA
- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
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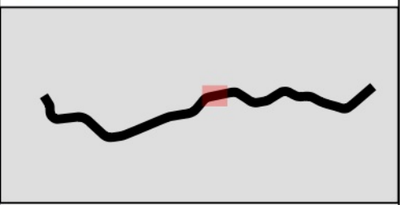
- 90-95 dBA
- >95 dBA



PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Asset upgrades – Bridge Upgrades Beamish St

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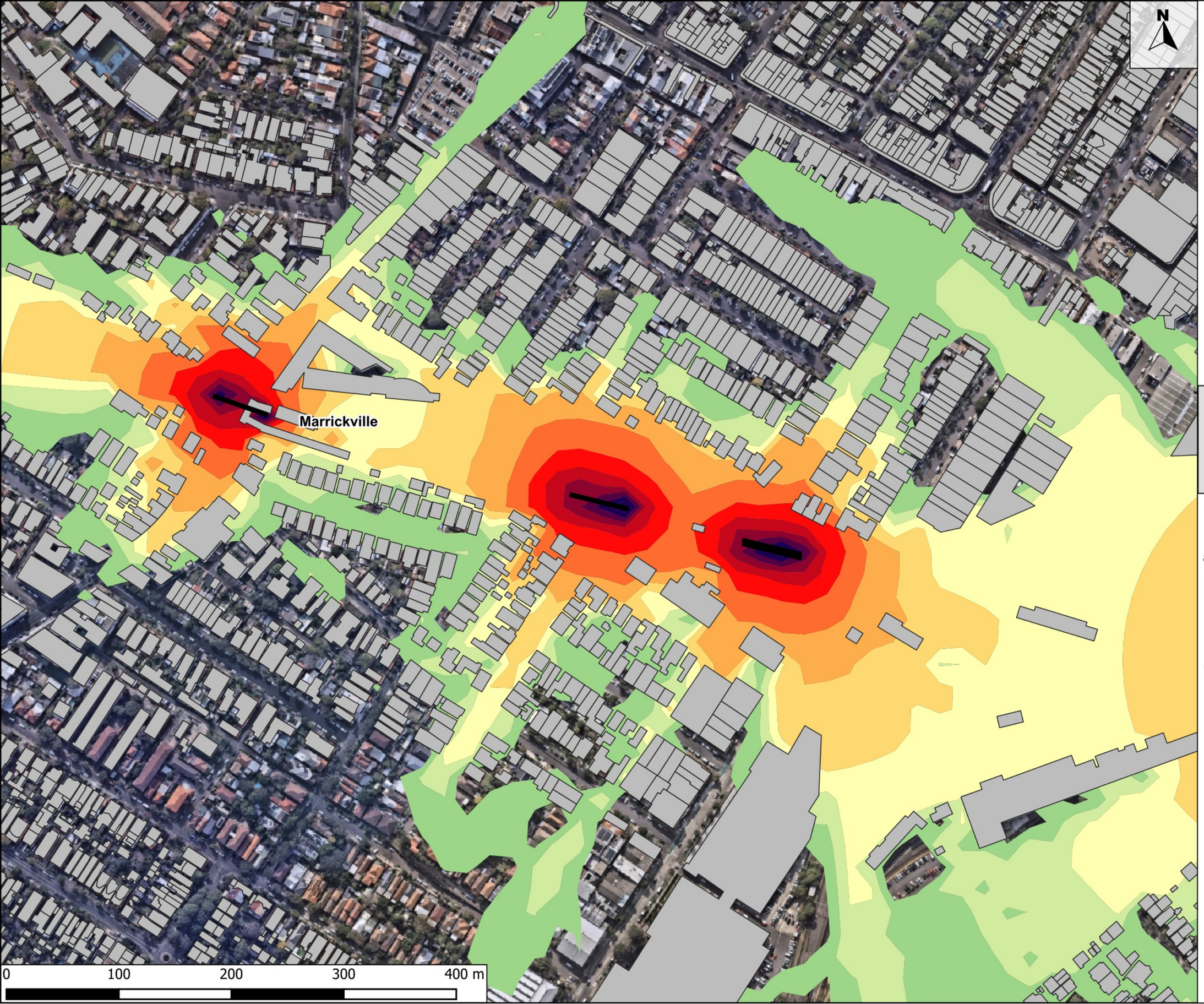

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Work Areas

Noise Contour

- <40 dBA
- 40-45 dBA
- 45-50 dBA
- 50-55 dBA
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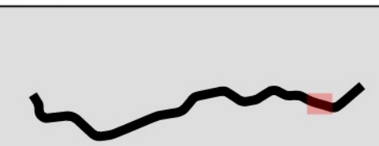
- >95 dBA



PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Asset upgrades – Bridge Upgrades Victoria Rd

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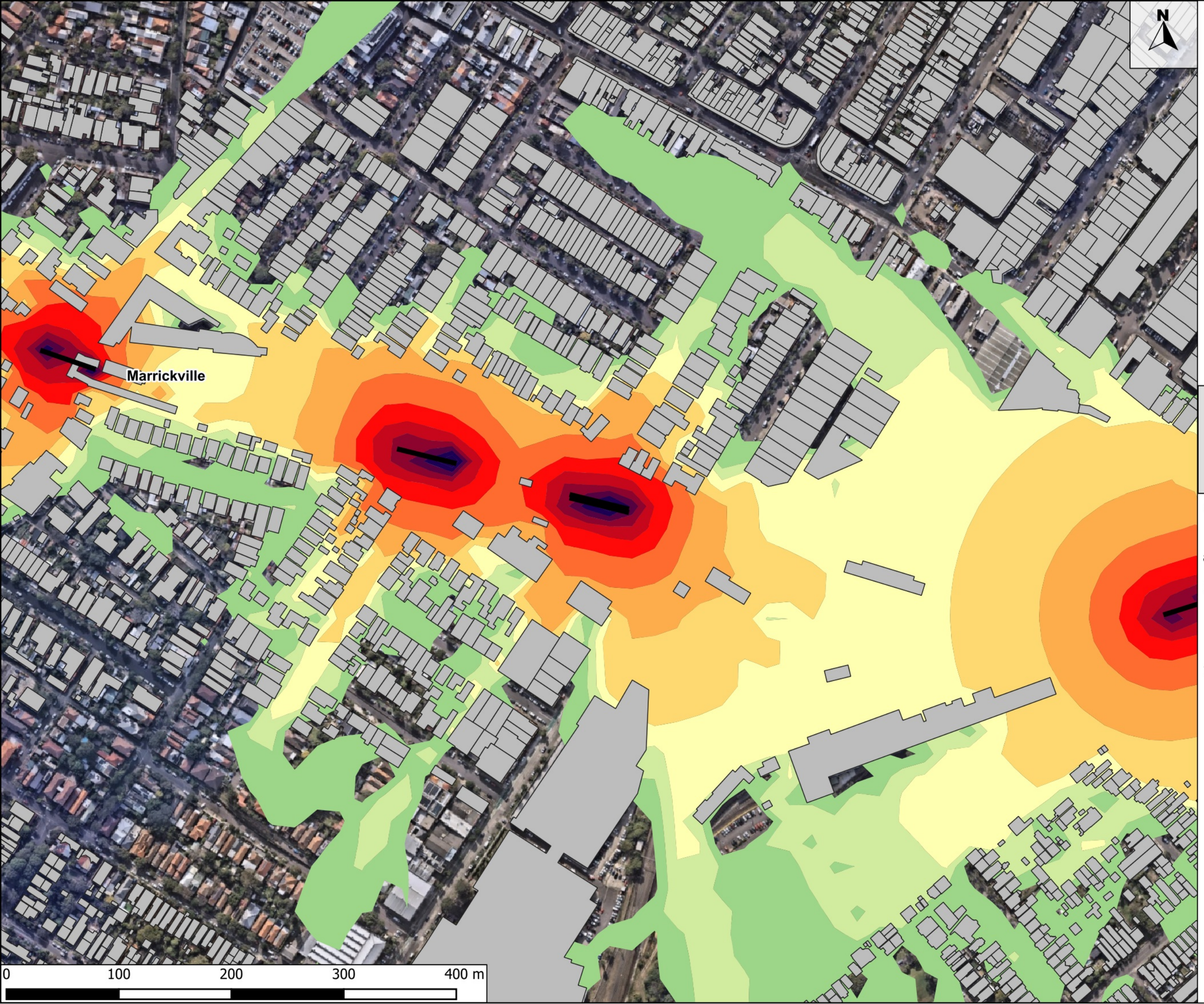

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Work Areas

Noise Contour

- <40 dBA
- 40-45 dBA
- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
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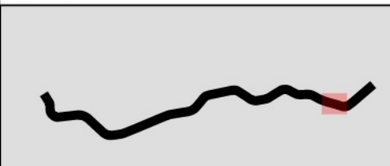
- 90-95 dBA
- >95 dBA



PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Asset upgrades – Bridge Upgrades Canal 1&2

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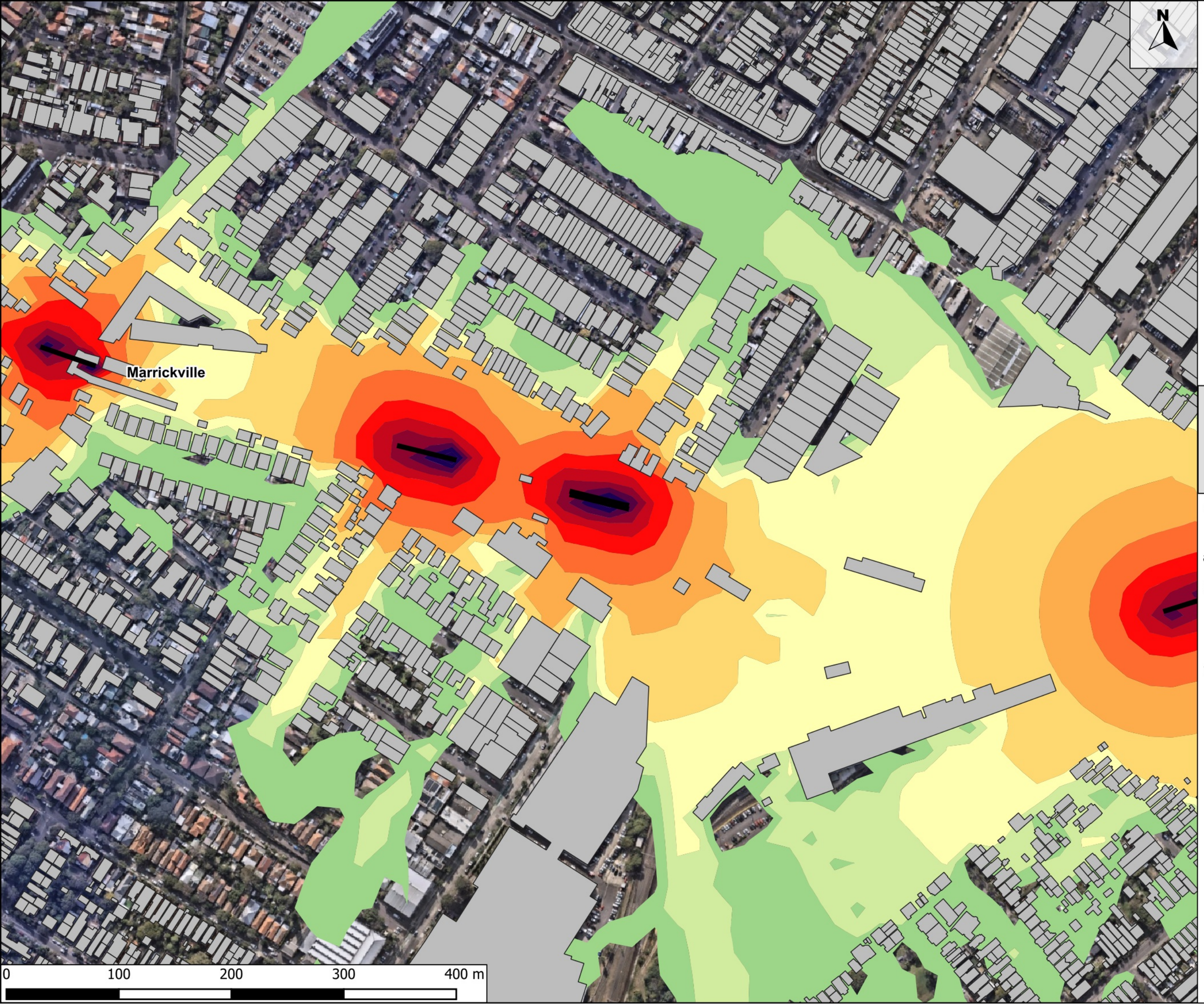

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Work Areas

Noise Contour

- <40 dBA
- 40-45 dBA
- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Asset upgrades – Bridge Upgrades Meeks Rd

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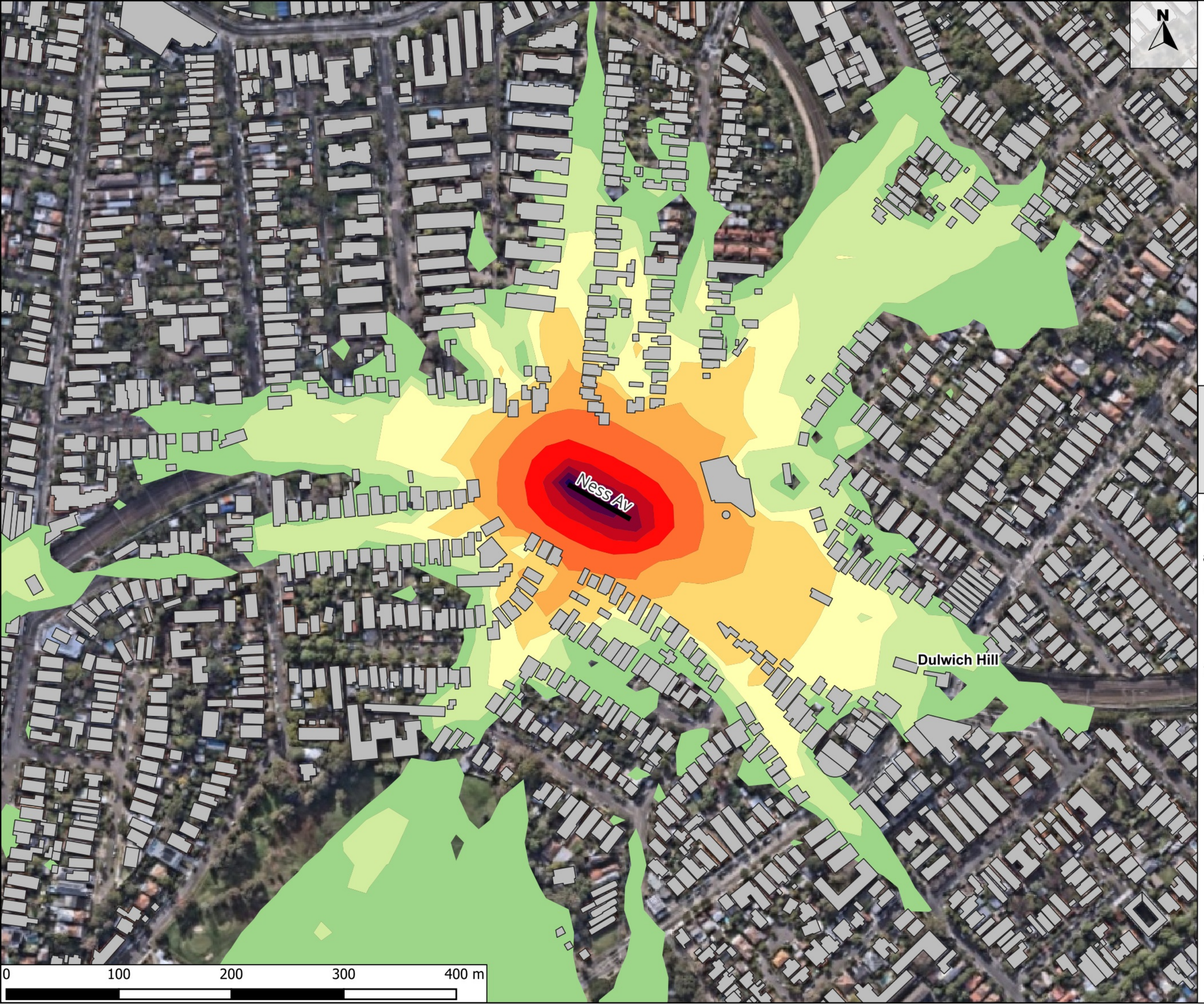

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Work Areas

Noise Contour

- <40 dBA
- 40-45 dBA
- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
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- 70-75 dBA
- 75-80 dBA
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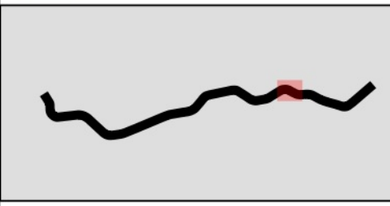
- 85-90 dBA
- 90-95 dBA
- >95 dBA



PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Asset upgrades – Bridge Upgrades
Ness Av

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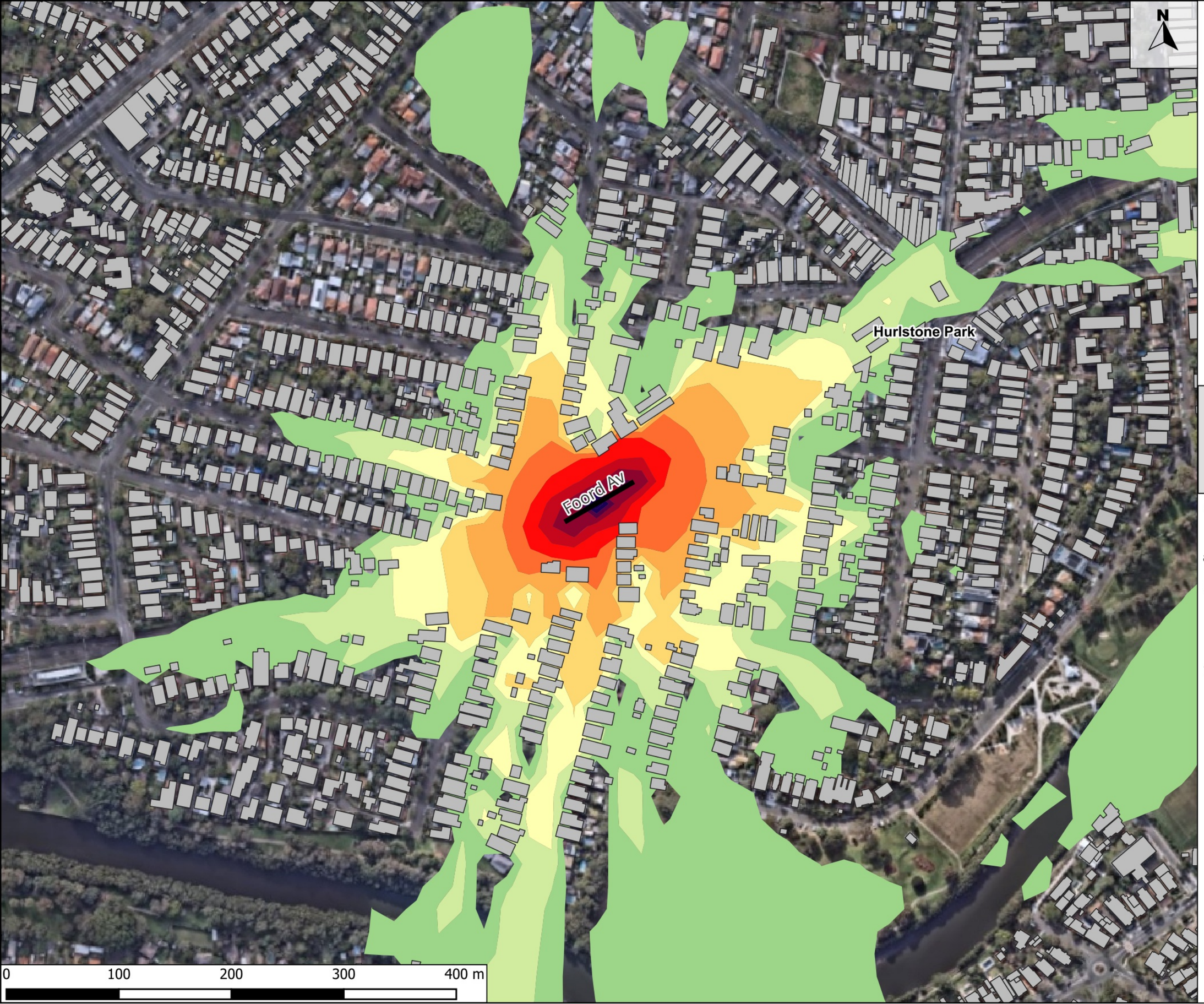

Legend

Work Areas

Noise Contour

- <40 dBA
- 40-45 dBA
- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
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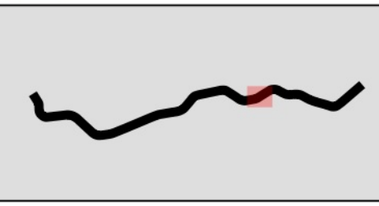
- 90-95 dBA
- >95 dBA



PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Asset upgrades – Bridge Upgrades Foord Av

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Legend

Work Areas

Noise Contour

- <40 dBA
- 40-45 dBA
- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
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- 70-75 dBA
- 75-80 dBA
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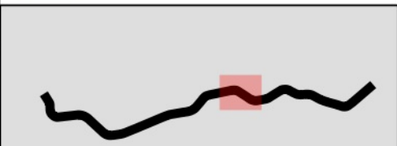
- 85-90 dBA
- 90-95 dBA
- >95 dBA



PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Asset upgrades – Bridge Upgrades Charles St

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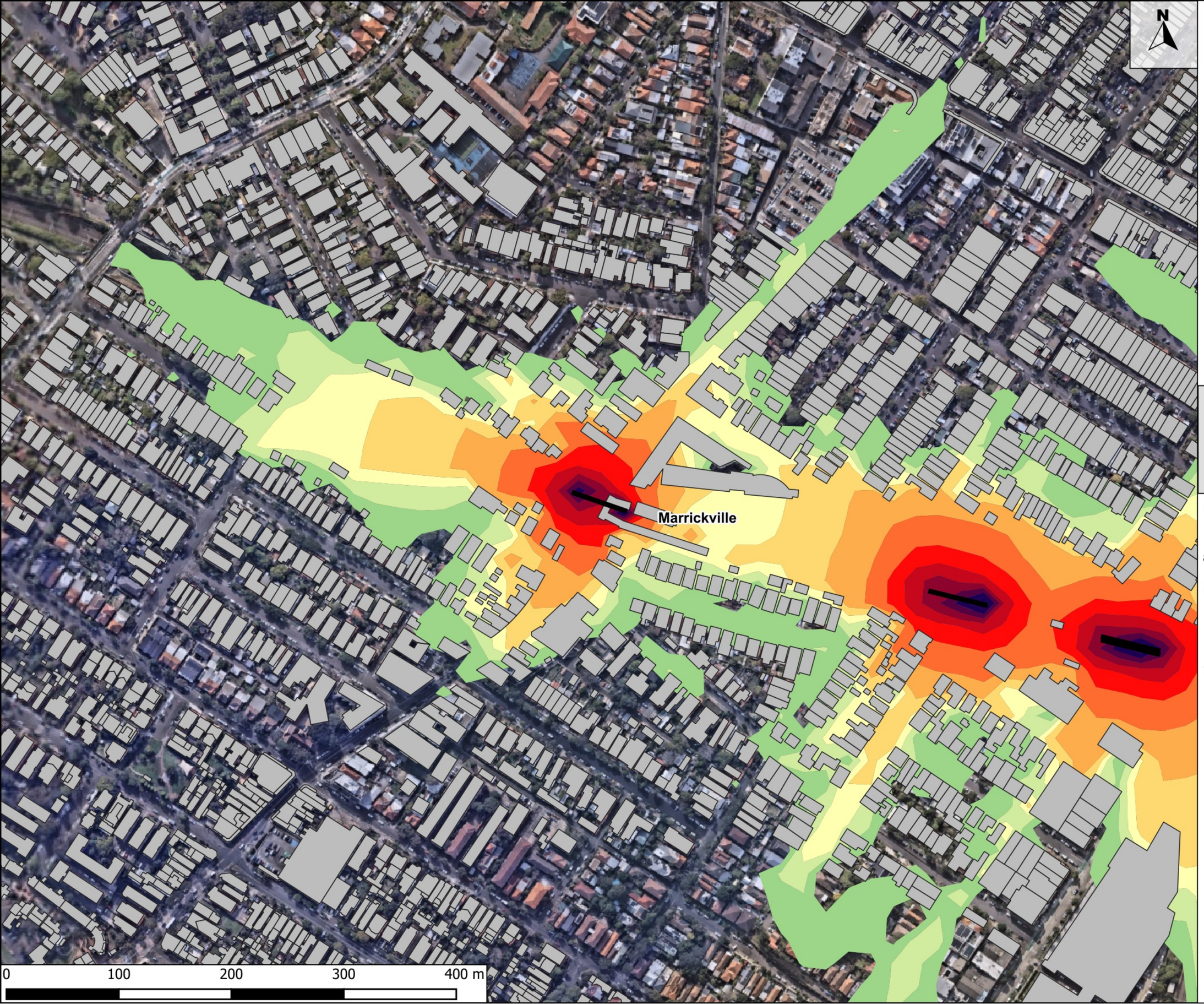

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Work Areas

Noise Contour

- <40 dBA
- 40-45 dBA
- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Asset upgrades – Bridge Upgrades
M24 Sewer

PROJECT No.:	REVISION:
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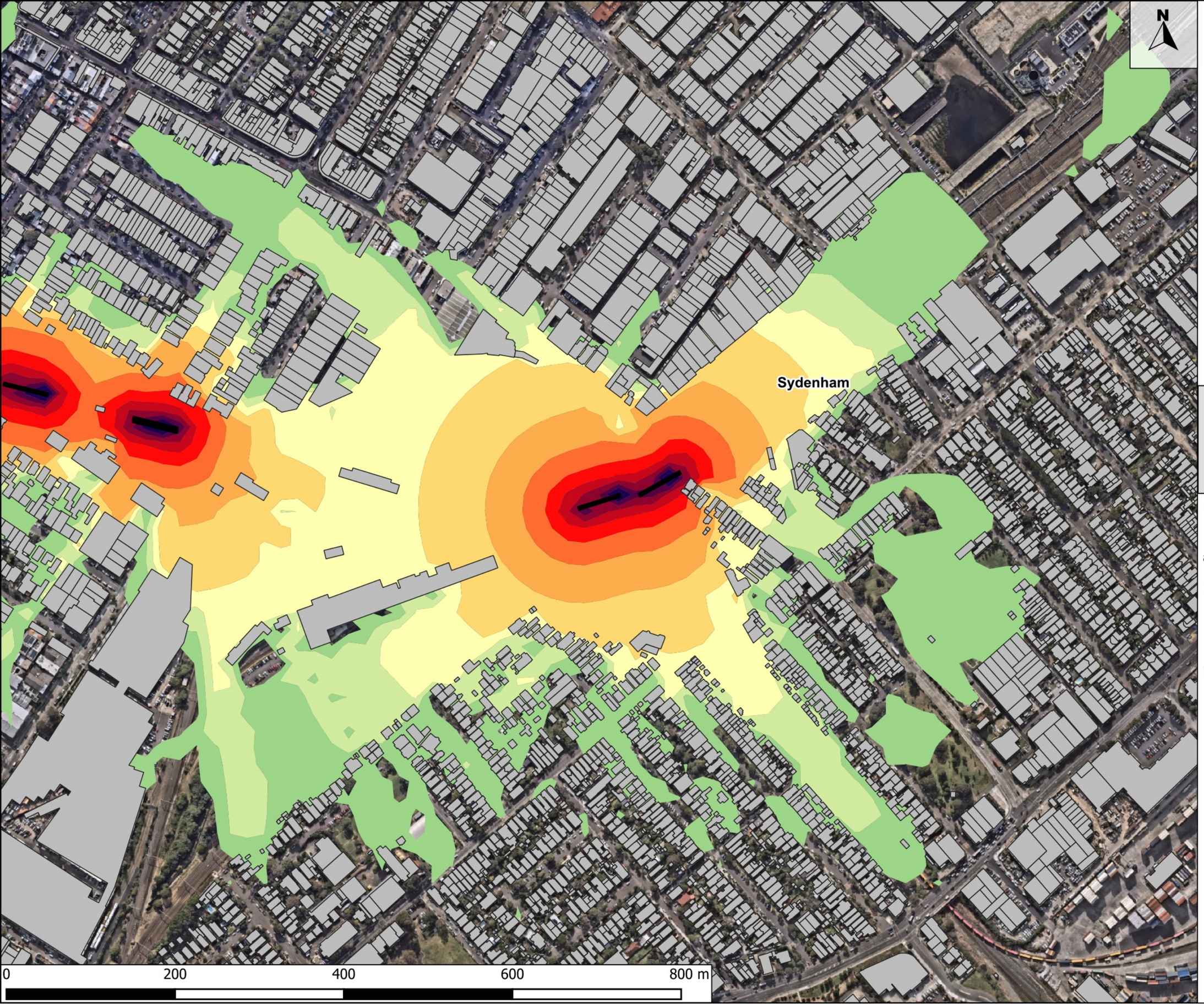

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Work Areas

Noise Contour

- <40 dBA
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- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Asset upgrades – Bridge Upgrades
Sydenham Canal

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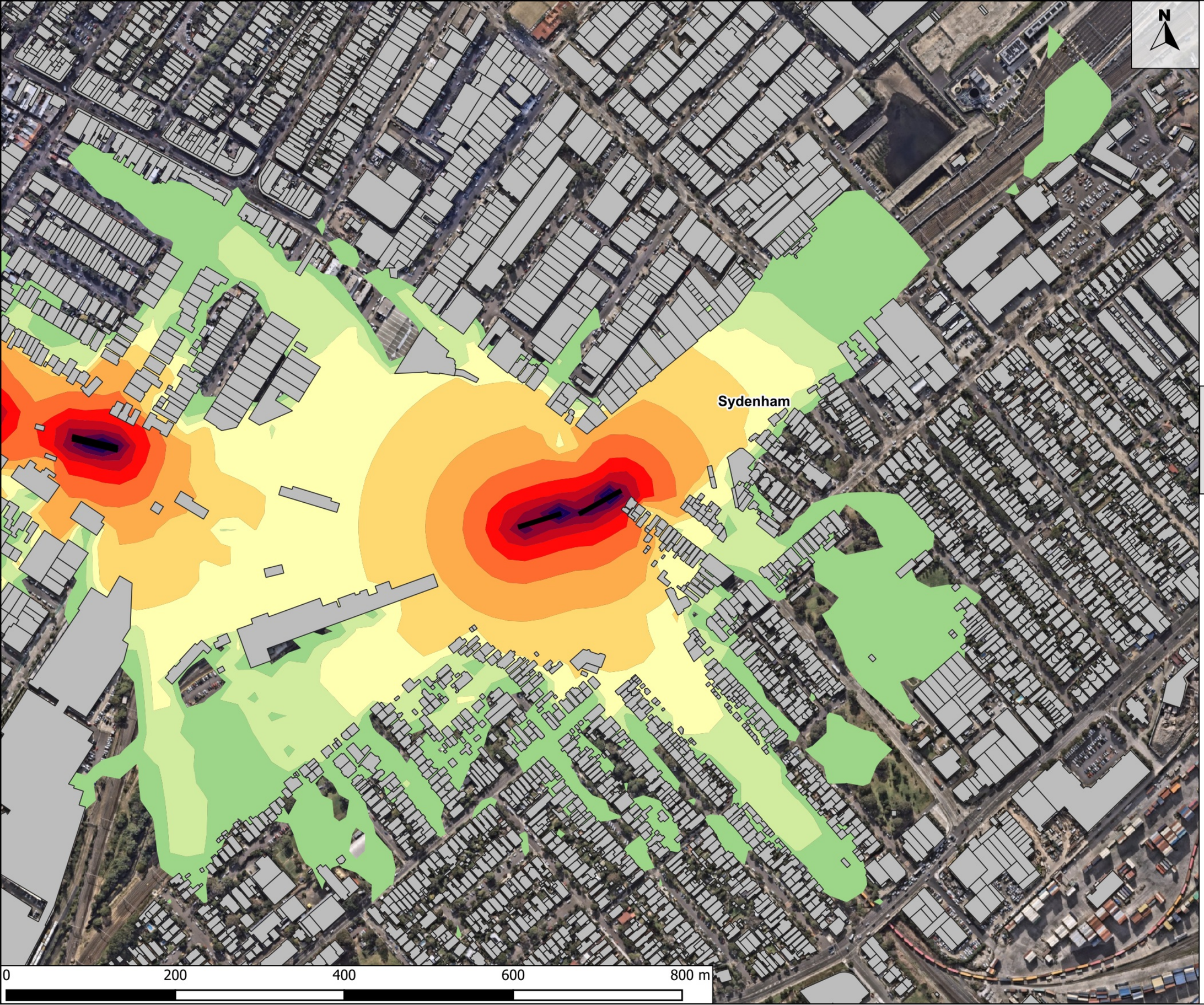

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Work Areas

Noise Contour

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- 40-45 dBA
- 45-50 dBA
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- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Asset upgrades – Bridge Upgrades
548 Freight Flyover

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N

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

Sydenham

0 300 600 900 1,200 m

PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Asset upgrades – Civil Assets

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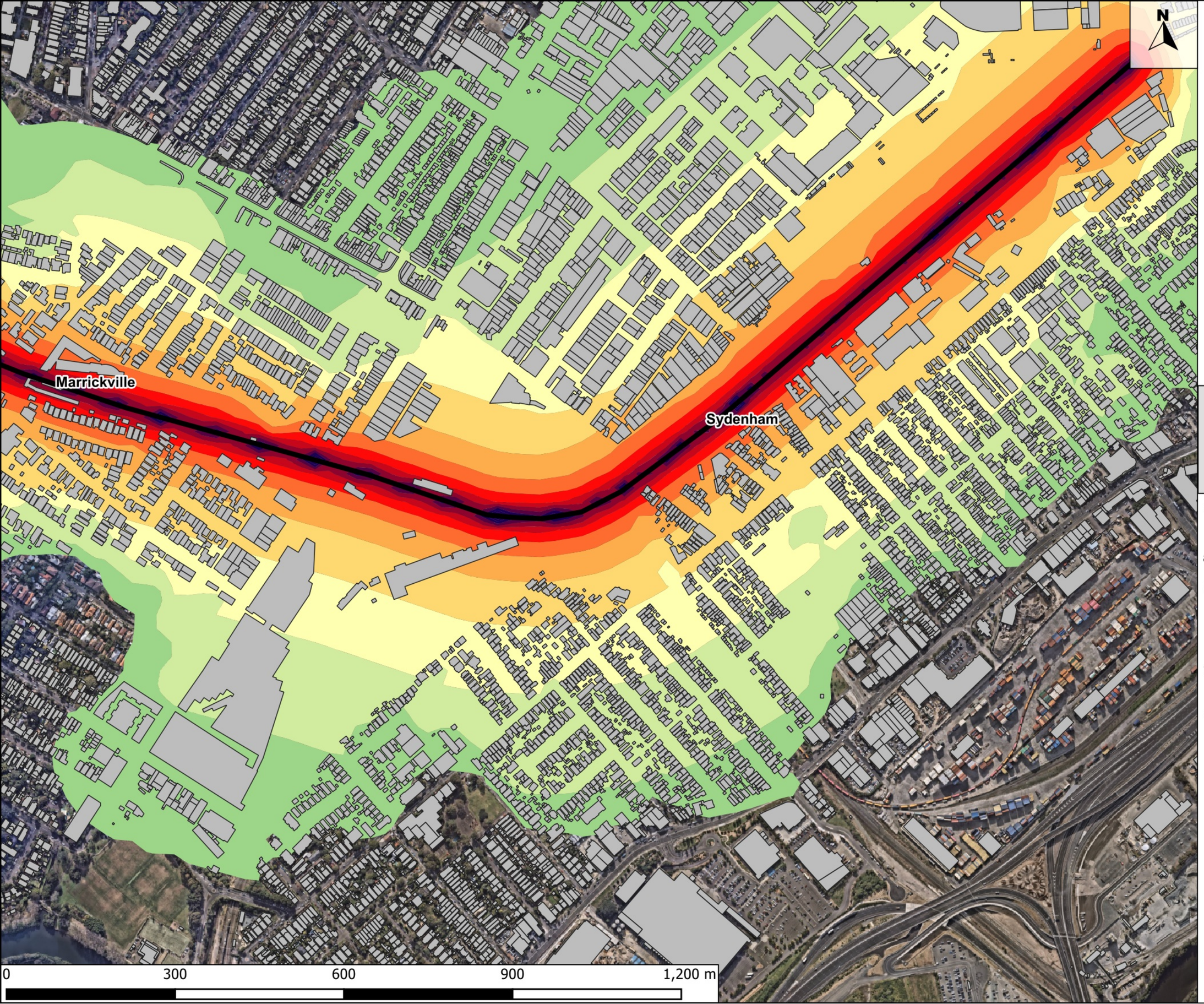

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Work Areas

Noise Contour

- 45-50 dBA
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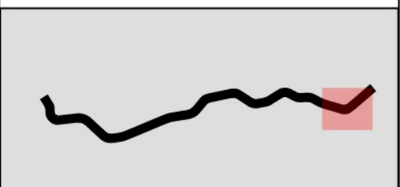
- >95 dBA



PROJECT:

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PREPARED FOR:

S2B JHLORJV

TITLE:

Asset upgrades – Civil Assets

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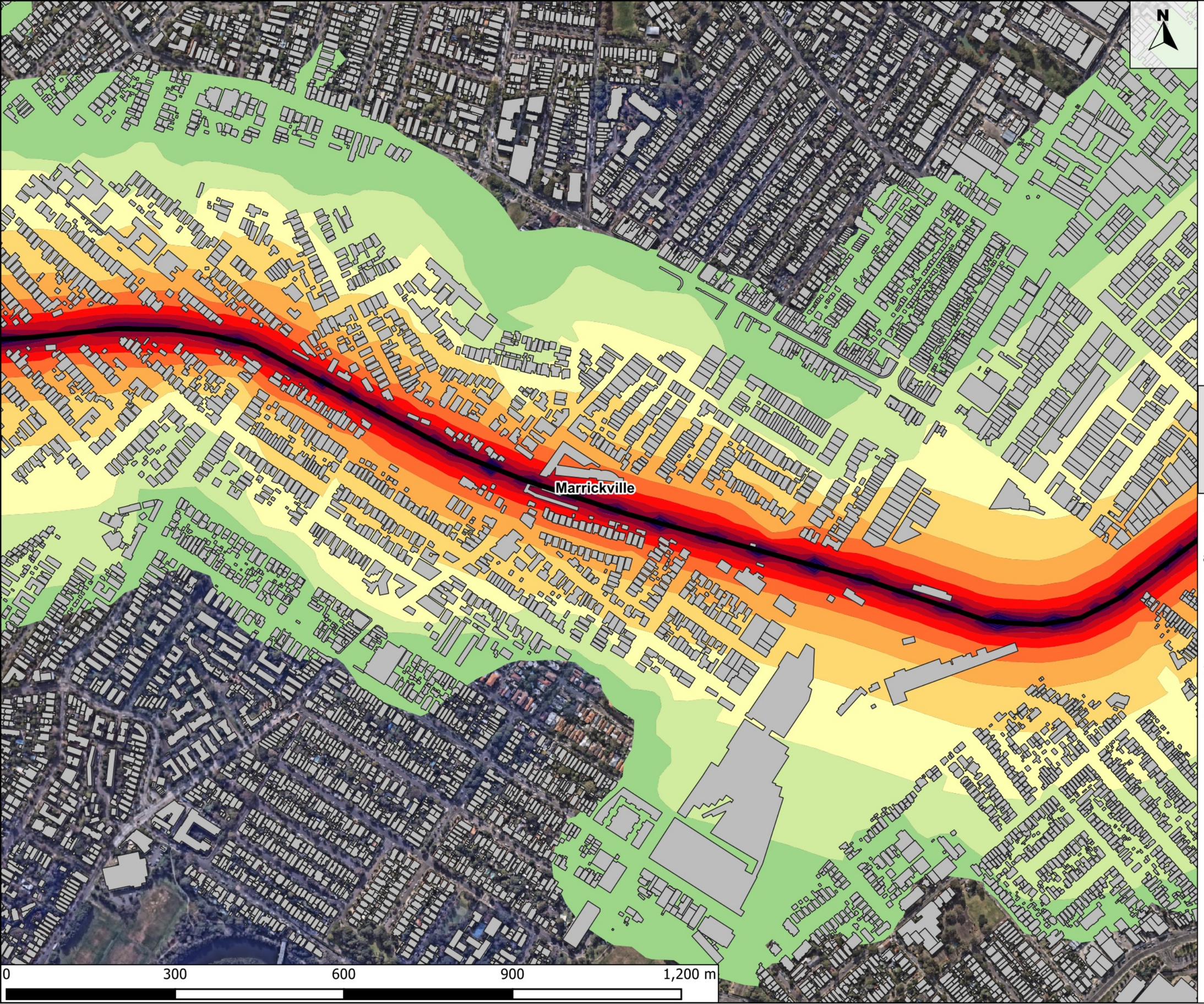

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Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
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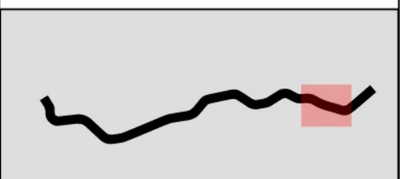
- 90-95 dBA
- >95 dBA



PROJECT:

Southwest Metro Conversion and Station Works - Package 3

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S2B JHLORJV

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Asset upgrades – Civil Assets

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Hurlstone Park

Dulwich Hill

Marrickville

0 300 600 900 1,200 m

N

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
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- 85-90 dBA
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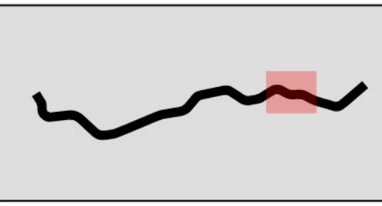
- >95 dBA



PROJECT:

Southwest Metro Conversion and Station Works - Package 3

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Asset upgrades – Civil Assets

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N

Hurlstone Park

Dulwich Hill

0 300 600 900 1,200 m

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
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PROJECT:

Southwest Metro Conversion and Station Works - Package 3

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Asset upgrades – Civil Assets

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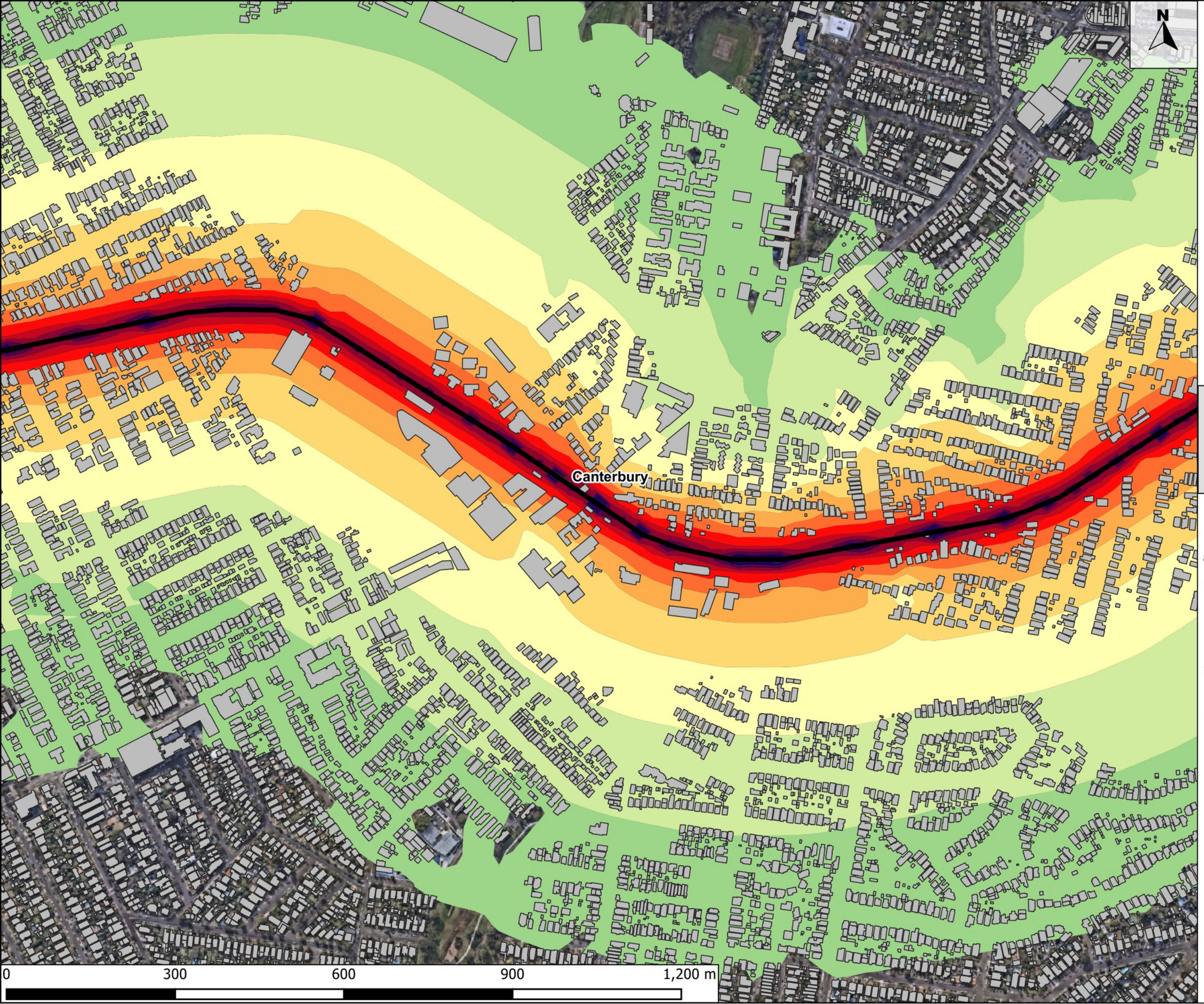

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Work Areas

Noise Contour

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- 50-55 dBA
- 55-60 dBA
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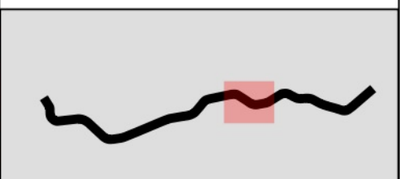

PROJECT:

Southwest Metro Conversion and Station Works - Package 3

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Asset upgrades – Civil Assets

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N

Campsie

Canterbury

0 300 600 900 1,200 m

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

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PREPARED FOR:

S2B JHLORJV

TITLE:

Asset upgrades – Civil Assets

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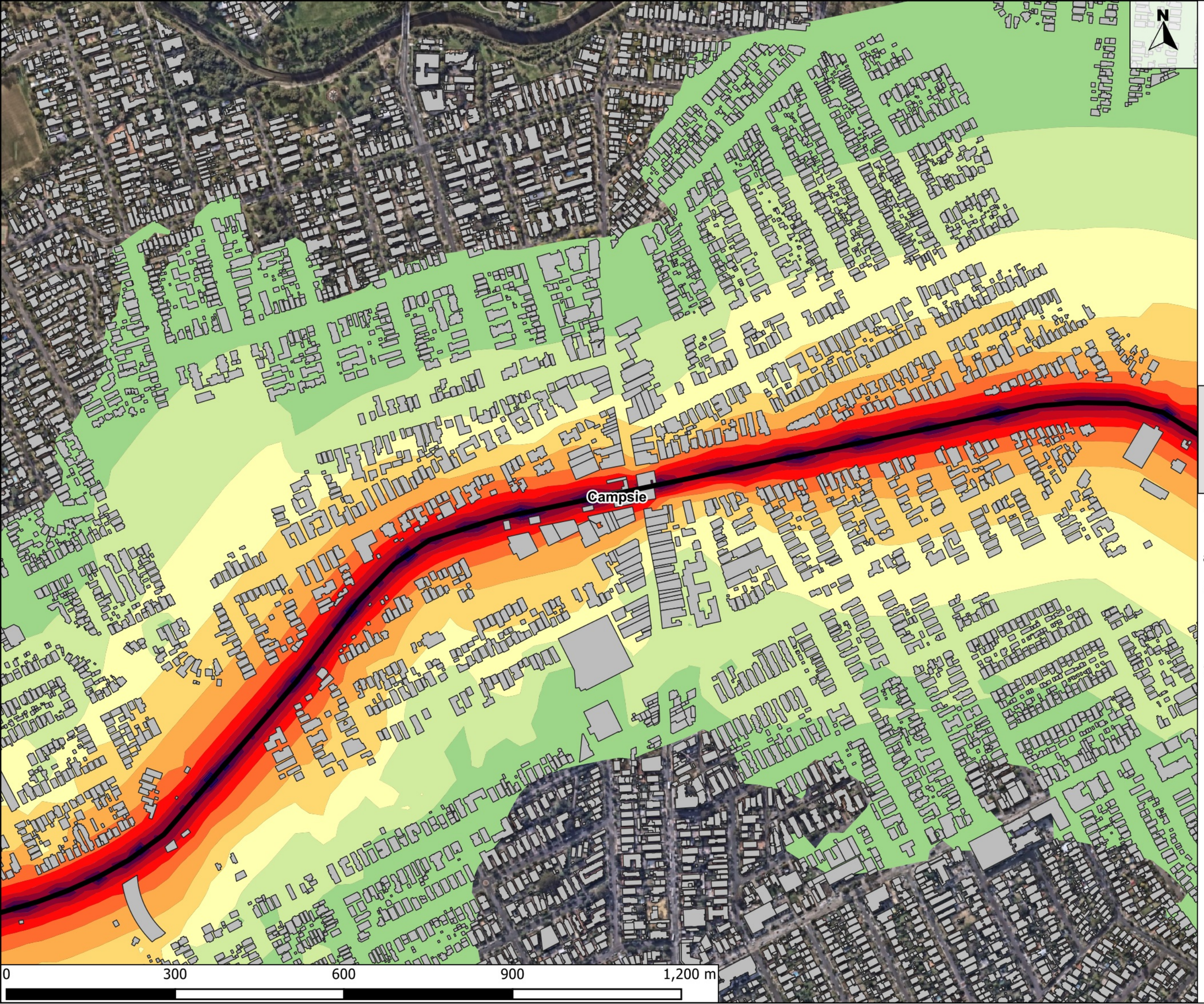

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
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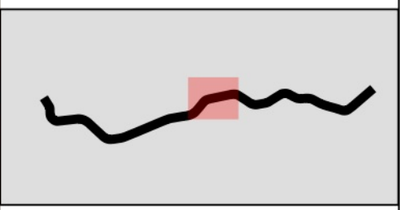
- >95 dBA



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Belmore

0 300 600 900 1,200 m

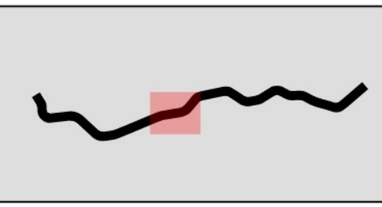
N

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA



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N

Lakemba

Wiley Park

0 300 600 900 1,200 m

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

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N

Lakemba

Wiley Park

0 300 600 900 1,200 m

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
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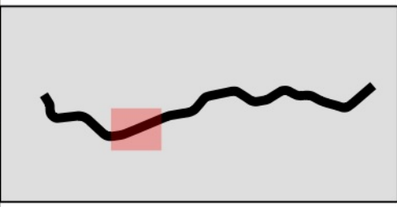
- >95 dBA



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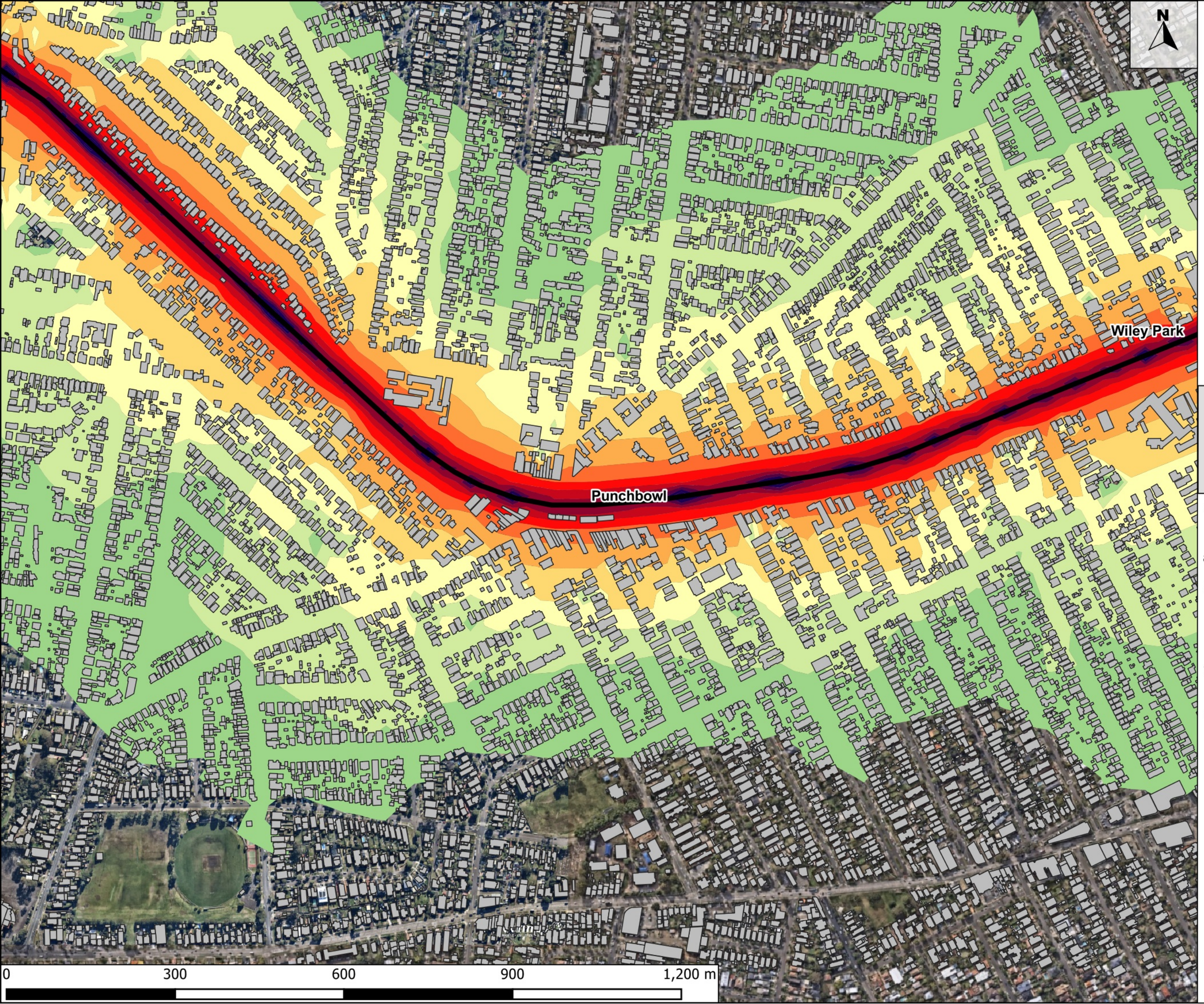

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
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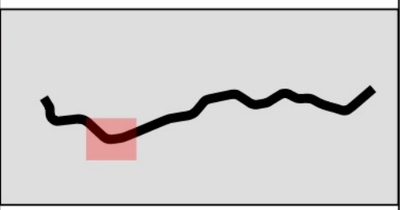
- 90-95 dBA
- >95 dBA



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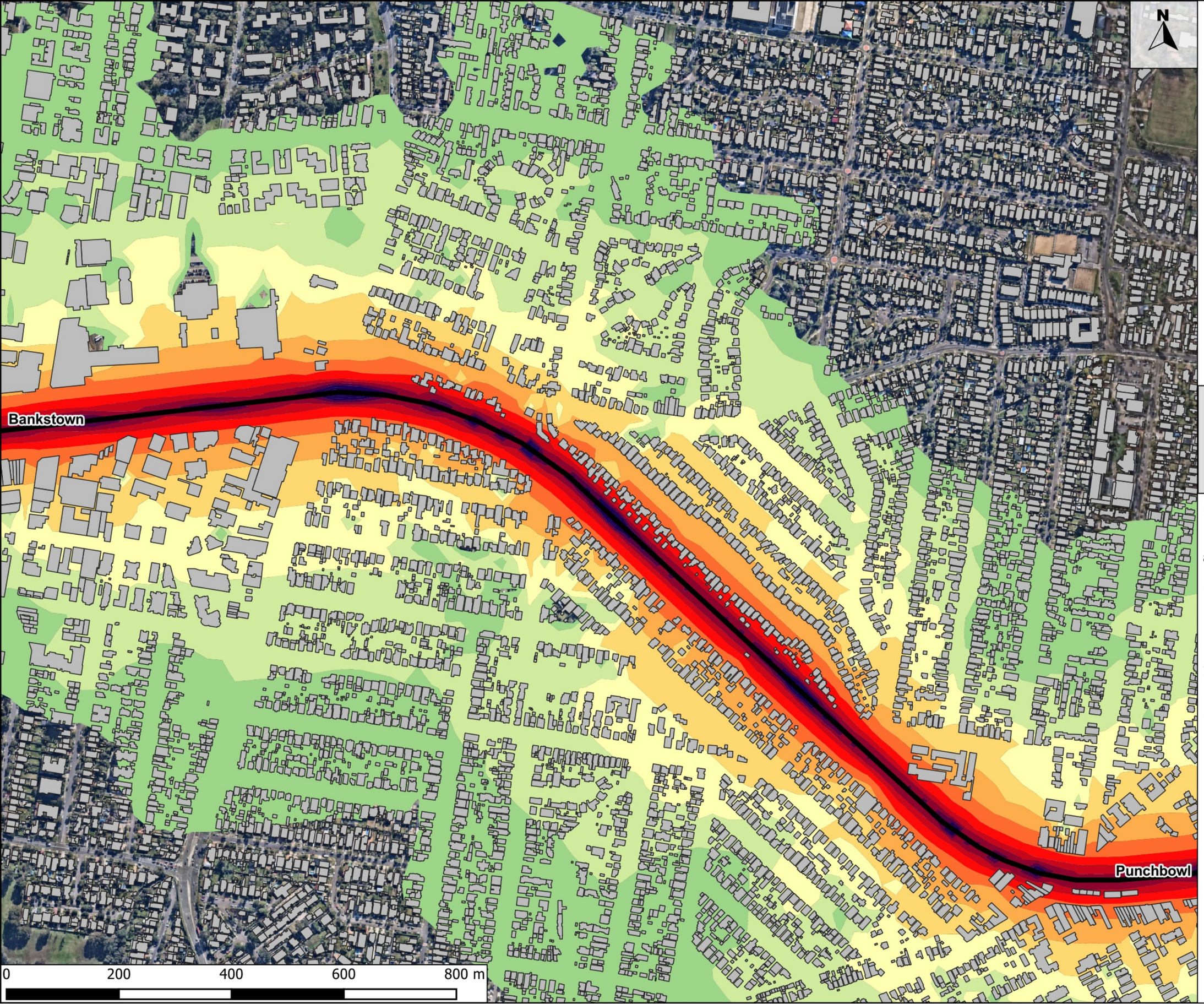

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Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
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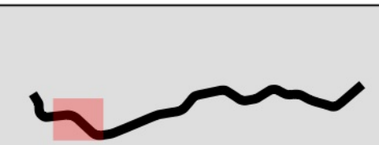
- 90-95 dBA
- >95 dBA



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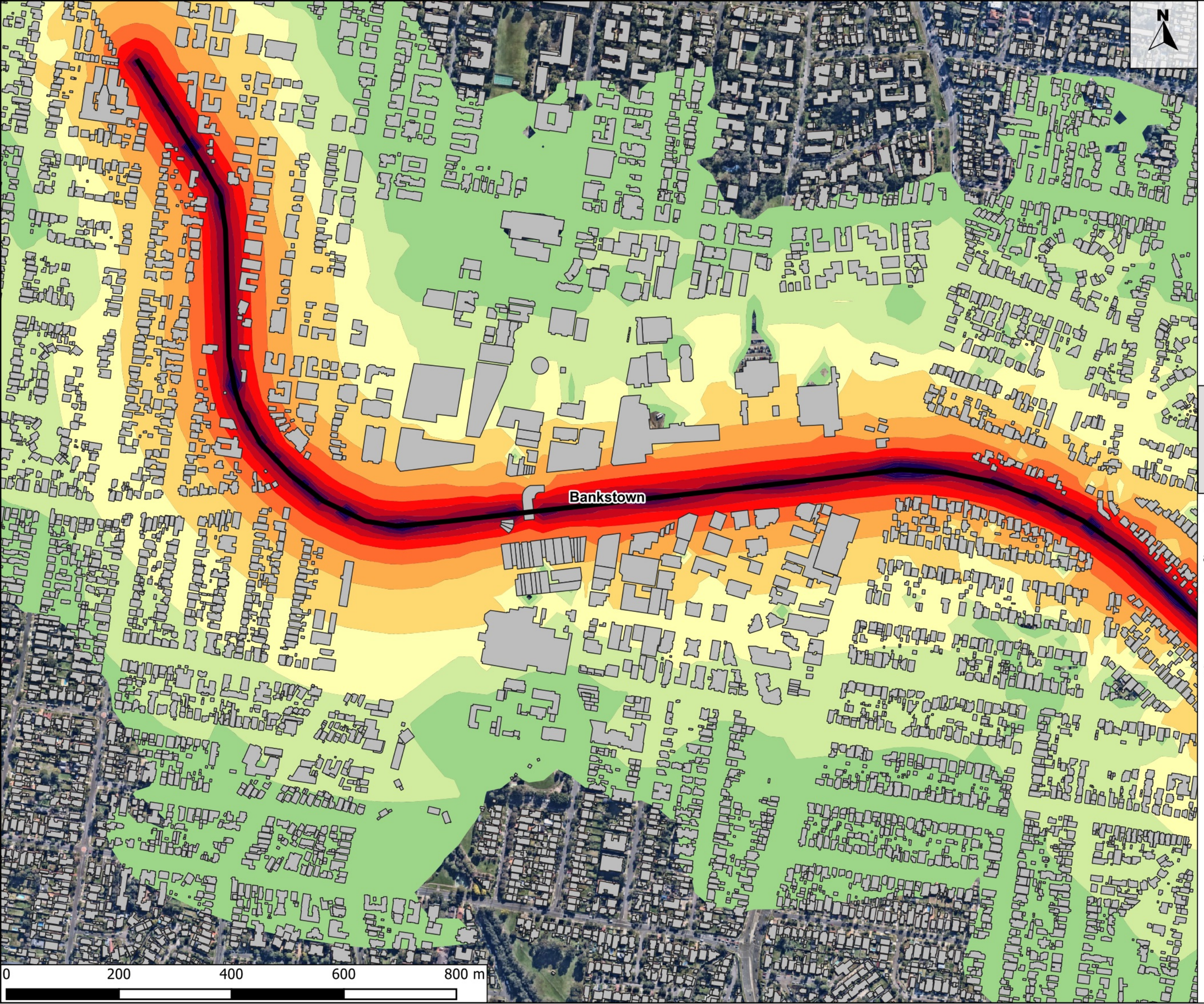

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Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
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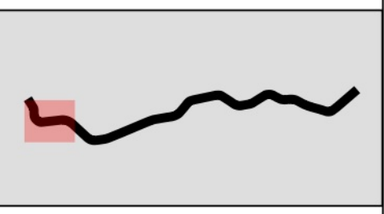

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N

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

Bankstown

0 200 400 600 800 m

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N

Sydenham

0 300 600 900 1,200 m

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

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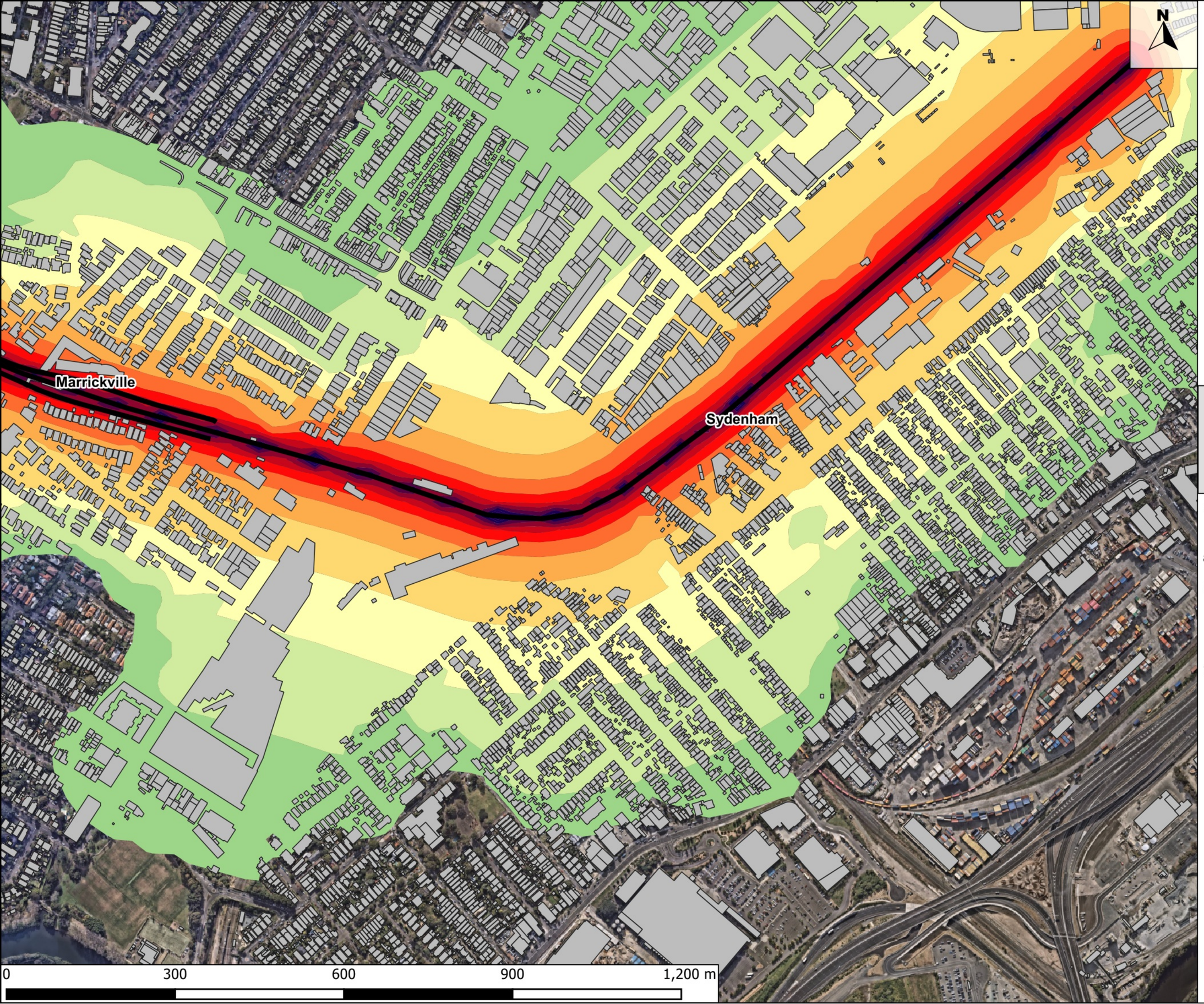

Legend

- Work Areas

Noise Contour

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- 50-55 dBA
- 55-60 dBA
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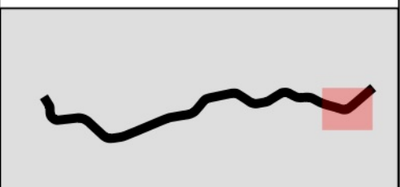
- 90-95 dBA
- >95 dBA



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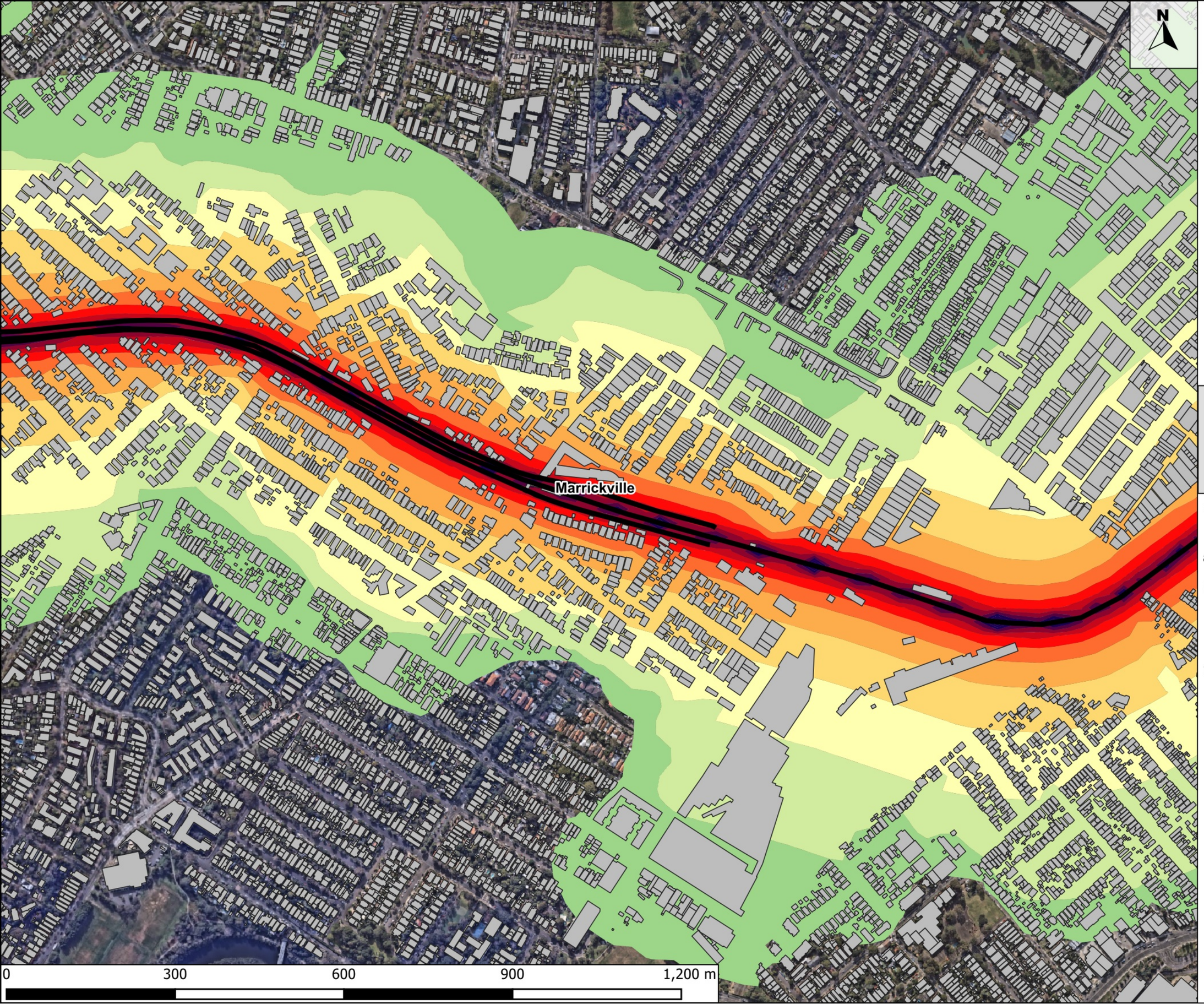

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Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
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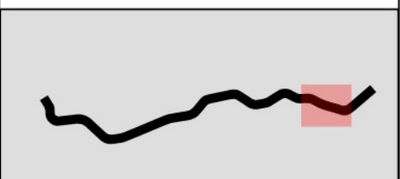
- 90-95 dBA
- >95 dBA



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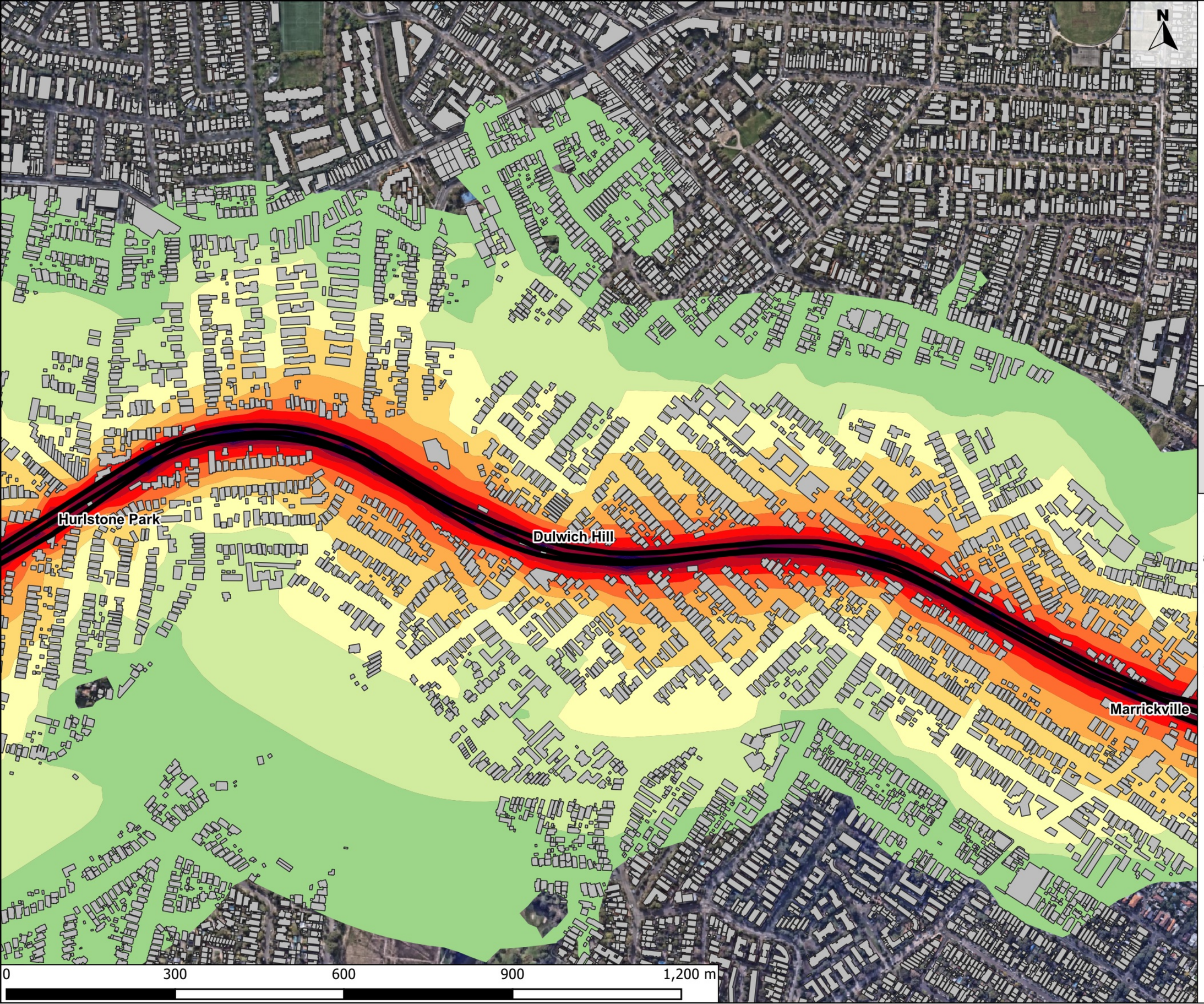

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Work Areas

Noise Contour

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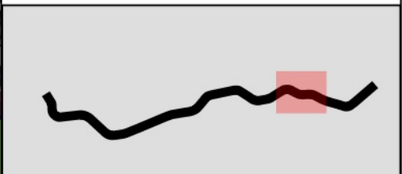
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA



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N

Hurlstone Park

Dulwich Hill

0 300 600 900 1,200 m

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

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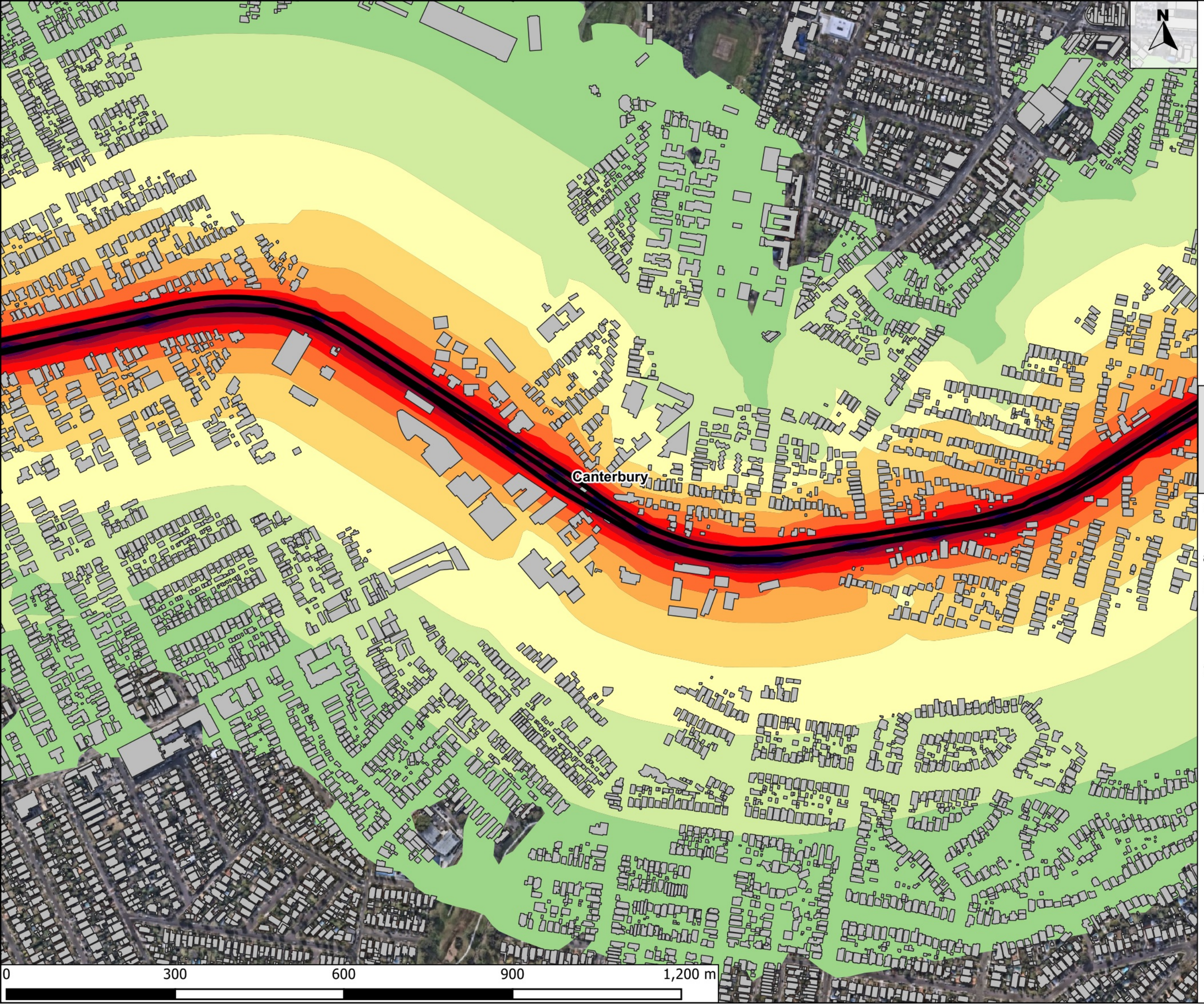

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Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
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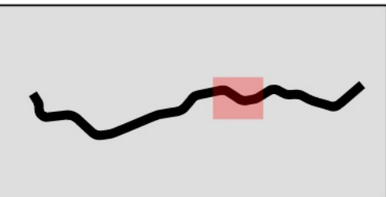
- >95 dBA



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N

Campsie

Canterbury

0 300 600 900 1,200 m

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

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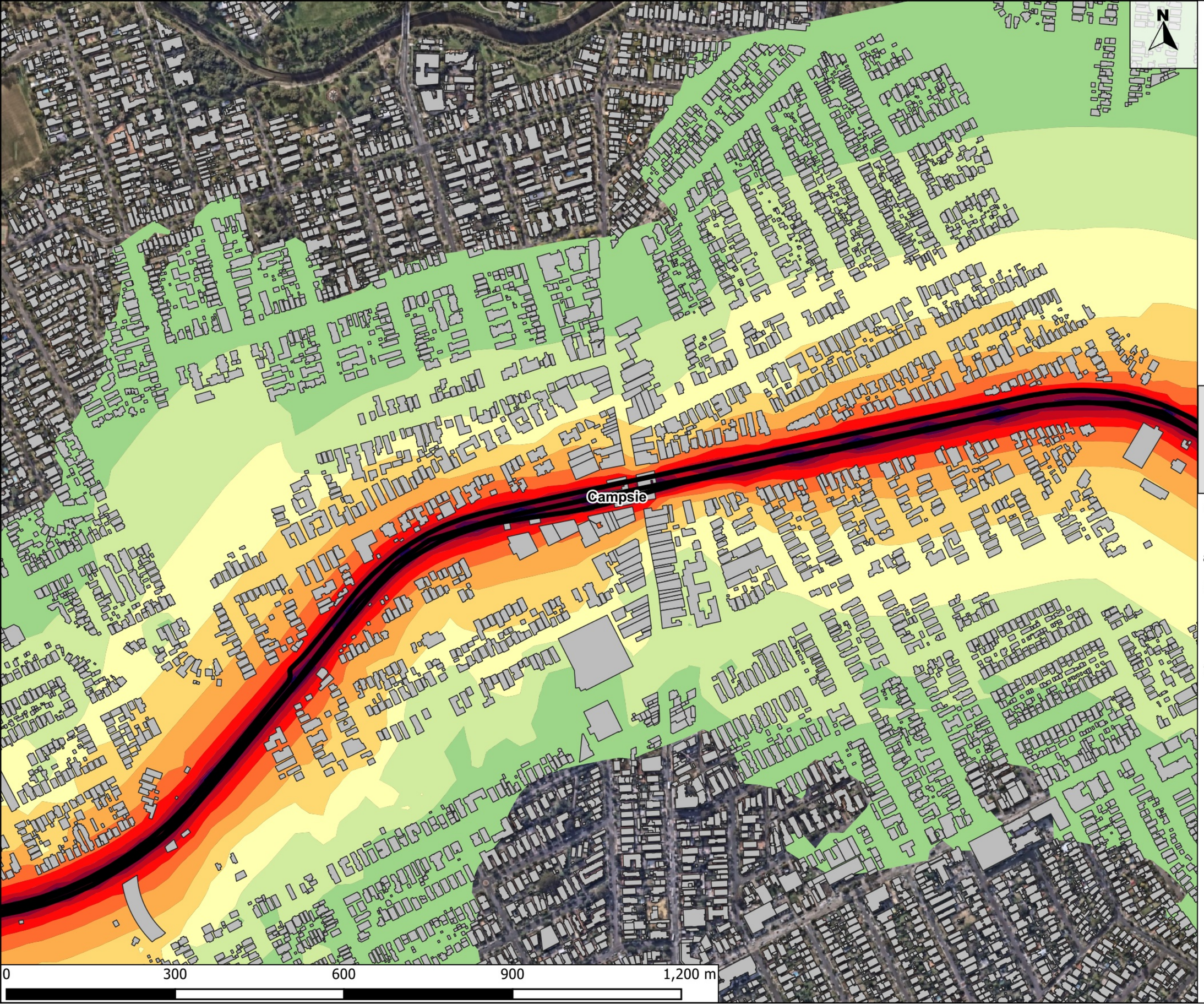

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
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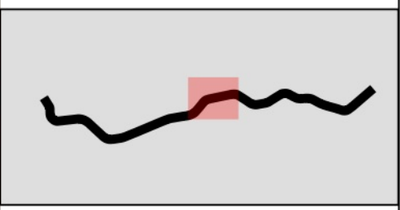
- 90-95 dBA
- >95 dBA



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Belmore

0 300 600 900 1,200 m

N

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
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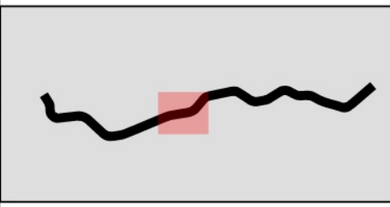

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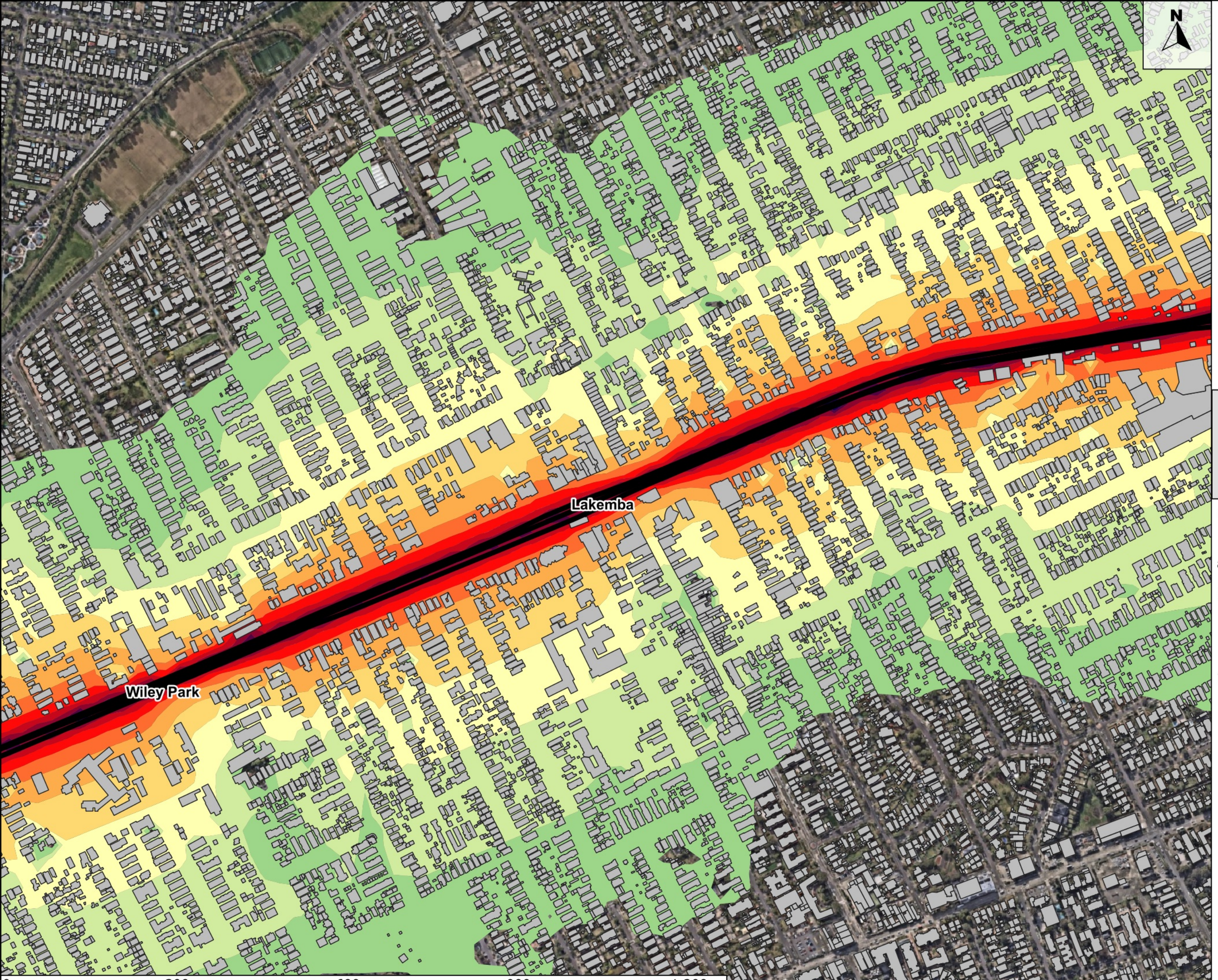

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Work Areas

Noise Contour

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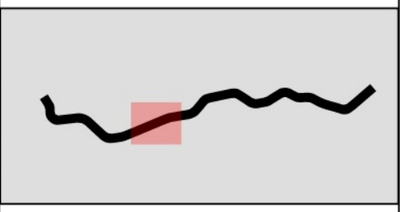

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Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
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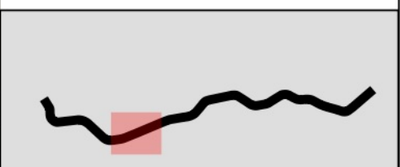

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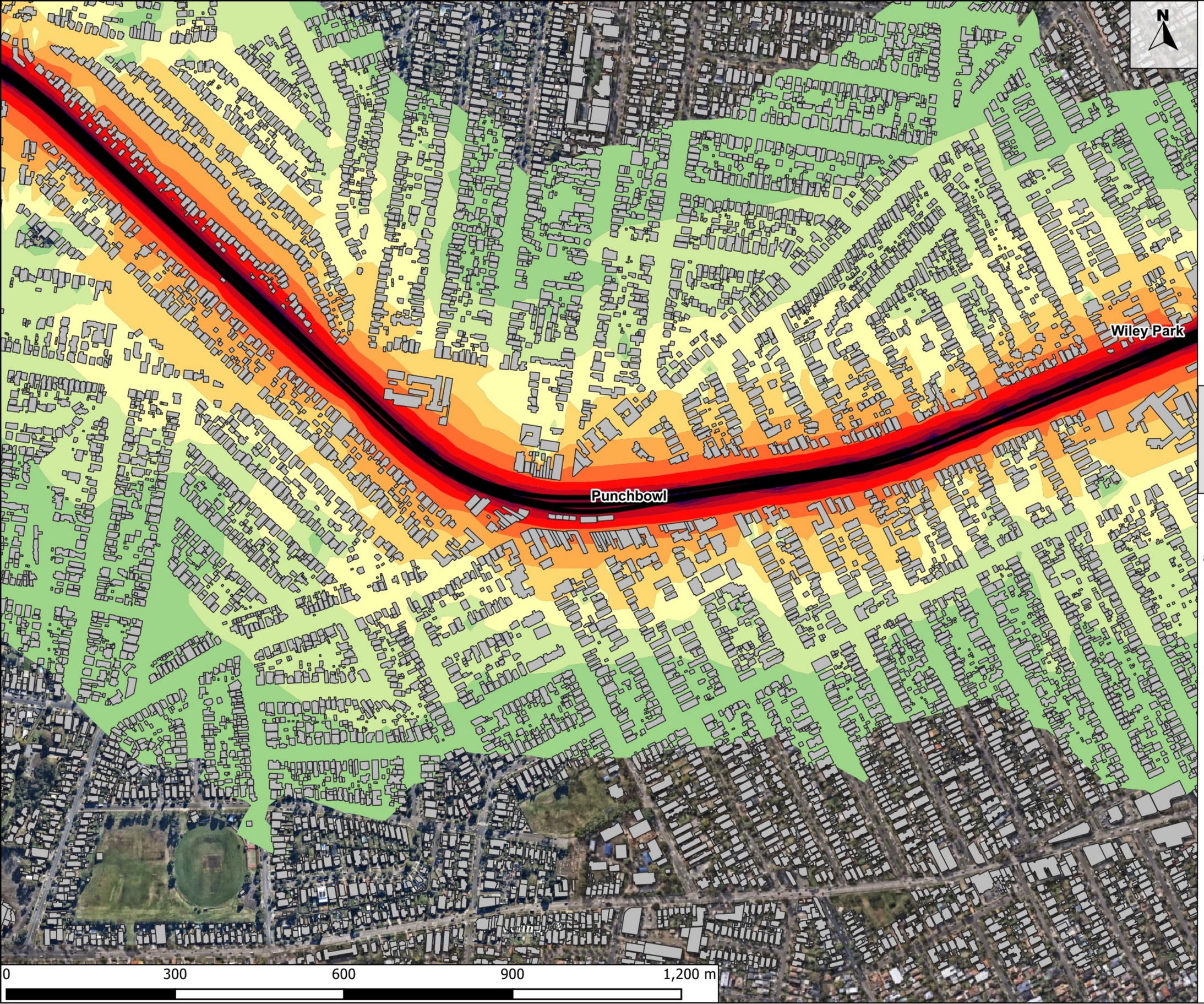

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Work Areas

Noise Contour

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- 50-55 dBA
- 55-60 dBA
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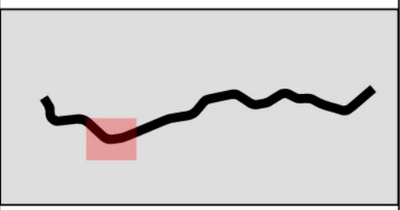

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Bankstown

Punchbowl

0 200 400 600 800 m

N

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Final Conversion

PROJECT No.:	REVISION:
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PT	BL
EXPORTED:	SHEET SIZE:
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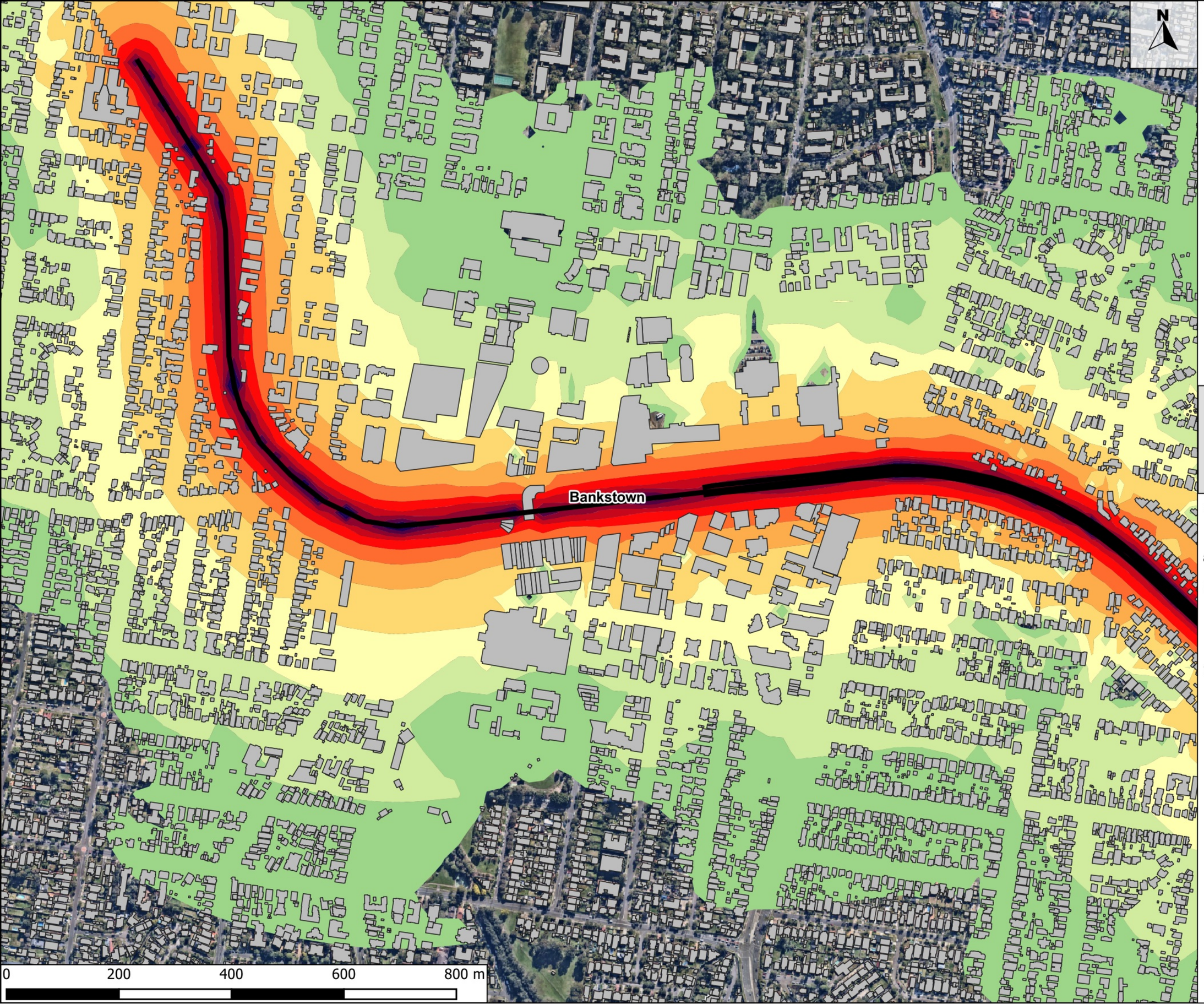
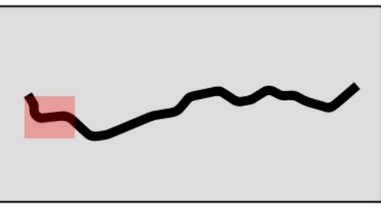


Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA



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S2B JHLORJV

TITLE:

Final Conversion

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N

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

Bankstown

0 200 400 600 800 m

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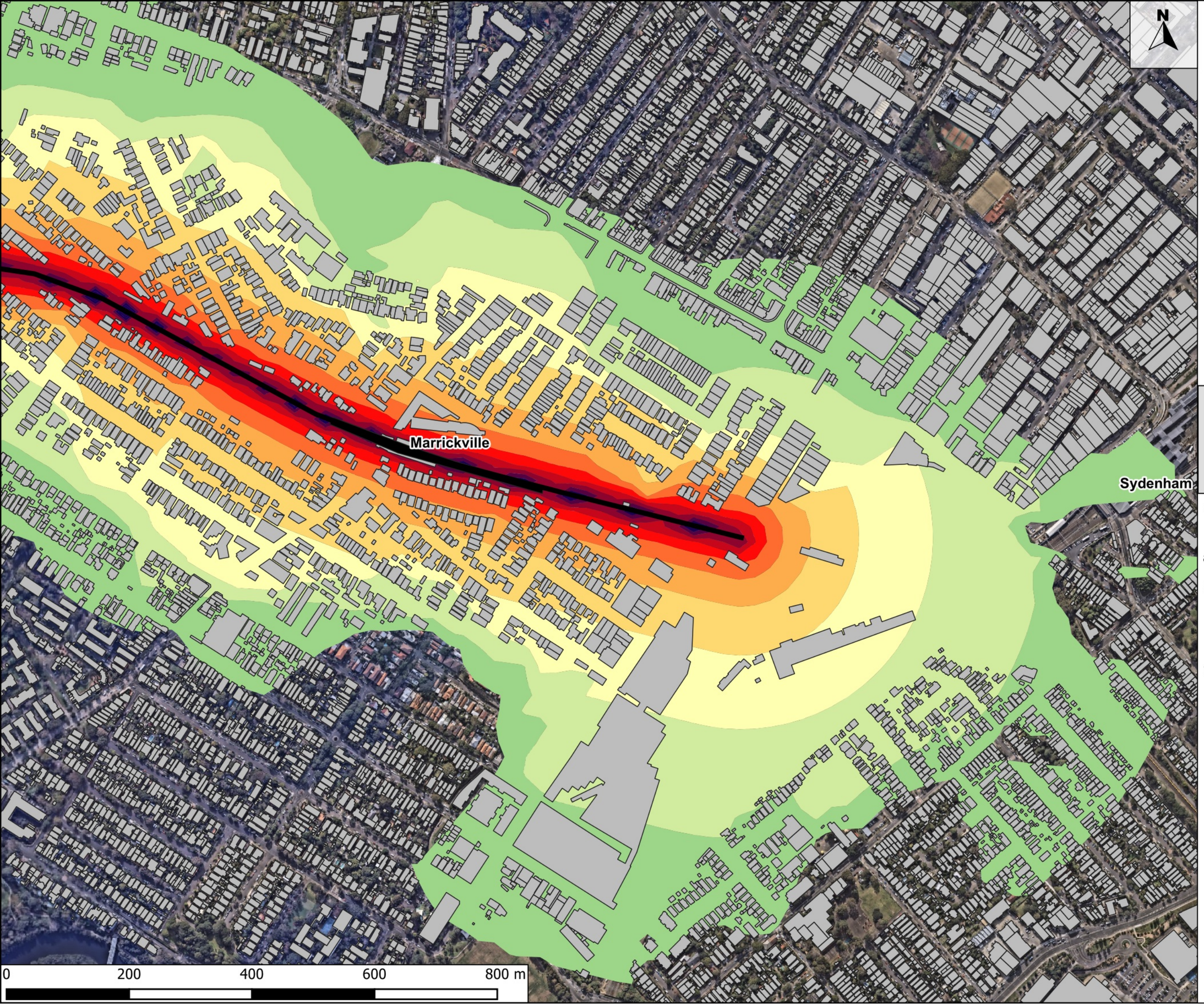

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Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
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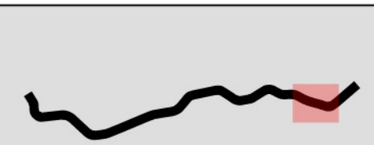
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA



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Dulwich Hill

Marrickville

0 200 400 600 800 m

N

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

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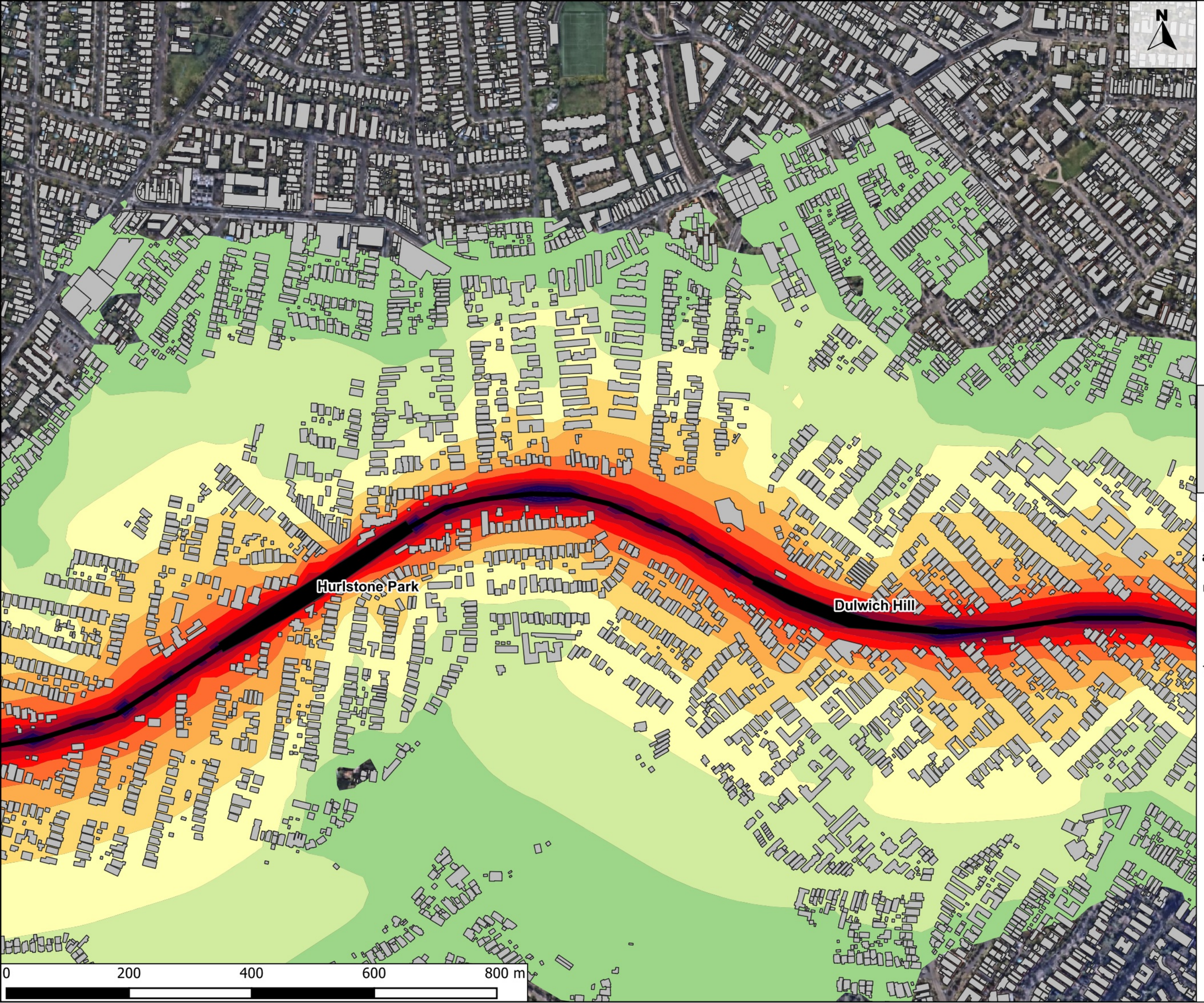

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Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
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- 70-75 dBA
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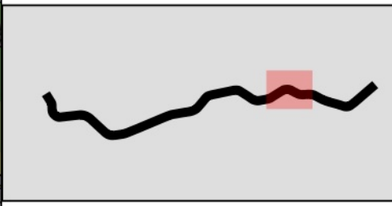
- 90-95 dBA
- >95 dBA



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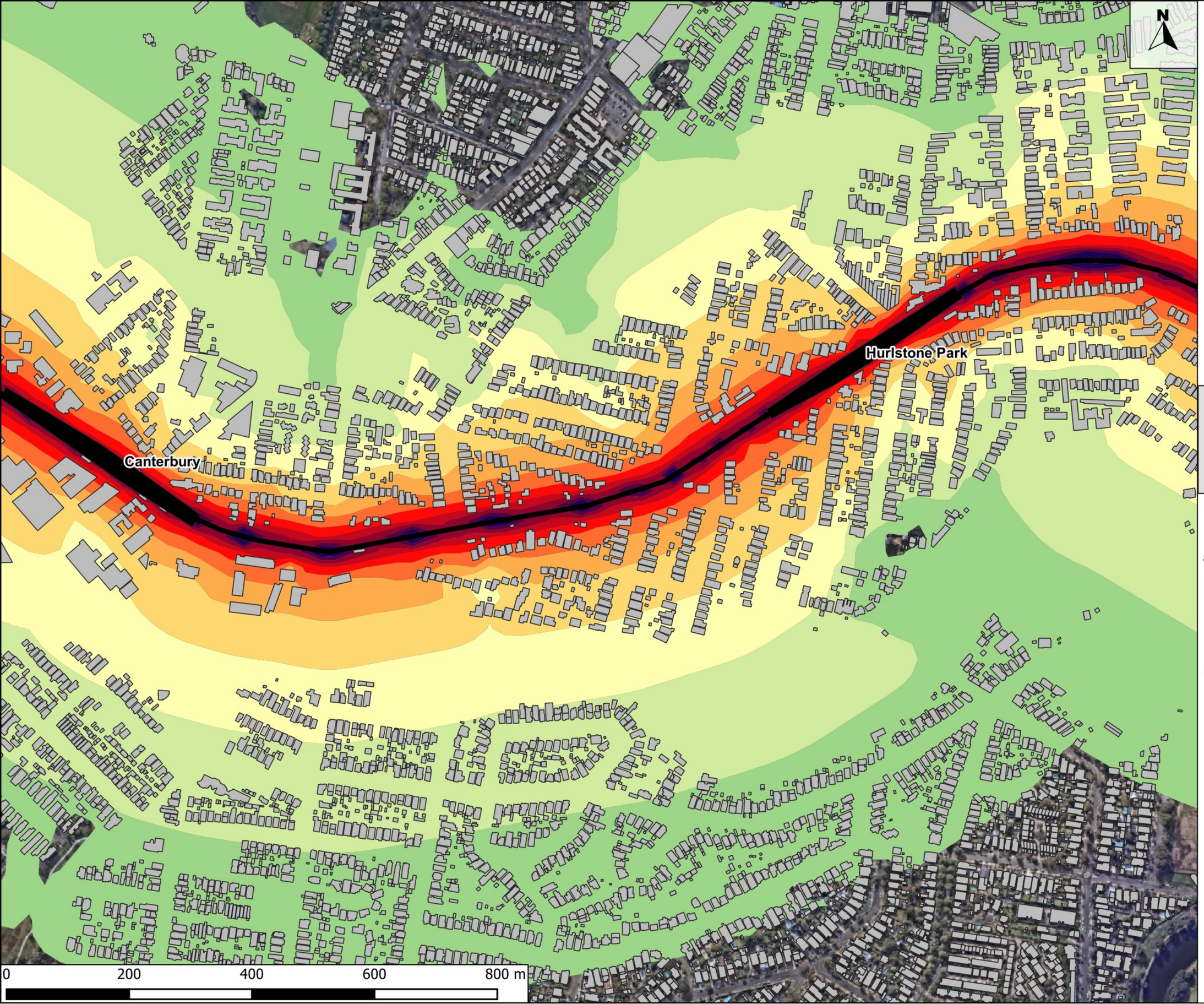

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Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
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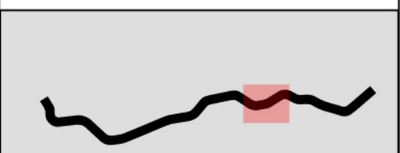
- 90-95 dBA
- >95 dBA



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N

Canterbury

0 200 400 600 800 m

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
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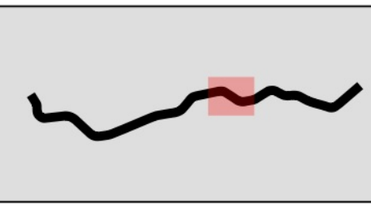
- 90-95 dBA
- >95 dBA



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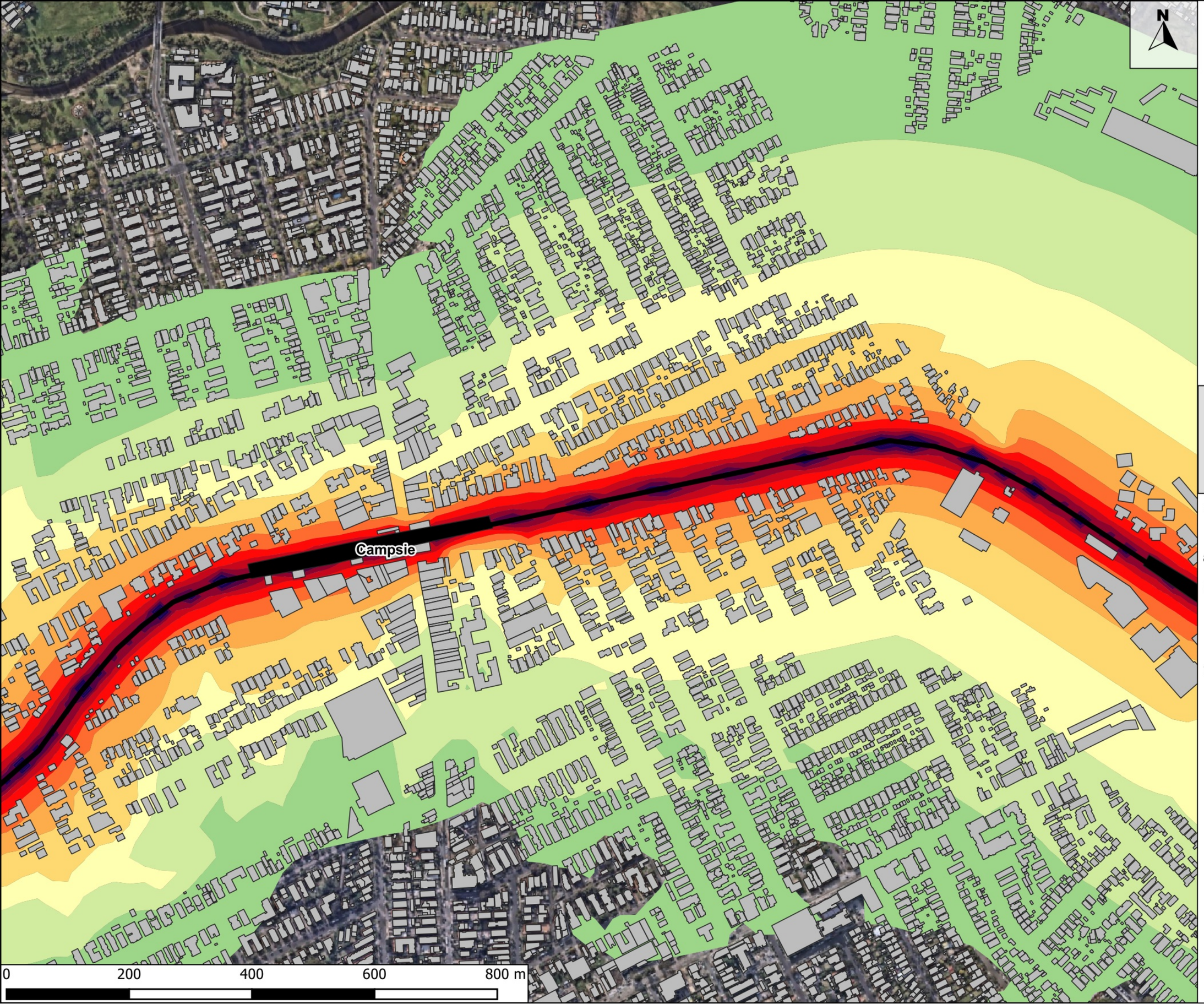

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Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
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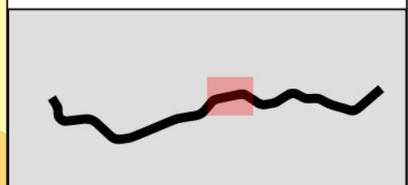
- 90-95 dBA
- >95 dBA



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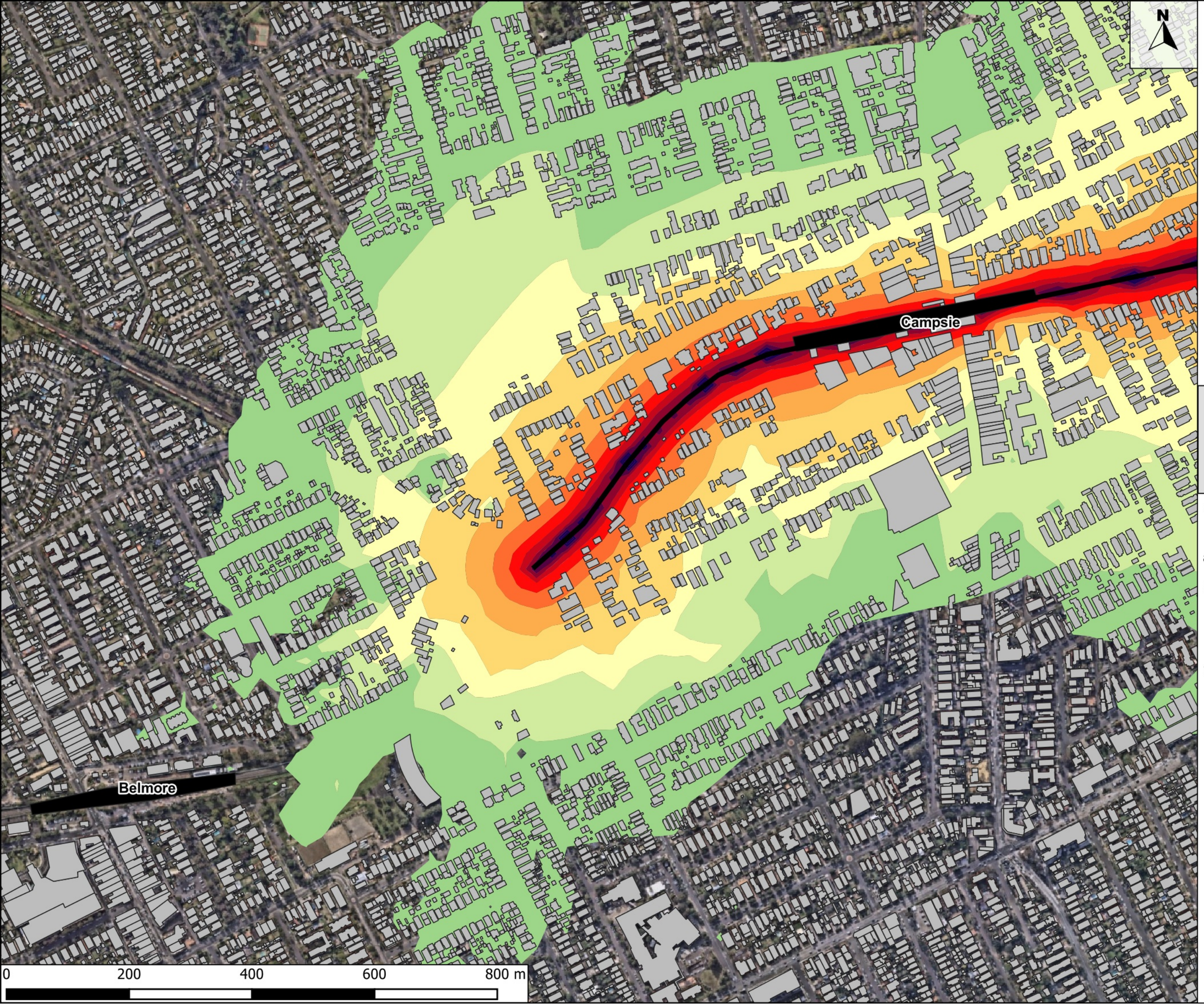

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
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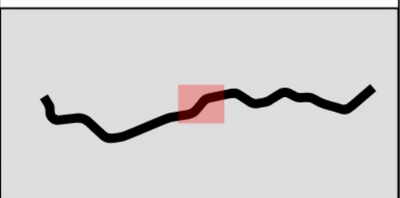
- 90-95 dBA
- >95 dBA



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N

Sydenham

0 300 600 900 1,200 m

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

PROJECT:

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N

Marrickville

Sydenham

0 300 600 900 1,200 m

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

PROJECT:

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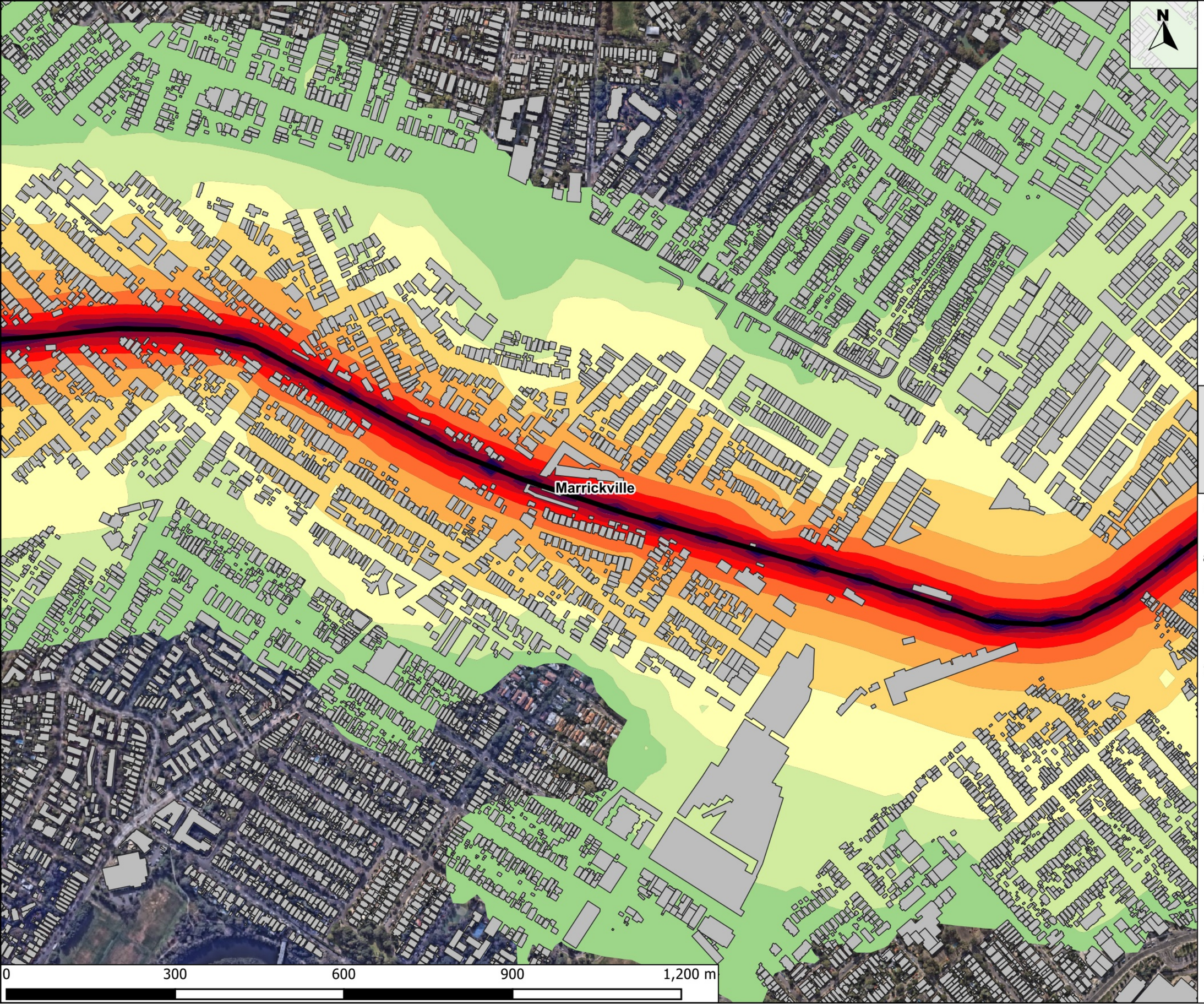

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Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
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- 70-75 dBA
- 75-80 dBA
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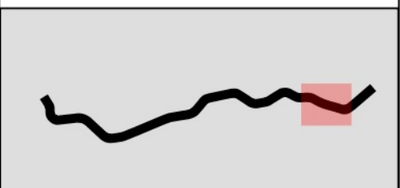
- 85-90 dBA
- 90-95 dBA
- >95 dBA



PROJECT:

Southwest Metro Conversion and Station Works - Package 3

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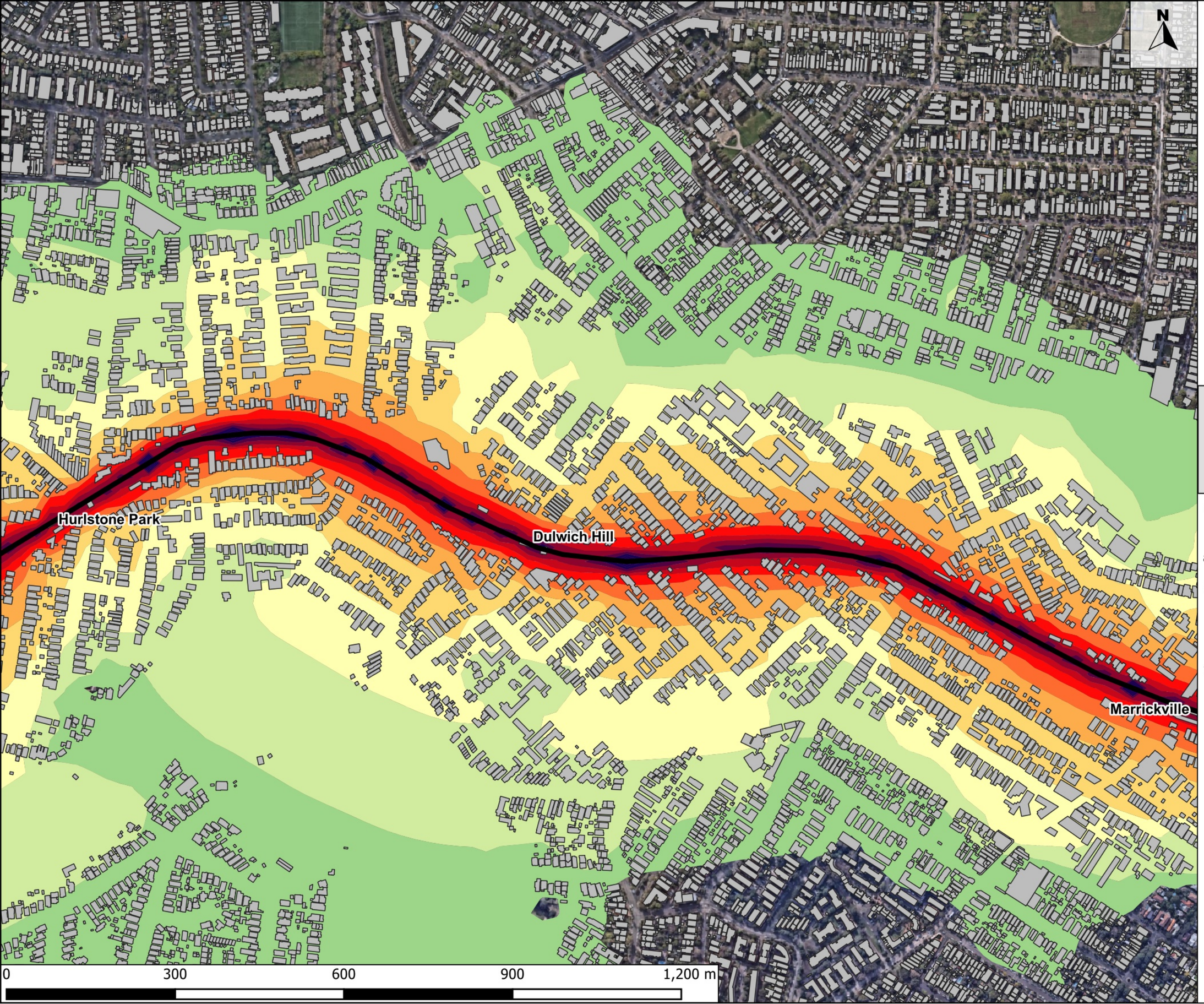

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Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
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- 70-75 dBA
- 75-80 dBA
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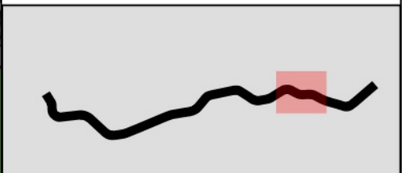
- 85-90 dBA
- 90-95 dBA
- >95 dBA



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N

Hurlstone Park

Dulwich Hill

0 300 600 900 1,200 m

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

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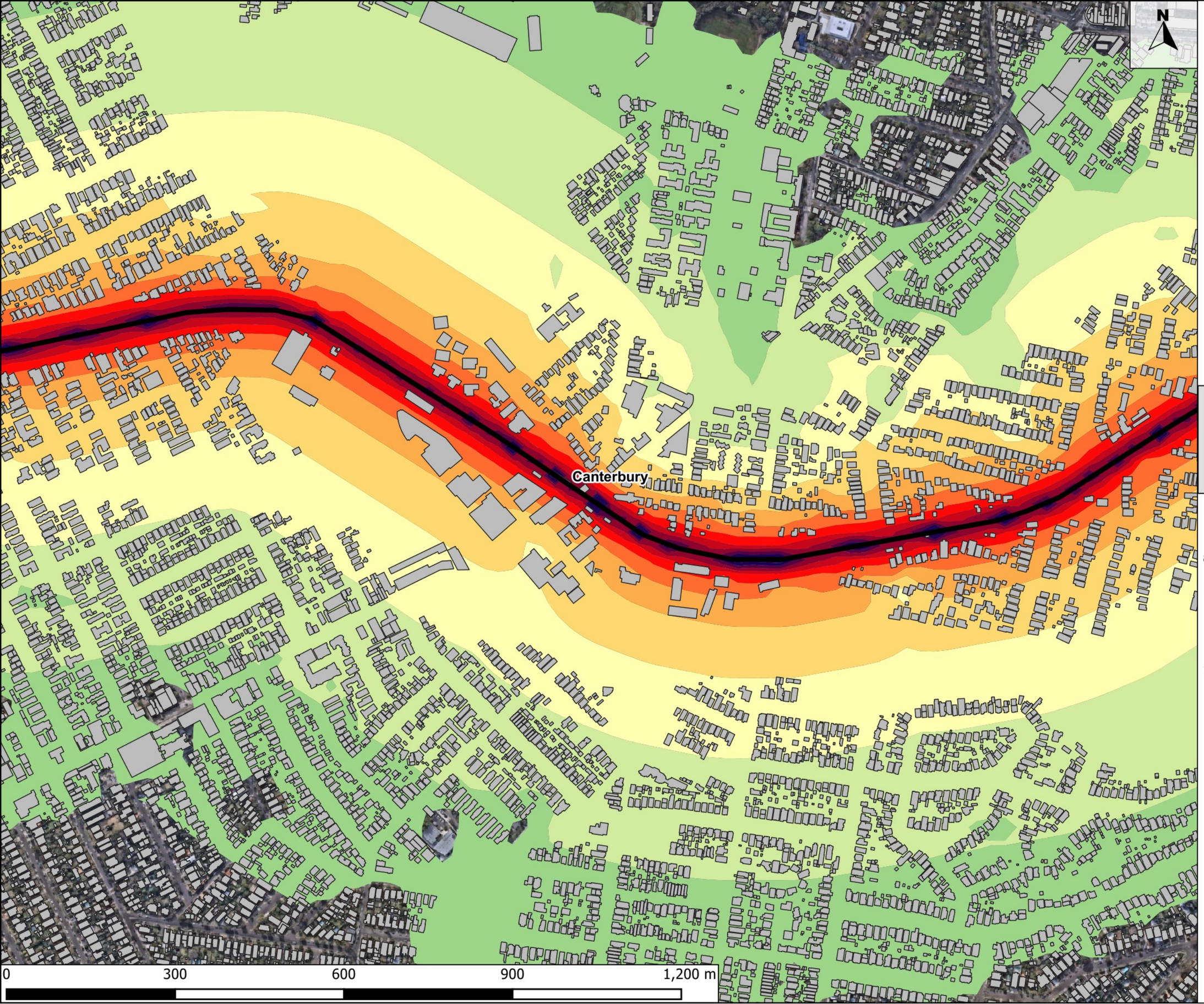

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Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
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- 75-80 dBA
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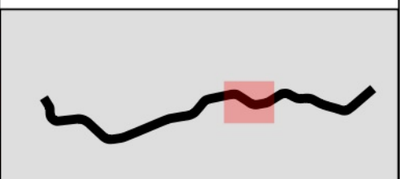
- 90-95 dBA
- >95 dBA



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N

Campsie

Canterbury

0 300 600 900 1,200 m

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

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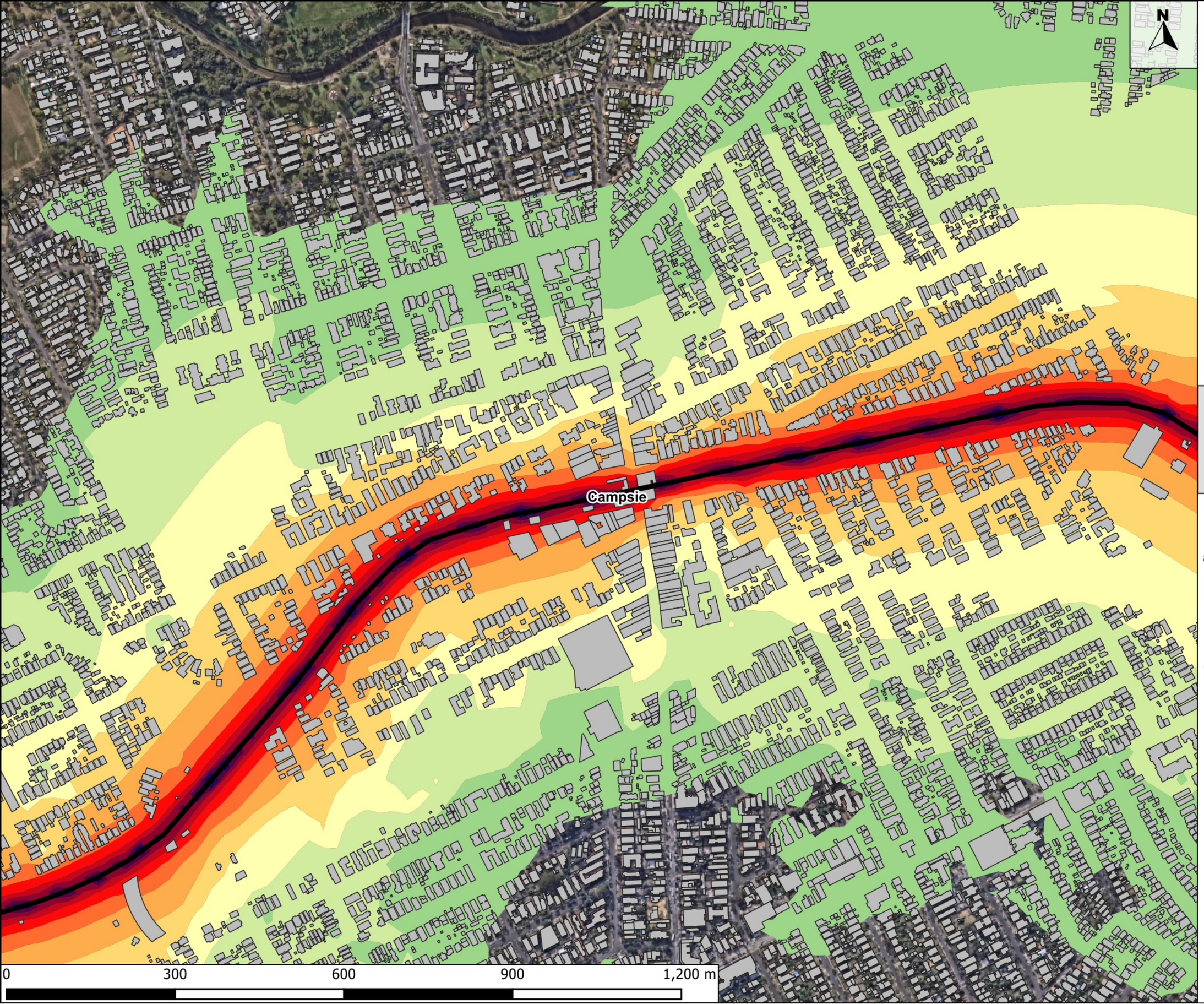

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Work Areas

Noise Contour

- 45-50 dBA
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- 55-60 dBA
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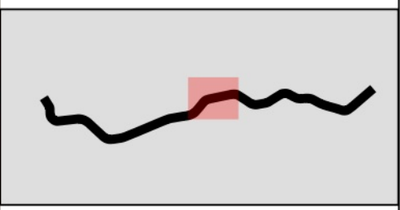
- >95 dBA



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Belmore

0 300 600 900 1,200 m

N

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

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Lakemba

Wiley Park

0 300 600 900 1,200 m

N

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

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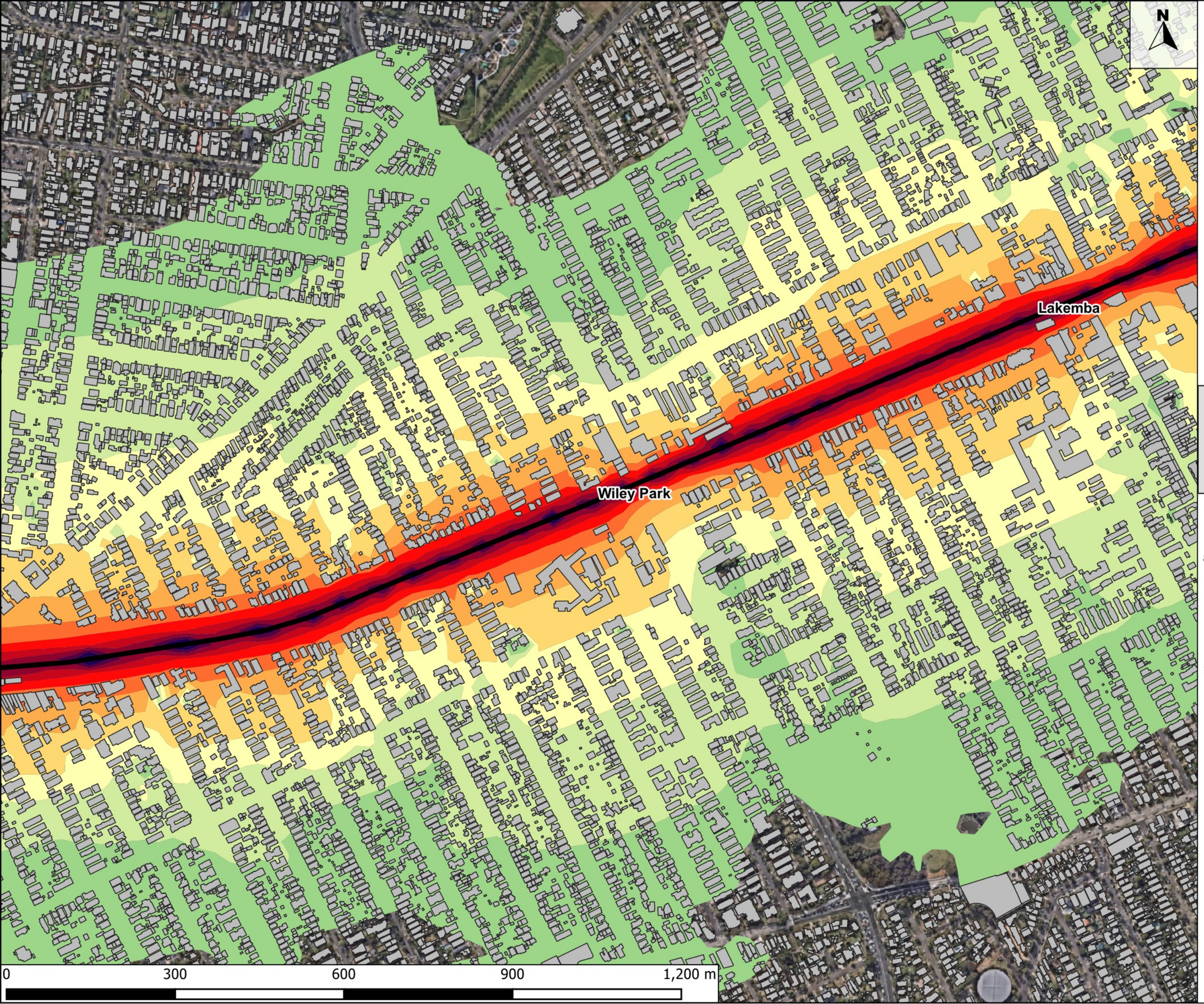

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Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
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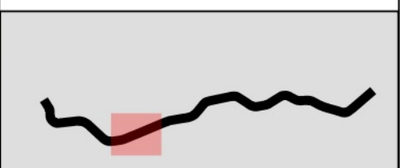
- >95 dBA



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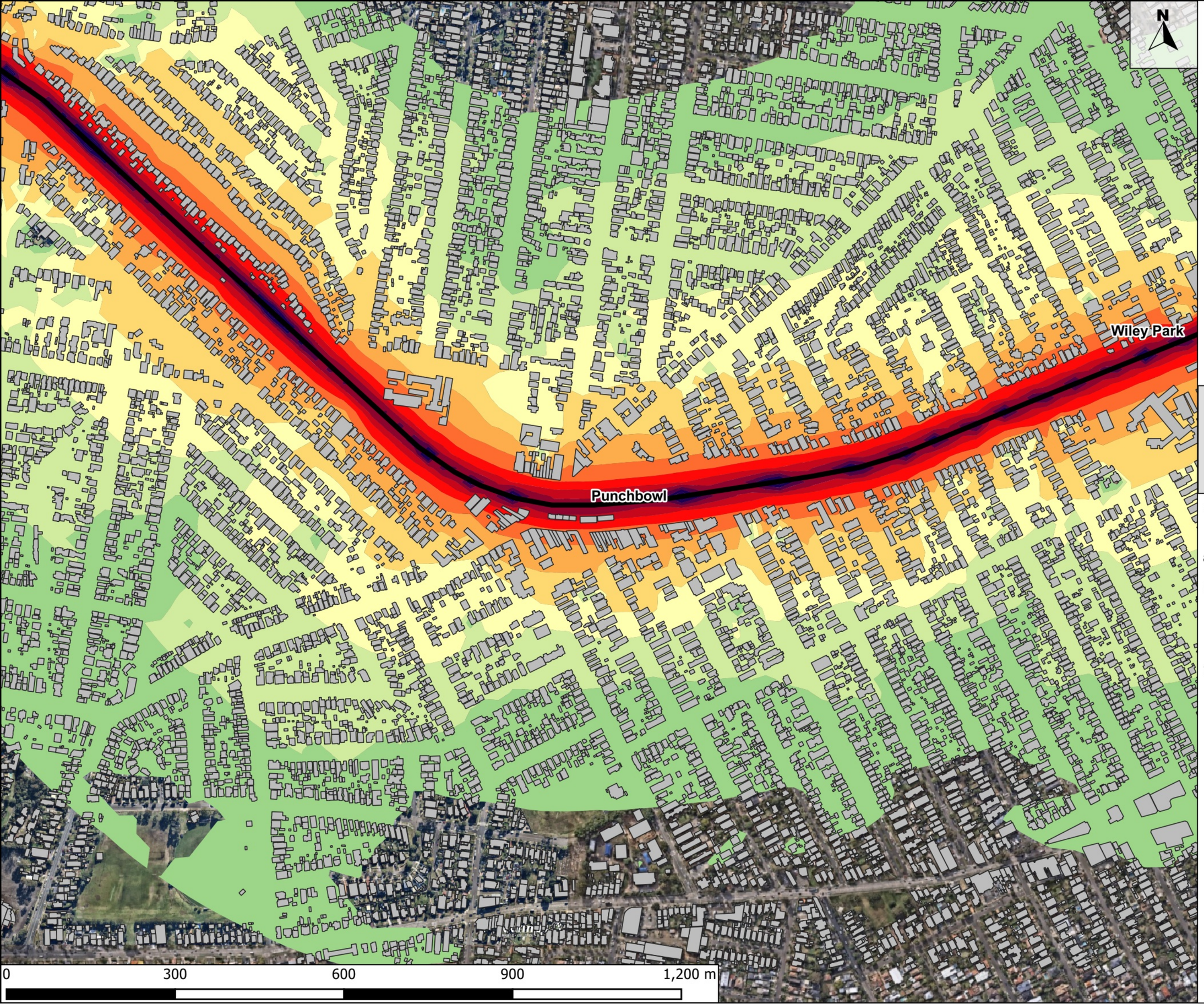

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
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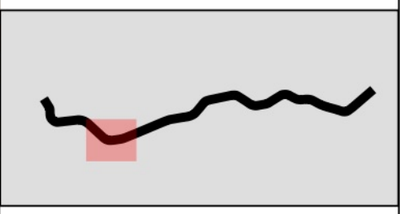

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Bankstown

Punchbowl

0 200 400 600 800 m

N

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Utility works

PROJECT No.:	REVISION:
2409491	A
PREPARED:	APPROVED:
PT	BL
EXPORTED:	SHEET SIZE:
21/8/2024	A3

Bankstown

0 200 400 600 800 m

N

Legend

Work Areas

Noise Contour

45-50 dBA
50-55 dBA
55-60 dBA
60-65 dBA
65-70 dBA
70-75 dBA
75-80 dBA
80-85 dBA
85-90 dBA
90-95 dBA
>95 dBA

PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Utility works

PROJECT No.:	REVISION:
2409491	A
PREPARED:	APPROVED:
PT	BL
EXPORTED:	SHEET SIZE:
21/8/2024	A3

N

Bankstown

0 200 400 600 800 m

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Utility works

PROJECT No.:	REVISION:
2409491	A
PREPARED:	APPROVED:
PT	BL
EXPORTED:	SHEET SIZE:
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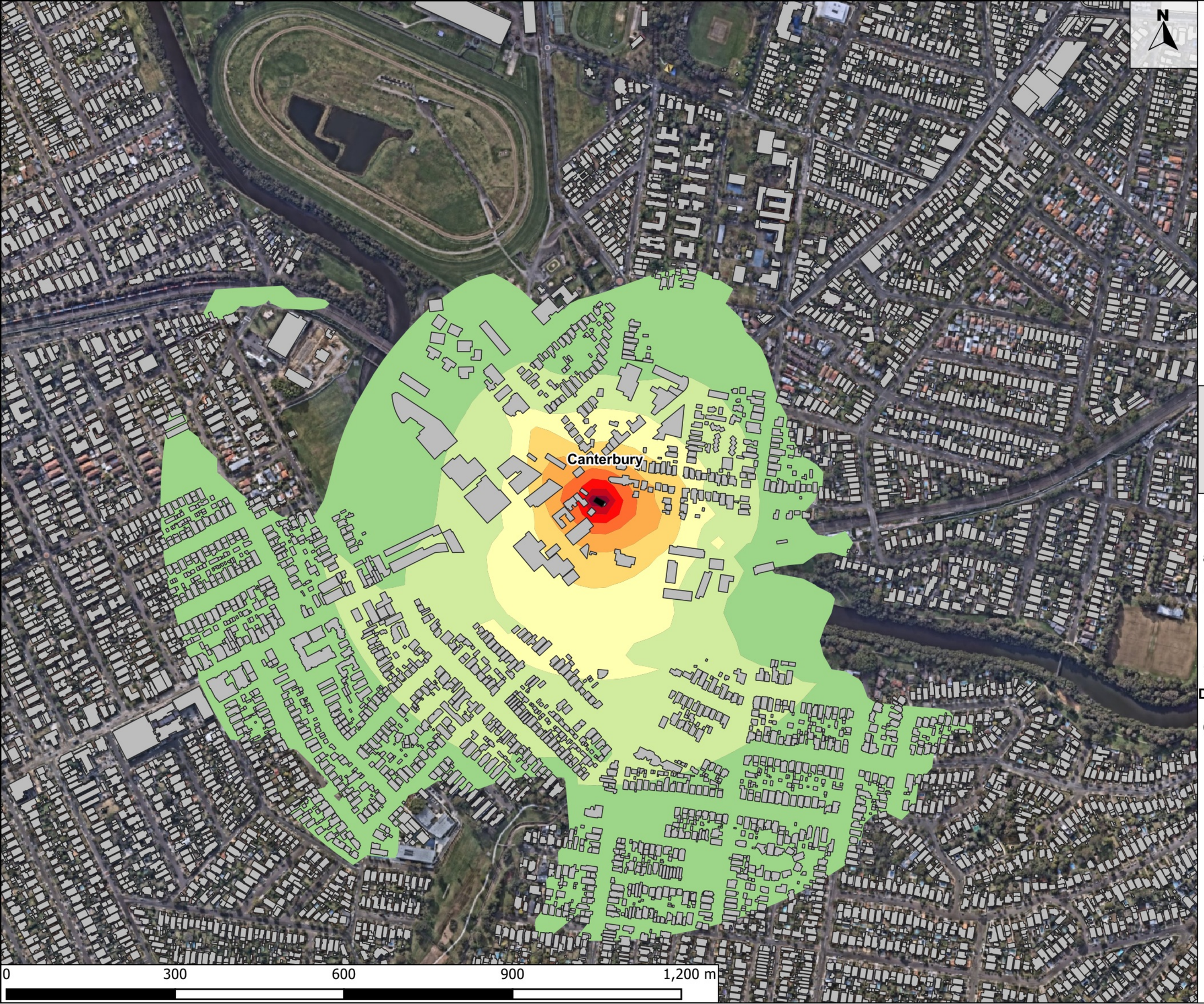
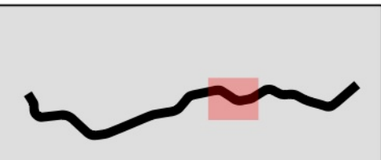


Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA



PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Demolition of Punchbowl Candy Shop and Parcel Office, Canterbury Signalling Building

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PROJECT No.:	REVISION:
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21/8/2024	A3

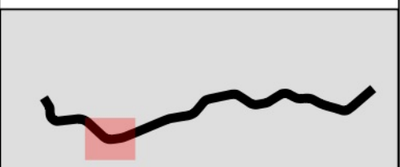


Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA



PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Demolition of Punchbowl Candy Shop and Parcel Office, Canterbury Signalling Building

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PROJECT No.:	REVISION:
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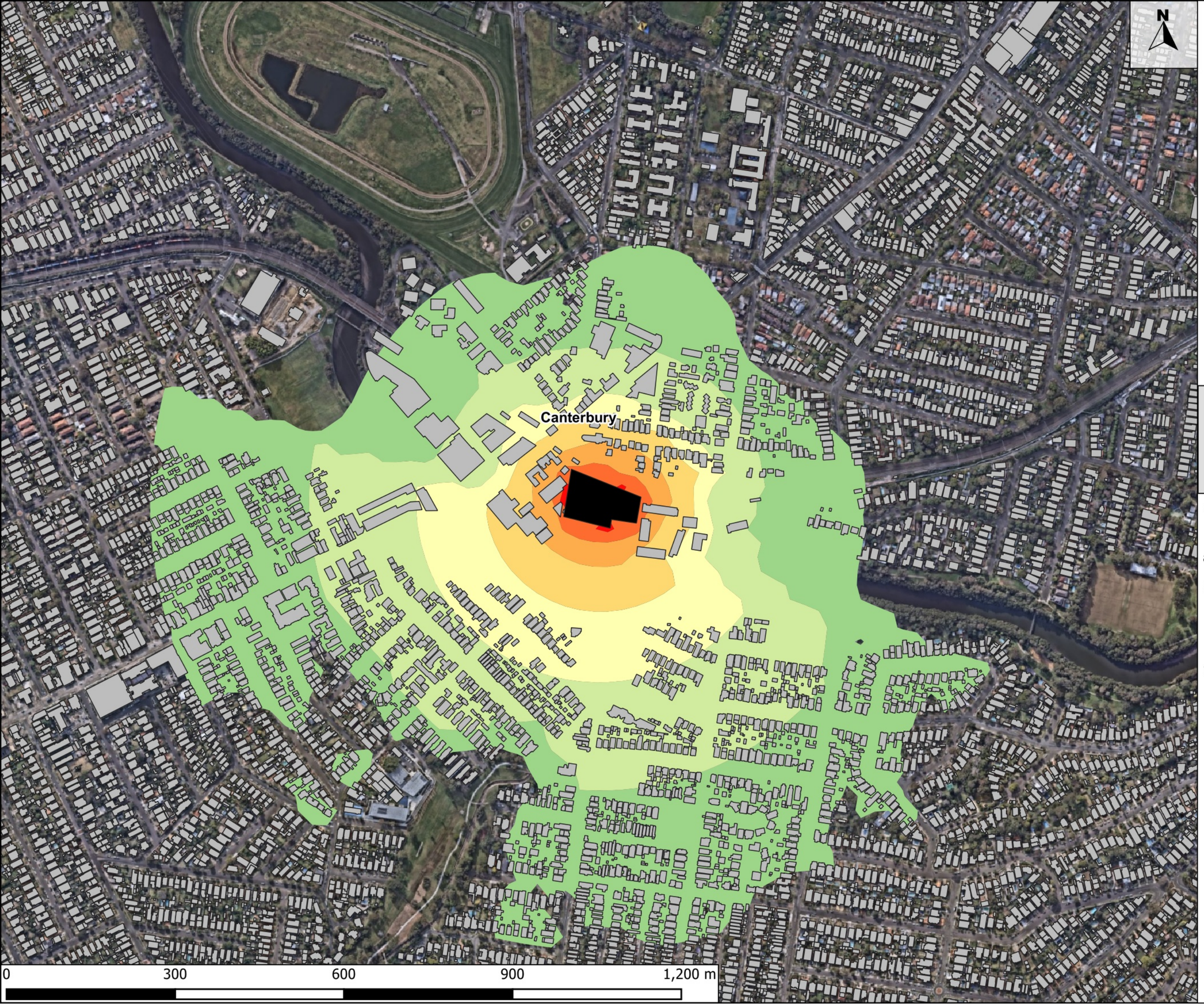

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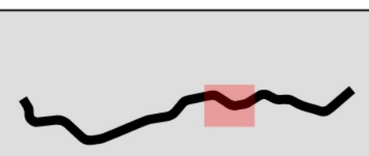
Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA



PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Temporary site compound removal including Canterbury and North Terrace Road Bankstown

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PROJECT No.:	REVISION:
2409491	A
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EXPORTED:	SHEET SIZE:
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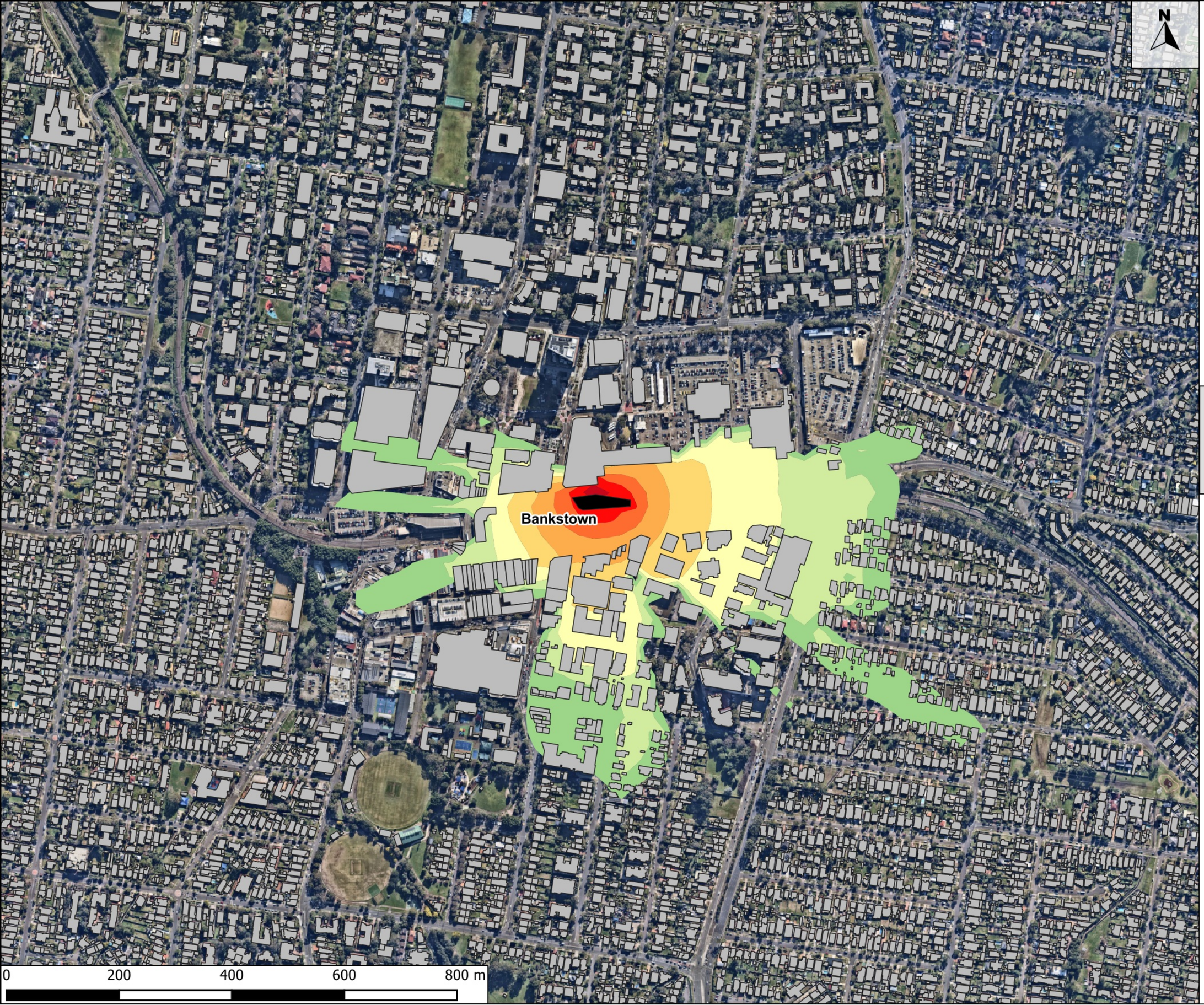
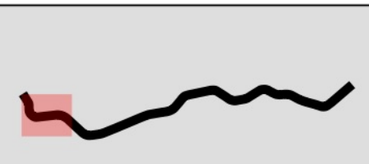


Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA



PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Temporary site compound removal including Canterbury and North Terrace Road Bankstown

Page 2/2

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N

Sydenham

0 300 600 900 1,200 m

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Temporary Works

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N

Marrickville

Sydenham

0 300 600 900 1,200 m

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

PROJECT:

Southwest Metro Conversion and Station Works - Package 3

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S2B JHLORJV

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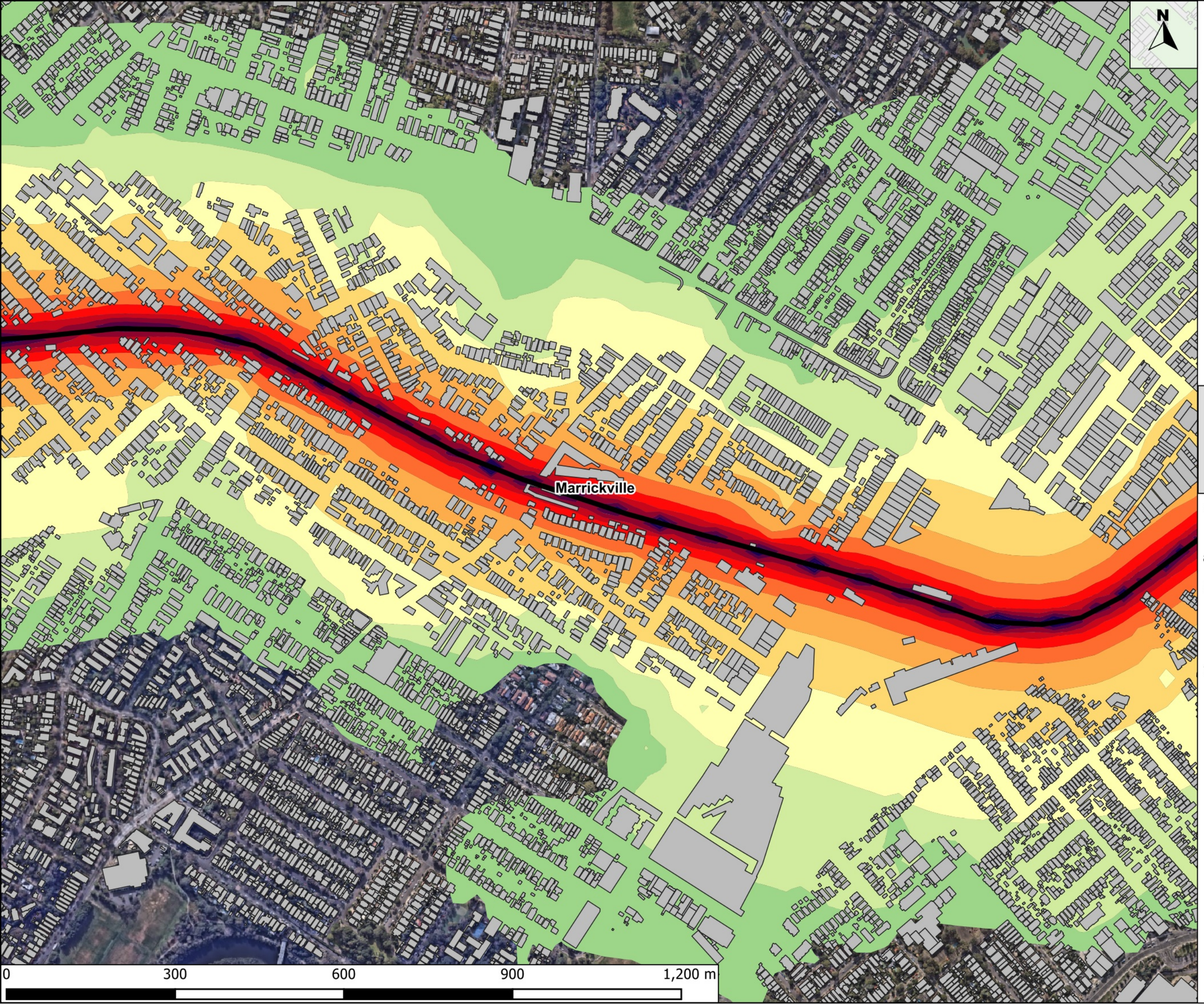
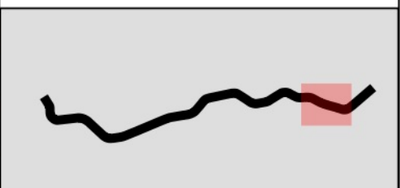


Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA



PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Temporary Works

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PROJECT No.:	REVISION:
2409491	A
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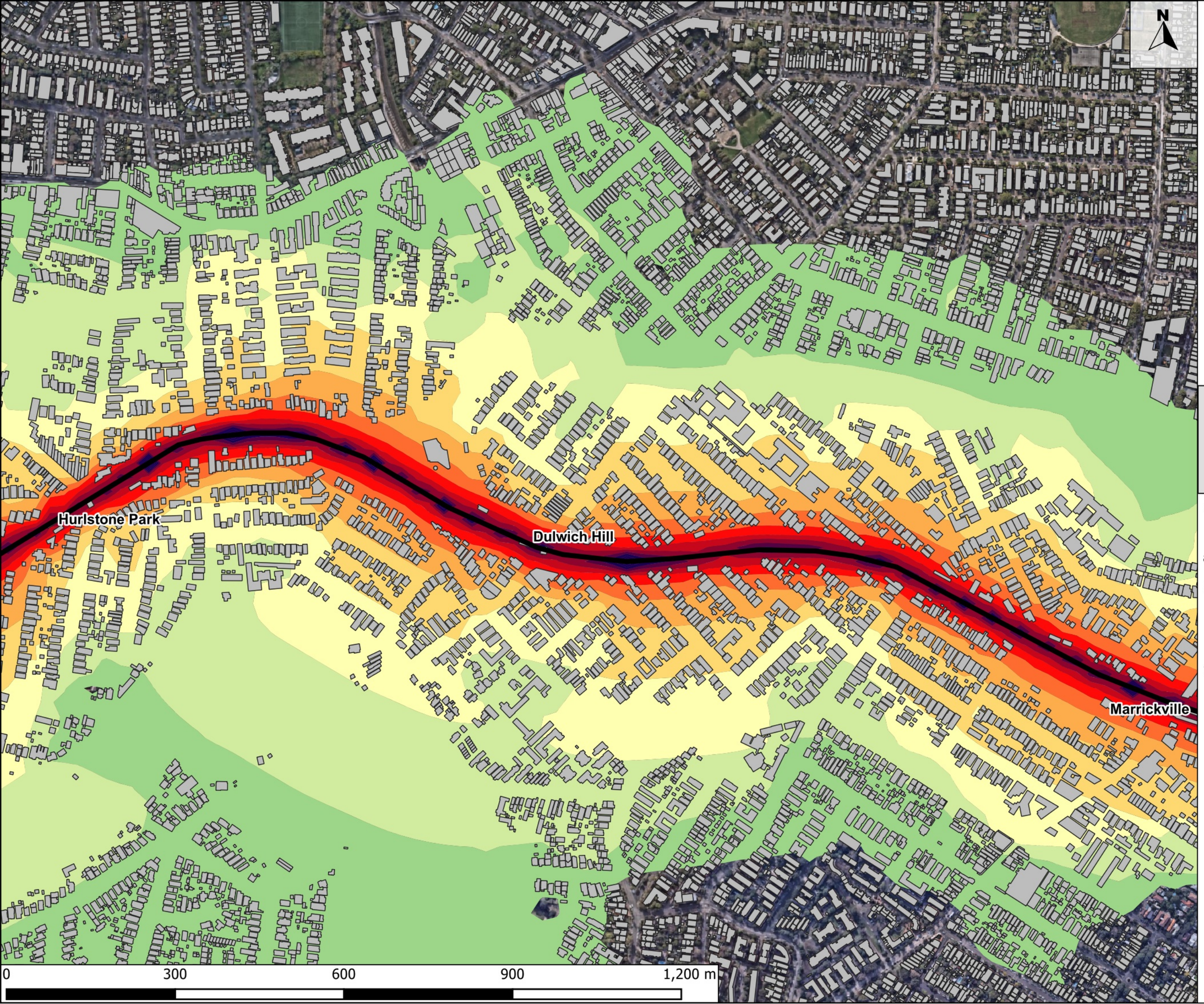

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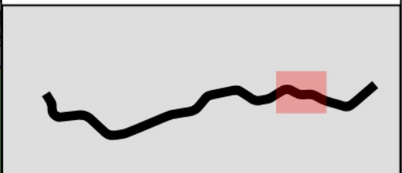
Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA



PROJECT:

Southwest Metro Conversion and Station Works - Package 3

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S2B JHLORJV

TITLE:

Temporary Works

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N

Hurlstone Park

Dulwich Hill

0 300 600 900 1,200 m

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Temporary Works

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PROJECT No.:	REVISION:
2409491	A
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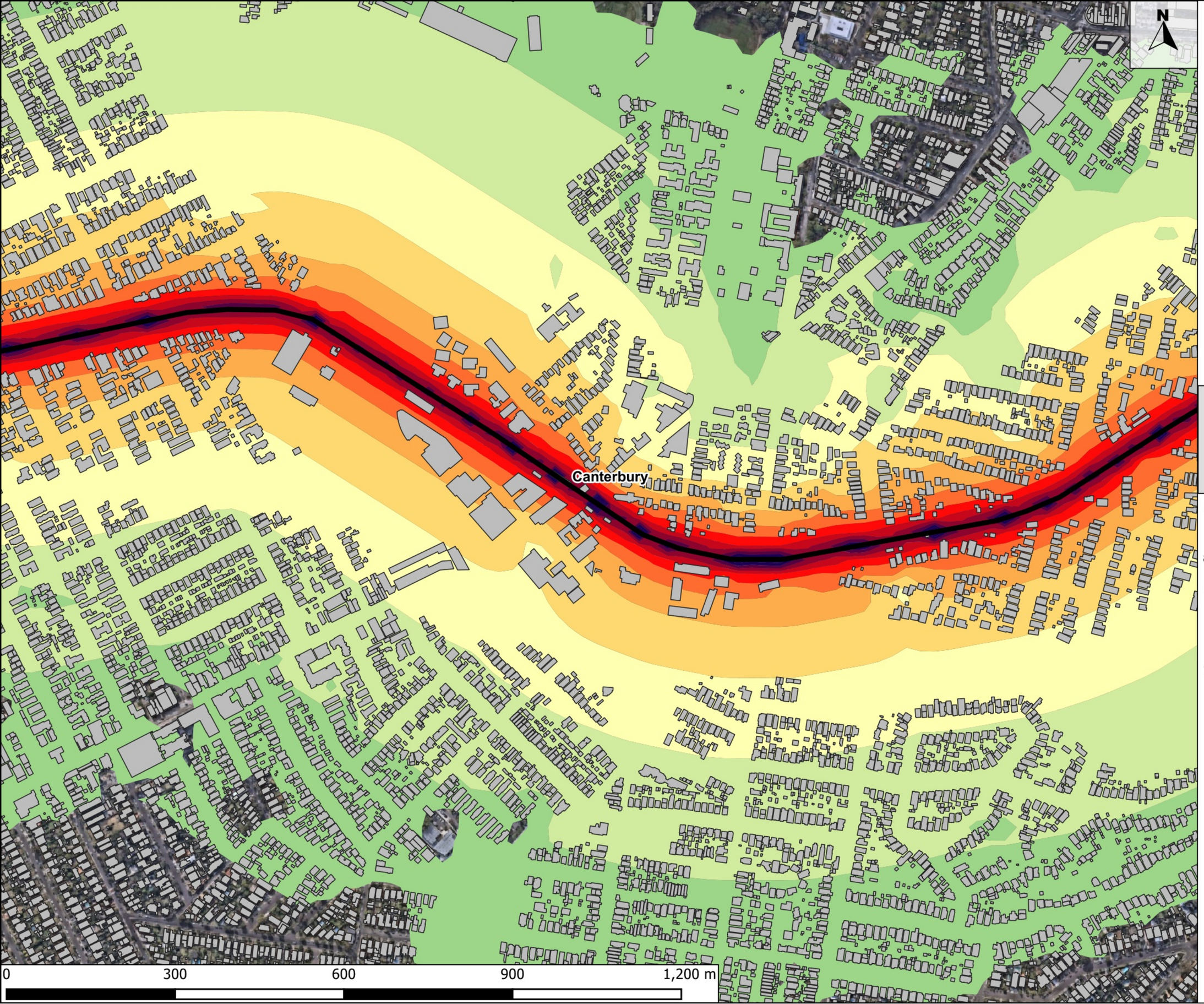
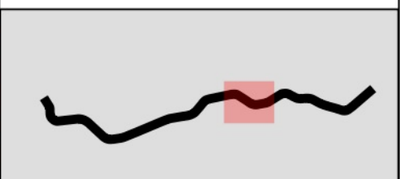


Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA



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S2B JHLORJV

TITLE:

Temporary Works

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N

Campsie

Canterbury

0 300 600 900 1,200 m

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Temporary Works

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PROJECT No.:	REVISION:
2409491	A
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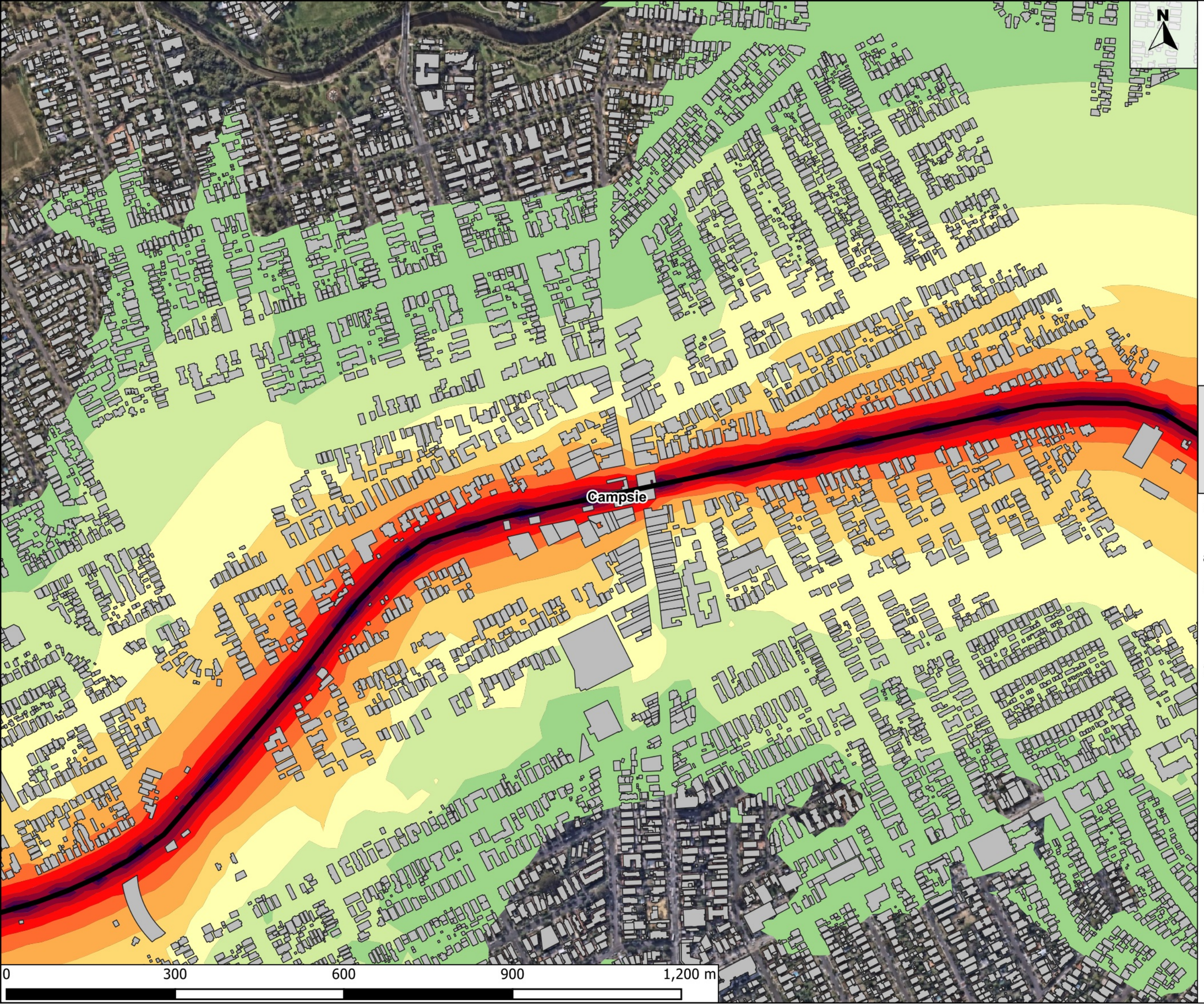
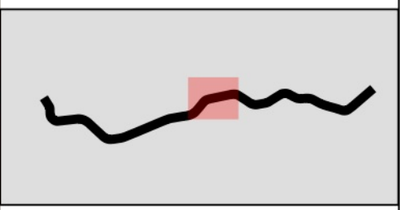


Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA



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Southwest Metro Conversion and Station Works - Package 3

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S2B JHLORJV

TITLE:

Temporary Works

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Belmore

0 300 600 900 1,200 m

N

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

PROJECT:

Southwest Metro Conversion and Station Works - Package 3

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S2B JHLORJV

TITLE:

Temporary Works

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Lakemba

Wiley Park

0 300 600 900 1,200 m

N

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

PROJECT:

Southwest Metro Conversion and Station Works - Package 3

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Temporary Works

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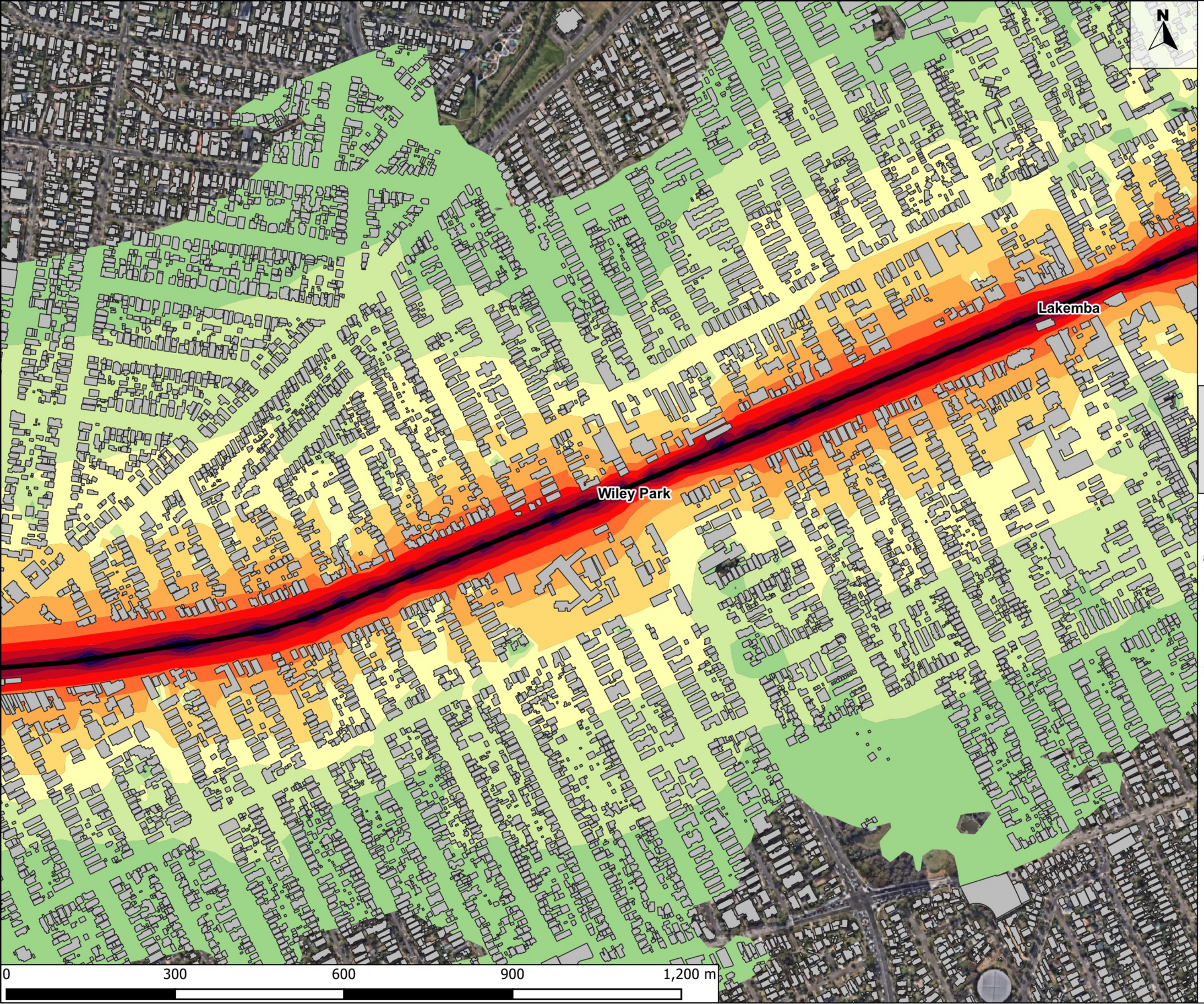
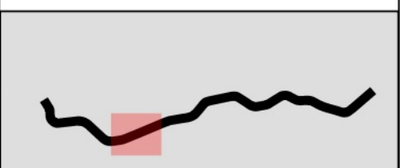


Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA



PROJECT:

Southwest Metro Conversion and Station Works - Package 3

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S2B JHLORJV

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Temporary Works

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PROJECT No.:	REVISION:
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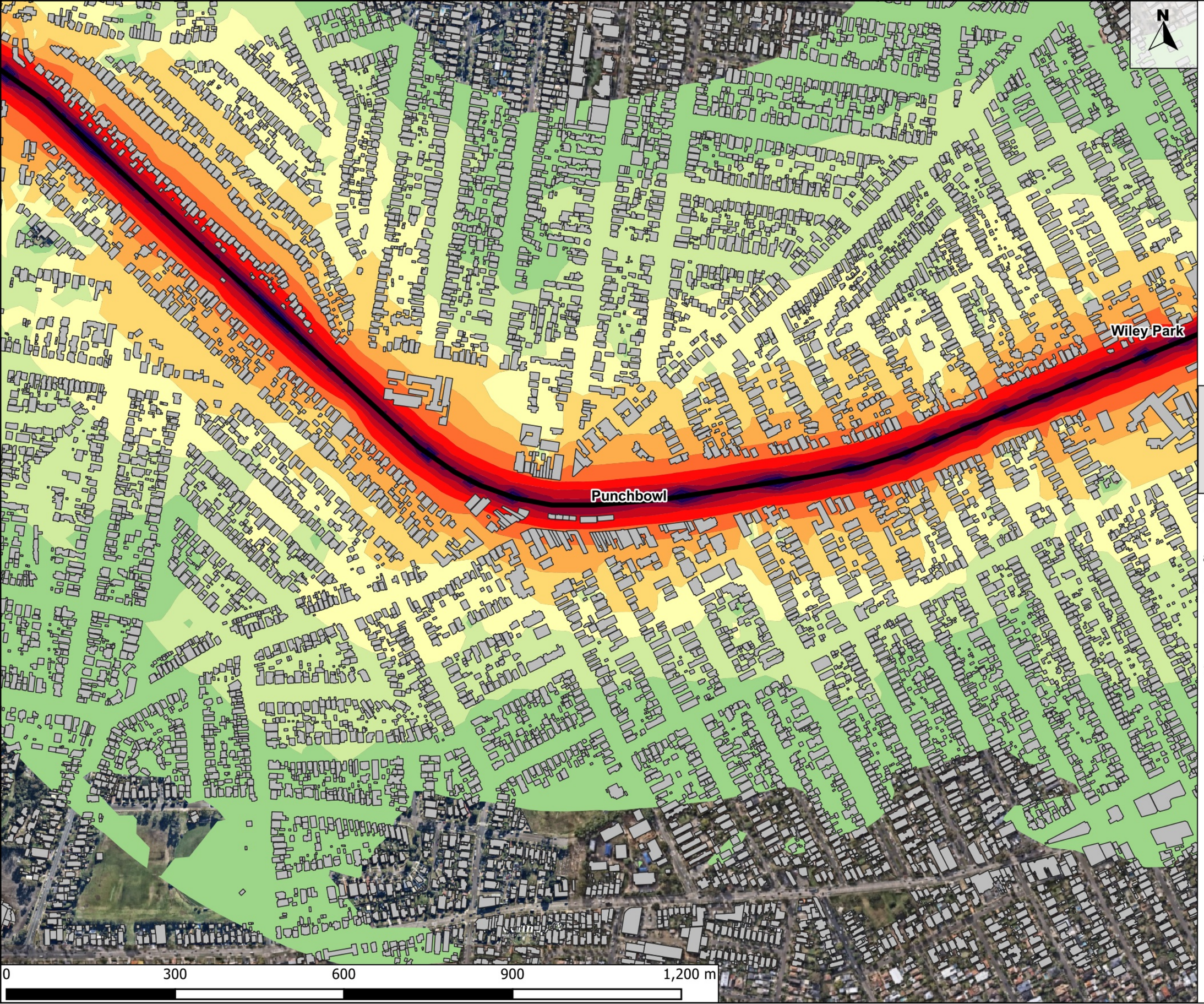
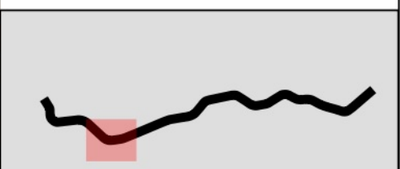


Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA



PROJECT:

Southwest Metro Conversion and Station Works - Package 3

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Temporary Works

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Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
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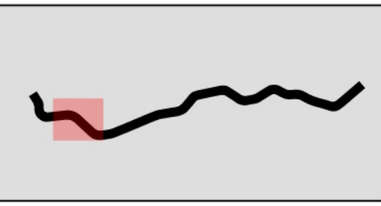
- 90-95 dBA
- >95 dBA



PROJECT:

Southwest Metro Conversion and Station Works - Package 3

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S2B JHLORJV

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Bankstown

0 200 400 600 800 m

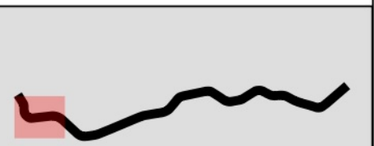
N

Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA



PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Temporary Works

PROJECT No.:	REVISION:
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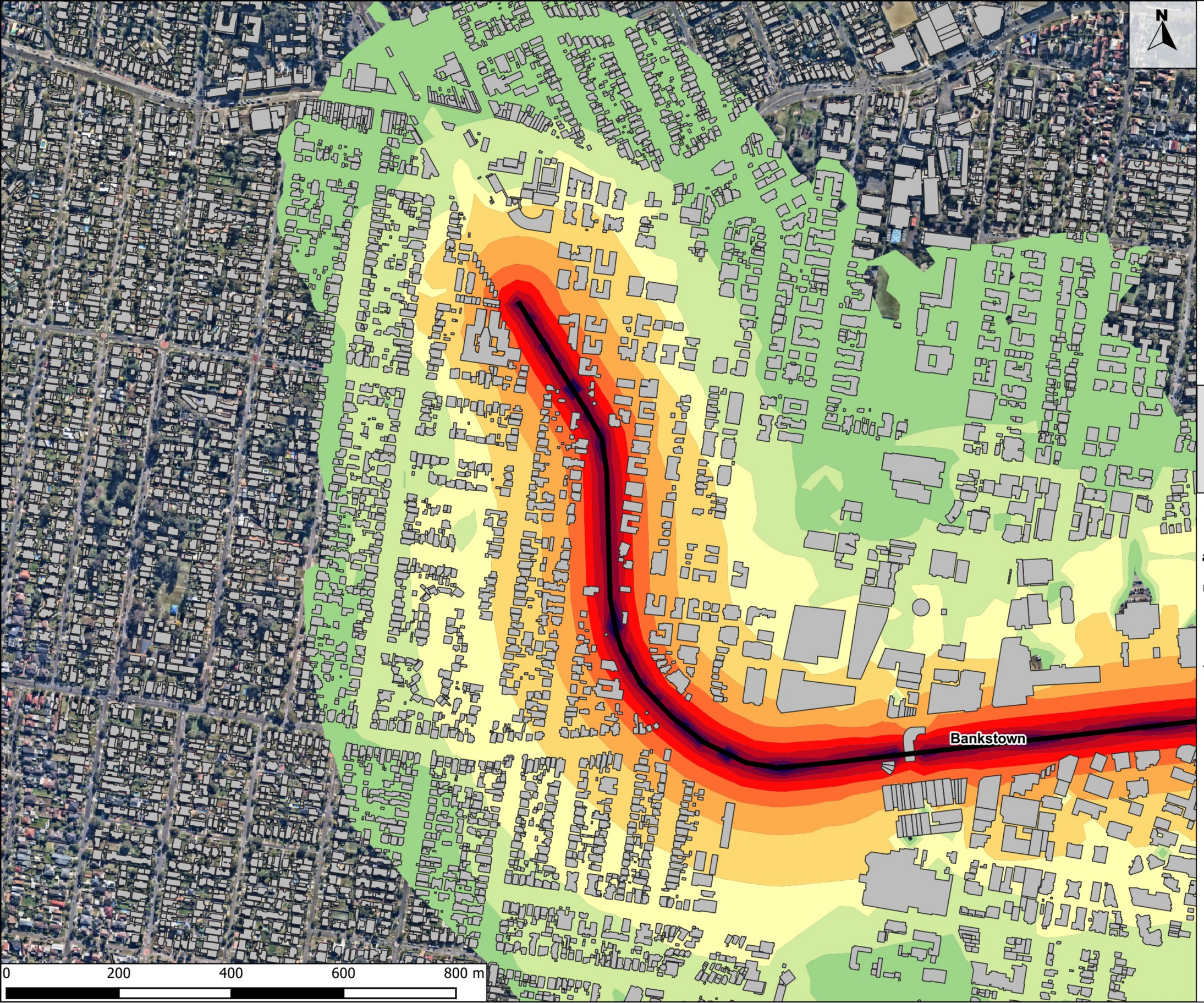
EXPORTED:	SHEET SIZE:
21/8/2024	A3



Legend

Work Areas

Noise Contour

- 45-50 dBA
- 50-55 dBA
- 55-60 dBA
- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- 90-95 dBA
- >95 dBA

PROJECT:

Southwest Metro Conversion and Station Works - Package 3

PREPARED FOR:

S2B JHLORJV

TITLE:

Temporary Works

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APPENDIX D – CONSTRUCTION NOISE CONTOURS SCENARIOS S12A, S12B, S12C

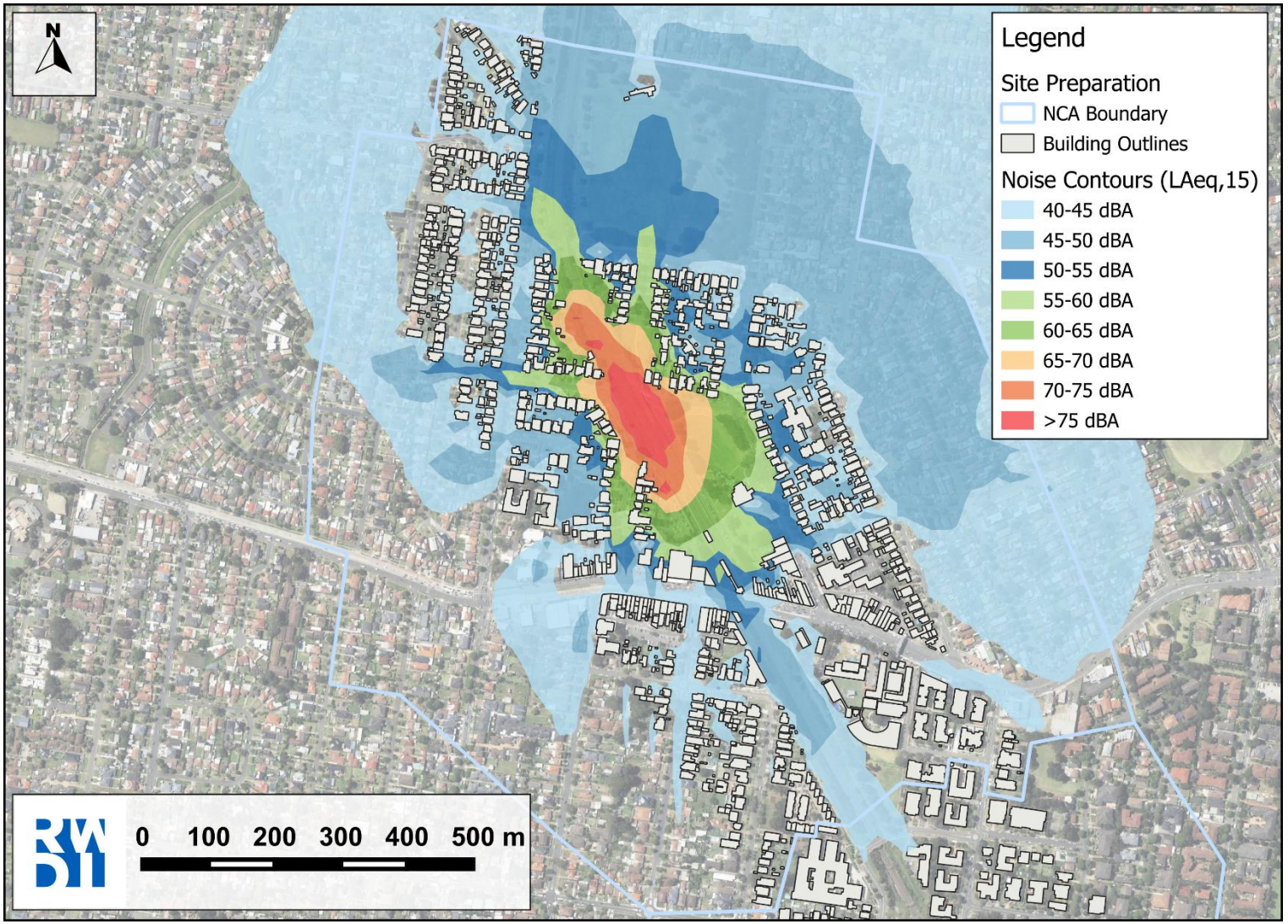

Figure D1: Scenario S12A

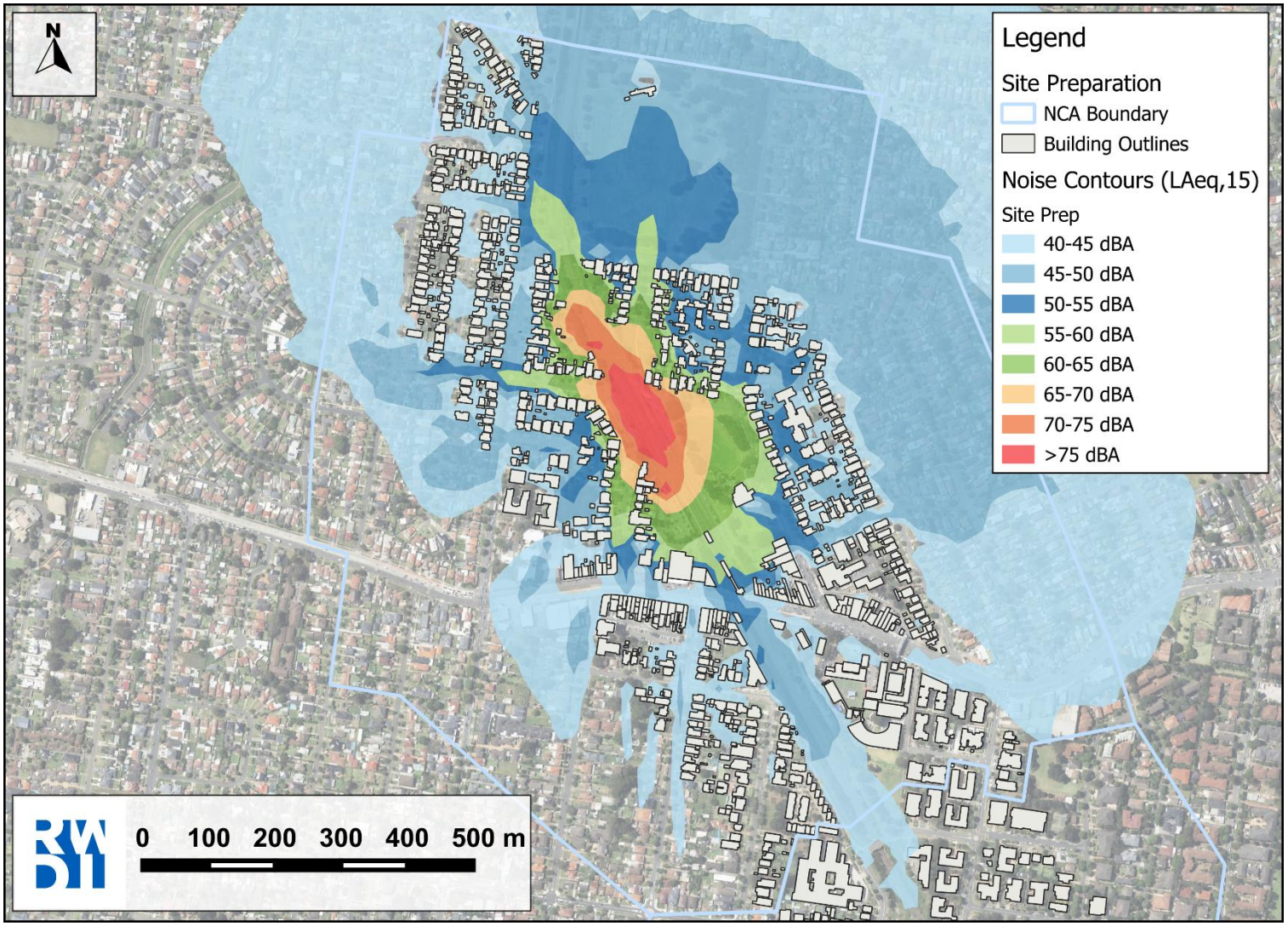

Figure D2: Scenario S12B

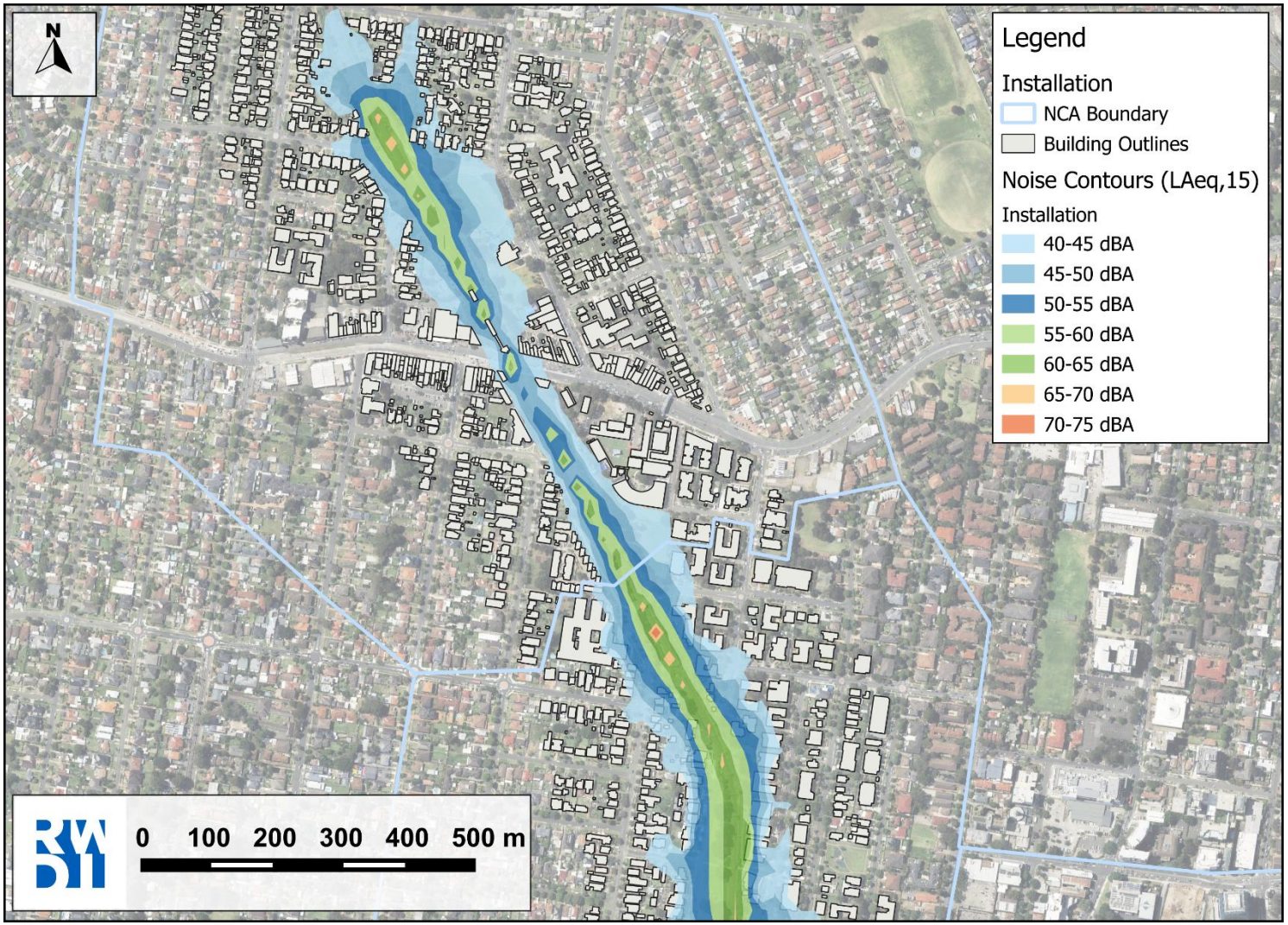

Figure D3: Scenario S12C (northern section)

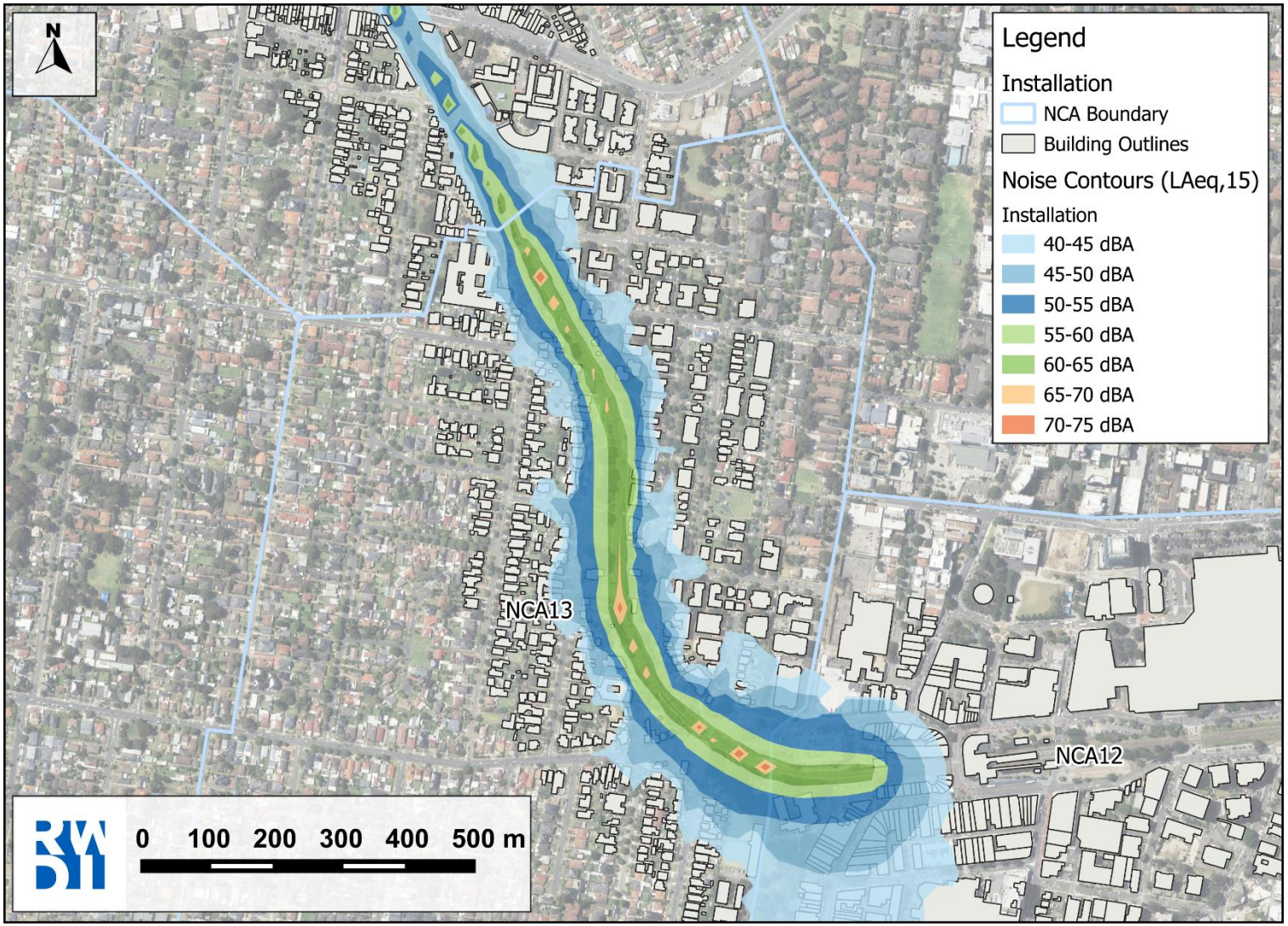

Figure D4: Scenario S12C (southern section)

Appendix E – JHLORJV EPL 21147 & MTS EPL 21247 OOH Work Application

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Environment Protection Licence

Licence - 21147

Licence Details	
Number:	21147
Anniversary Date:	17-January

Licensee

LAING O'ROURKE AUSTRALIA CONSTRUCTION PTY LTD

LEVEL 21, 100 MOUNT STREET

NORTH SYDNEY NSW 2060

Premises

SYDENHAM STATION JUNCTION

SYDENHAM STATION JUNCTION WORKS PROJECT SITE AT SYDENHAM STATION

SYDENHAM NSW 2044

Scheduled Activity

Railway activites - railway infrastructure construction

Fee Based Activity	Scale
Railway infrastructure construction (>=50,000T & track to be constructed <=10km)	> 100000-500000 Remaining extraction or processing

Contact Us

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Environment Protection Licence

Licence - 21147

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Information about this licence

Dictionary

A definition of terms used in the licence can be found in the dictionary at the end of this licence.

Responsibilities of licensee

Separate to the requirements of this licence, general obligations of licensees are set out in the Protection of the Environment Operations Act 1997 ("the Act") and the Regulations made under the Act. These include obligations to:

- ensure persons associated with you comply with this licence, as set out in section 64 of the Act;
- control the pollution of waters and the pollution of air (see for example sections 120 - 132 of the Act);
- report incidents causing or threatening material environmental harm to the environment, as set out in Part 5.7 of the Act.

Variation of licence conditions

The licence holder can apply to vary the conditions of this licence. An application form for this purpose is available from the EPA.

The EPA may also vary the conditions of the licence at any time by written notice without an application being made.

Where a licence has been granted in relation to development which was assessed under the Environmental Planning and Assessment Act 1979 in accordance with the procedures applying to integrated development, the EPA may not impose conditions which are inconsistent with the development consent conditions until the licence is first reviewed under Part 3.6 of the Act.

Duration of licence

This licence will remain in force until the licence is surrendered by the licence holder or until it is suspended or revoked by the EPA or the Minister. A licence may only be surrendered with the written approval of the EPA.

Licence review

The Act requires that the EPA review your licence at least every 5 years after the issue of the licence, as set out in Part 3.6 and Schedule 5 of the Act. You will receive advance notice of the licence review.

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

- an administrative fee; and
- a load-based fee (if applicable).

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The EPA publication “A Guide to Licensing” contains information about how to calculate your licence fees. The licence requires that an Annual Return, comprising a Statement of Compliance and a summary of any monitoring required by the licence (including the recording of complaints), be submitted to the EPA. The Annual Return must be submitted within 60 days after the end of each reporting period. See condition R1 regarding the Annual Return reporting requirements.

Usually the licence fee period is the same as the reporting period.

Transfer of licence

The licence holder can apply to transfer the licence to another person. An application form for this purpose is available from the EPA.

Public register and access to monitoring data

Part 9.5 of the Act requires the EPA to keep a public register of details and decisions of the EPA in relation to, for example:

- licence applications;
- licence conditions and variations;
- statements of compliance;
- load based licensing information; and
- load reduction agreements.

Under s320 of the Act application can be made to the EPA for access to monitoring data which has been submitted to the EPA by licensees.

This licence is issued to:

LAING O'ROURKE AUSTRALIA CONSTRUCTION PTY LTD
LEVEL 21, 100 MOUNT STREET
NORTH SYDNEY NSW 2060

subject to the conditions which follow.

Environment Protection Licence

Licence - 21147

1 Administrative Conditions

A1 What the licence authorises and regulates

A1.1 This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation.

Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition.

Scheduled Activity	Fee Based Activity	Scale
Railway activites - railway infrastructure construction	Railway infrastructure construction (>=50,000T & track to be constructed <=10km)	> 100000 - 500000 Remaining extraction or processing

A2 Premises or plant to which this licence applies

A2.1 The licence applies to the following premises:

Premises Details
SYDENHAM STATION JUNCTION
SYDENHAM STATION JUNCTION WORKS PROJECT SITE AT SYDENHAM STATION
SYDENHAM
NSW 2044

A2.2 The premises is the most recently approved premises maps held on EPA electronic file EF18/8938.

A2.3 Premises maps are not deemed to be approved by the EPA unless confirmed in writing.

A2.4 Premises maps changes as a result of scheduled land portion handover, land portion surrenders or land portion additions are permitted to be altered through this condition. Any proposed variations to the premises must:

(a) be submitted to the EPA in electronic format; and
(b) be a complete map set containing unique identifiers for revision number and map sheet numbers; and
(c) be submitted to the EPA no less than 5 business days prior to the scheduled handover, surrender or land portion addition date.

A2.5 The licensee must display the most recently approved premises maps on the project's website.

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A3 Information supplied to the EPA

A3.1 Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.

In this condition the reference to "the licence application" includes a reference to:
a) the applications for any licences (including former pollution control approvals) which this licence replaces under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and
b) the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.

A3.2 Unless specifically stated by another condition of this licence, Environmental Management Plans or systems supplied to the EPA by the licensee do not form part of this licence.

2 Discharges to Air and Water and Applications to Land

P1 Location of monitoring/discharge points and areas

P1.1 The following points referred to in the table are identified in this licence for the purposes of the monitoring and/or the setting of limits for discharges of pollutants to water from the point.

Water and land

EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
1	Discharge and Monitoring	Discharge and Monitoring	Eastern Channel adjacent to corridor and Sydenham Pit Up stream between (Easting 330640.51, Northing 6245668.257, MGA56, GDA94) and (Easting 330521.077, Northing 6245897.75, MGA56, GDA94).
2	Discharge and Monitoring	Discharge and Monitoring	Pit within platform of Sydenham Station (Easting: 330504.634, Northing: 6245850.91, MGA56, GDA94)
3	Discharge and Monitoring	Discharge and Monitoring	Eastern Channel adjacent to Sydenham Signalling Centre (Easting: 330224.294, Northing: 6245646.956, MGA56, GDA94)
4	Discharge and monitoring	Discharge and monitoring	Stormwater pit in cess area. Easting: 330426.727 Northing: 6245758.670 (GDA94, MGA56)
5	Discharge and Monitoring	Discharge and Monitoring	Charles Street Canterbury stormwater pit. Easting: 325796.33 Northing: 6246193.798 (MGA56, GDA94)

6	Discharge and Monitoring	Discharge and Monitoring	Railway Corridor stormwater pit. Easting: 325721.302 Northing: 6246226.499 (MGA56, GDA94)
7	Discharge and Monitoring	Discharge and Monitoring	Nowra St, Canterbury stormwater pit. Easting: 325529.162 Northing: 6246307.054 (MGA56, GDA94)
8	Discharge and Monitoring	Discharge and Monitoring	Stormwater pit on kerbside gutter at South Terrace, Bankstown. (Easting: 318572.203, Northing: 6245216.438, MGA56, GDA94)

3 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Concentration limits

L2.1 For each monitoring\discharge point or utilisation area specified in the table\s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.

L2.2 Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.

L2.3 To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table\s.

L2.4 Water and/or Land Concentration Limits

POINT 1

Pollutant	Units of Measure	50 Percentile concentration limit	90 Percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
Oil and Grease	Visible				Not visible
pH	pH				6.5-8.5
Total suspended solids	milligrams per litre				50

Environment Protection Licence

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POINT 2

Pollutant	Units of Measure	50 Percentile concentration limit	90 Percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
Oil and Grease	Visible				Not visible
pH	pH				6.5-8.5
Total suspended solids	milligrams per litre				50

POINT 3

Pollutant	Units of Measure	50 Percentile concentration limit	90 Percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
Oil and Grease	Visible				Not visible
pH	pH				6.5-8.5
Total suspended solids	milligrams per litre				50

POINT 4

Pollutant	Units of Measure	50 Percentile concentration limit	90 Percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
Oil and Grease	Visible				not visible
pH	pH				6.5-8.5
Total suspended solids	milligrams per litre				50

POINT 5

Pollutant	Units of Measure	50 Percentile concentration limit	90 Percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
Oil and Grease	Visible				Not Visible
pH	pH				6.5-8.5

Total suspended solids	milligrams per litre				50

POINT 6

Pollutant	Units of Measure	50 Percentile concentration limit	90 Percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
Oil and Grease	Visible				Not Visible
pH	pH				6.5-8.5
Total suspended solids	milligrams per litre				50

POINT 7

Pollutant	Units of Measure	50 Percentile concentration limit	90 Percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
Oil and Grease	Visible				Not Visible
pH	pH				6.5-8.5
Total suspended solids	milligrams per litre				50

POINT 8

Pollutant	Units of Measure	50 Percentile concentration limit	90 Percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
Oil and Grease	Visible				Not Visible
pH	pH				6.5-8.5
Total suspended solids	milligrams per litre				50

L2.5 If the licensee uses turbidity (NTU) in place of TSS to determine compliance with Conditions L2.4 the licensee must develop a statistical correlation which identifies the relationship between NTU and TSS for water quality in the sediment basins, water treatment plants and excavations in order to determine the NTU equivalent of 50 mg/L TSS before NTU is used.

L2.6 The licensee must provide the EPA with a copy of the statistical assessment methodology and results before using NTU in place of TSS.

L2.7 The licensee must develop and implement a method to enable the ongoing verification of the relationship between NTU and TSS.

L2.8 The licensee must provide the EPA with any amendments the licensee makes to the statistical correlation as a result of the ongoing verification required by Condition L2.6 before using the revised statistical correlation.

L3 Waste

L3.1 The licensee must not cause, permit or allow any waste to be received at the premises, except the wastes expressly referred to in the column titled “Waste” and meeting the definition, if any, in the column titled “Description” in the table below.
Any waste received at the premises must only be used for the activities referred to in relation to that waste in the column titled “Activity” in the table below.
Any waste received at the premises is subject to those limits or conditions, if any, referred to in relation to that waste contained in the column titled “Other Limits” in the table below.
This condition does not limit any other conditions in this licence.

Code	Waste	Description	Activity	Other Limits
NA	Hazardous Wastes	Qenos pipe pre-classified as Hazardous (tar) and Special waste (asbestos) meeting the requirements of the EPAs Waste Classification Guidelines	Waste storage	The amount of waste stored at the premises at any time must not exceed 3 tonnes.

L4 Noise limits

L4.1 The licensee must implement all feasible and reasonable noise and vibration mitigation measures at the premises to minimise noise and vibration impacts on noise sensitive receivers to seek to achieve the Noise Management Levels in the *Interim Construction Noise Guidelines* (DECC, 2006).

L5 Hours of operation

L5.1 Unless permitted by another condition of this licence, construction works and activities must:

(a) only be undertaken between the hours of 0700 and 1800 Monday to Friday; and
(b) only be undertaken between the hours of 0800 and 1800 Saturday; and
(c) not be undertaken on Sundays or Public Holidays.

L5.2 **Exemptions to standard construction hours for low noise impact works**

The following works and activities may be carried out outside of the hours specified in Condition L5.1 if the works and activities do not cause, when measured at the boundary of the most affected noise sensitive receiver:

(a) LAeq(15 minute) noise levels greater than 5dB above the day, evening and night rating background level (RBL) as applicable; and
(b) LA1(1 minute) or LAmax noise levels greater than 15dB above the night RBL for night works; and
(c) continuous or impulsive vibration values greater than those for human exposure to vibration, set out for residences in Table 2.2 in “Environmental noise management - Assessing Vibration: a technical guideline” (Department of Environment and Conservation, February 2006); and
(d) intermittent vibration values greater than those for human exposure to vibration, set out for residences in Table 2.4 in “Environmental noise management - Assessing Vibration: a technical guideline” (Department of Environment and Conservation, February 2006).

For the purpose of this condition, the RBLs are those contained in an environmental assessment for the scheduled activity subject to this licence prepared under the Environmental Planning and Assessment Act 1979. Alternatively, the licensee may use another RBL determined in accordance with the NSW Industrial Noise Policy (EPA, 2000) and provided to the EPA prior to carrying out any works or activities under this condition.

L5.3 **Exemptions to standard construction hours in exceptional circumstances**

(a) The licensee may undertake works outside of standard construction hours if any of the following applies:
(i) emergency works is required to avoid the loss of lives or property, or to prevent material harm to the environment;
(ii) the delivery of oversized plant or structures has been determined by the police or other authorised authorities to require special arrangements to transport along public roads.

(b) The licensee must, on becoming aware of the need to undertake emergency construction work under this condition notify the EPA's Environment Line as soon as practicable and submit a report to the EPA by 2pm on the next business day after the emergency works commenced that describes:

1. the cause, time and duration of the emergency; and
2. action taken by or on behalf of the licensee in relation to the emergency; and
3. details of any measures taken or proposed to be taken by the licensee to prevent or mitigate against a recurrence of the emergency.

For the purpose of this condition, “material harm to the environment” has the same meaning as in section 147 of the *POEO Act*.

L5.4 **High Noise Impact Works**

Unless otherwise specified by another condition of this licence, the following applies in relation to high noise impact works:

(a) High noise impact works and activities must only be undertaken:

1. between the hours of 8:00am to 6:00pm Monday to Friday;
2. between the hours of 8:00am to 1:00pm Saturday; and
3. in continuous blocks not exceeding 3 hours each with a minimum respite from those activities and works of not less than 1 hour between each block.

For the purposes of this condition 'continuous' includes any period during which there is less than a 1hour respite between ceasing and recommencing any of the work that is the subject of this condition.

L5.5 **Respite for receivers**

The licensee must:

(a) identify all receivers likely to experience internal noise levels greater than Leq(15 minute) 60 dB(A) inclusive of a 5dB penalty, if rock breaking or any other annoying activity likely to result in regenerated (ground-borne) noise or a perceptible level of vibration is planned, between 7am to 8pm; and,

(b) consult with all receivers identified in Condition L5.5(a) with the objective of determining appropriate hours of respite so that construction noise (including ground-borne noise), does not exceed internal noise levels of:
(i) Leq(15 minute) 60dB(A) inclusive of a 5dB penalty if rock breaking or any other annoying activity likely to result in ground-borne noise or a perceptible level of vibration is planned between 7am to 8pm for more than 50% of the time; and,
(ii) Leq(15 minute) 55dB(A) inclusive of a 5dB penalty if rock breaking or any other annoying activity likely to result in ground-borne noise or a perceptible level of vibration is planned between 7am to 8pm for more than 25% of the time.

(c) prior to the commencement of works associated with this licence, submit to EPA a map or register of receiver locations identified in accordance with condition L5.5(a), the results of consultation with receivers in accordance with condition L5.5(b) and the proposed work practices and scheduling to provide receivers with the respite required under condition L5.6(b)(i)&(ii).

L5.6 **Works Approved Outside of Standard Construction Hours - Local Possessions**

a) Works and activities may be undertaken during any local possession, but only if:

(i) carrying on those works and activities during standard construction hours (specified in Condition L5.1) would cause unacceptable risks to:

(1) construction personnel safety;

(2) rail passenger and railways personnel safety; or

(3) railway network operational reliability as may be notified to the licensee from time to time by RailCorp; and

(ii) noise and vibration mitigation measures are implemented as detailed in the *Interim Construction Noise Guideline* (DECC 2009); and

(iv) the licensee complies with Condition L5.8(b),(c),(d),(e),(f)&(g).

b) High noise impact works and activities (excluding rail adjustment, tamping and regulating) may be undertaken during any local possession permissible by Condition L5.6(a) as follows:

(i) where feasible and reasonable between the hours of 6:00am to 10:00pm on any day subject to the works and activities being undertaken in continuous blocks not exceeding 3 hours each with a minimum respite from those works and activities of not less than one hour between each block.

For the purposes of this condition "continuous" includes any period during which there is less than a 1 hour respite between ceasing and recommencing any of the works or activities that are the subject of this condition.

c) Rail adjustment, tamping and regulating may be undertaken at any time during a local possession permissible by Condition L5.6(a).

L5.7 **Works Approved Outside of Standard Construction Hours – Local Area and Utility Works**

(a) Local area and utilities works may be undertaken outside of standard construction hours specified in L5.1 at the premises but only if one or more of the following applies:

(i) carrying on those works and activities during the hours specified in Condition L5.1 would result in a high risk to construction personnel or public safety, based on a risk assessment carried our in accordance with AS/NZS ISO 31000:2009 "Risk Management"; or
(ii) the relevant road network operator has advised the licensee in writing that carrying out the works and activities during the hours specified in Condition L5.1 would result in a high risk to road network operational performance; or
(iii) the relevant utility service operator has advised the licensee in writing that carrying out the works and activities during the hours specified in Condition L5.1 would result in a high risk to the operation and integrity of the utility network; or
(iv) the TfNSW Transport Management Centre (or other road authority) have advised the licensee in writing that a road occupancy licence is required and will not be issued for the works or activities during the hours specified in Condition L5.1; or

L5.8 In undertaking any works or activities under Condition L5.7 the licensee must:
(a) Only undertake activities between the hours of:

1. 6:00 pm and 7:00 am the following day on Mondays, Tuesdays, Wednesdays, and Thursdays; and
2. 6:00 pm and 8:00 am the following day on Fridays.

(b) Ensure that combined works and activities undertaken under L5.6 and L5.7 do not impact the same noise sensitive receivers on more than:

(i) 3 evenings or nights per week; and

(ii) 10 evenings or nights per month.

(c) Implement reasonable and feasible noise and vibration mitigation measures as detailed in the Interim Construction Noise Guidelines (DECC 2009).

(d) Undertake noise monitoring at the boundary of the most noise affected receiver or other sensitive land uses(s) that is most representative of noise generating activities being carried out at the site; and

(e) Comply with the requirements of Condition R4.1; and

(f) Comply with the requirements of Condition R4.4; and

(g) Ensure that an indicative schedule of works undertaken in accordance with L5.6 and L5.7 is made publicly accessible on the licensee's project website; and,

(h) Ensure that high noise impact activities and works are concluded before midnight unless directly related to essential road reinstatement works.

NOTE: For the purposes of L5.8(b) "impact" is defined as noise levels that exceed the noise levels in L5.2.

L5.9 If works are undertaken by a utilities provider during a scheduled respite period identified by Condition L5.8, and those works are related to the scheduled activity permitted by this licence, the licensee must:

(a) where feasible, reschedule any works permissible by Condition L5.7 to provide respite to impacted noise sensitive receivers so that the minimum number of respite periods in any week can be achieved; or
(b) consider the provision of alternative respite or mitigation to impacted noise sensitive receivers; and
(c) provide documentary evidence to the EPA in support of any decision made by the licensee in relation to the provision or refusal of any respite or mitigation within the validation report required by Condition R4.4.

L5.10 **Community Agreement**

The licensee may undertake works outside of standard construction hours if agreement between the licensee and a substantial majority of noise sensitive receivers has been reached.

Note: This condition applies to out-of-hours works that have not been approved by another condition of this licence.

L5.11 Any agreement(s) between the licensee and noise sensitive receivers referred to in Condition L5.10 must be:

(a) submitted to the EPA for approval prior to any works that are the subject of the agreement being undertaken; and
(b) prepared in writing and a copy of the agreement(s) kept on the premises by the licensee for the duration of this licence; and
(c) kept on the licensee's project website for the duration of the agreement (personal details of residents must be omitted); and
(d) prepared and implemented in accordance with Condition E1

L5.12 **Notification of works approved outside of standard construction hours**

(a) The licensee must notify affected noise sensitive receivers of works approved outside of standard construction hours not less than 5 days and not more than 14 days before those works are to be undertaken.
(b) The notification must be:

- by letterbox drop or email; and
- be detailed on the project website.

(c) The notification required by paragraphs (a) and (b) of this condition must:

- clearly outline the reason that the work is required to be undertaken outside the hours specified in Condition L5.1;
- include a diagram that clearly identifies the location of the proposed works in relation to nearby cross streets and local landmarks;
- include details of relevant time restrictions that apply to the proposed works;
- clearly outline, in plain English, the location, nature, scope and duration of the proposed works;
- detail the expected noise impact of the works on noise sensitive receivers;
- clearly state how complaints may be made and additional information obtained; and
- include the number of the telephone complaints line required by Condition M4.1, an after hours contact phone number specific to the works undertaken outside the hours specified in Condition L5.1, and the project website address.

This condition does not apply to works undertaken in accordance with Condition L5.3.

L5.13 The operation of condition L5.7 is subject to review by the EPA after the first four (4) occasions of works permitted under L5.7. The licensee must submit to EPA for information, and at least one week prior to the execution of works, the out of hours works permit or assessment prepared to assess noise impacts for each occasion of works to be executed under condition L5.7.

L5.14 Works Approved Outside of Standard Construction hours - Stacey Street Bridge, Bankstown.

Works at Stacey Street Bridge, Bankstown, as outlined in the licence variation application supporting document submitted to the EPA on 26 August 2022, are permitted to be undertaken over six weekends, plus an additional three contingency weekends if required, between 14 October 2022 and 31 January 2023, provided that:
(a) Works occur between 1800 Friday and 0700 Monday;
(b) The need for contingency weekend/s is notified in writing to the EPA prior to works commencing. Works may be undertaken on the contingency weekend only in the case of an emergency, poor weather conditions or operational constraints;
(c) All reasonable and feasible noise and vibration measures as detailed in the *Interim Construction Noise*

Guidelines (DECC 2009) are implemented;
(d) No jackhammering is undertaken;
(f) The licensee must undertake noise validation monitoring on the first two weekends of work and provide a report to the EPA within 14 days; and
(g) The licensee complies with requirements of Condition L5.12.

L6 Potentially offensive odour

L6.1 No condition of this licence identifies a potentially offensive odour for the purposes of section 129 of the Protection of the Environment Operations Act 1997.

Note: Section 129 of the Protection of the Environment Operations Act 1997, provides that the licensee must not cause or permit the emission of any offensive odour from the premises but provides a defence if the emission is identified in the relevant environment protection licence as a potentially offensive odour and the odour was emitted in accordance with the conditions of a licence directed at minimising odour.

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
a) must be maintained in a proper and efficient condition; and
b) must be operated in a proper and efficient manner.

O3 Dust

O3.1 The licensee must minimise the emission of dust from the premises to the greatest extent practicable.

O4 Waste management

O4.1 **Waste management**

The licensee must assess, classify and manage any waste generated at the premises in accordance with the *Waste Classification Guidelines Part 1: Classifying Waste, November 2014* prior to taking the waste off the premises.

O4.2 The licensee must not cause, permit or allow any waste generated:

(a) Outside the premises to be received at the premises, except for recycled materials from Sydney Trains rail corridor (EPL 12208) or Sydney Trains recycling facility (EPL 7515), Virgin Excavated Natural Material or materials that meet the EPA's Resource Recovery Exemptions for engineered fill purposes;
(b) At the premises to be land applied at the premises, except as permitted in Condition O4.3.

O4.3 Excavated material suitable for re-use within the premises, may be transported from one part of the premises or the Sydney Trains rail corridor or Sydney Trains recycling facility to another part of the premises by road.

O4.4 **Waste Management Plans**

Waste Management Plans must be prepared for all demolition/construction/excavation works undertaken on the premises that generate waste that will be disposed offsite (not including office paper or cardboard). The plan must be completed prior to waste being transported off the premises. The plans must include the following:

(a) Estimations of the different waste types to be generated from the proposed works; and
(b) Estimations of how much of each waste type will be generated from the proposed works; and
(c) List of all places (full street address) where waste will be transported to; and
(d) Written confirmation from each place of disposal (listed in point c) that they can lawfully receive the types of waste proposed to be transported there.
(e) Where the place of disposal changes after the plan has been made, an amendment to the plan can be made as an addendum that includes an update points a) to d) above.

O4.5 The licensee must ensure waste management, waste transport and waste disposal is carried out in accordance with the waste management plans prepared for the premises.

O4.6 A copy of all waste management plans must be kept on the premises.

O4.7 **Waste Transport Documentation and Record Keeping**

Legible copies of all receipts and/or weighbridge dockets in relation to disposal of waste from the premises must be collected from transporters and/or contractors and kept by the licensee.

O4.8 **Transport and Storage of Qenos pipe**

The Qenos pipe identified within the premises in accordance with L3.1 may be transported by road to the secure storage, located within the Canterbury site compound of the premises.

O4.9 Transport of Qenos pipe under Condition O4.8 must be in accordance with Clause 78 of the *Protection of the Environment Operations (Waste) Regulation 2014*.

O4.10 The Qenos pipe must be securely packaged and stored in a sealed container when stored at the

Canterbury site compound of the premises.

O5 Other operating conditions

O5.1 Erosion and sediment control

All feasible and reasonable erosion and sediment controls are to be implemented to minimise sediment (including dust) leaving the premises and are to be implemented before any soil disturbance or vegetation clearing commences.

O5.2 All erosion and sediment controls at the premises must be maintained until all disturbed areas are stabilised.

O5.3 The erosion and sediment controls to be implemented are to include but not be limited to:
a) minimising the area of exposed soil as much as practicable, including stabilising disturbed areas as soon as practicable; and
b) diversion of run-off from land upslope of the premises or undisturbed portions of the premises away from areas of soil disturbance as much as practicable; and
c) diversion of run-off from areas of exposed soil to appropriate sediment control devices as much as practicable; and
d) installing erosion controls in the base of drains used to divert runoff, to minimise erosion of sediment from the drain

O5.4 Erosion and sediment controls are to be selected, installed and maintained taking into consideration the guidance in "Managing Urban Stormwater – Soils and Construction, Volume 2D, Main road construction" (DECC 2008) and "Managing urban stormwater: soils and construction – Volume 1" (Landcom 2006).

O5.5 The licensee must inspect the operation of all erosion and sediment controls installed on the premises and undertake any works required to repair and/or maintain these controls:
a) at least weekly;
b) daily during periods of rainfall that causes runoff to occur; and
c) prior to any site closure of greater than 24 hours.

O5.6 The licensee is required to prepare an erosion and sediment control strategy document. The licensee must ensure that:
a) The document describes all erosion and sediment controls (including those relating to the minimisation of mud tracking from the premises) to be implemented at the site; and
b) The document is prepared before the controls are implemented; and
c) A copy of the document is kept at the premises until the licences is surrendered; and
d) The document includes an assessment of how the reasonable and feasible erosion and sediment controls (including those relating to the minimisation of mud tracking from the premises) were selected; and
e) The document is updated prior to any changes to the erosion and sediment controls.

O5.7 The licensee must record all inspections of erosion and sediment controls, including observations on the condition of the controls, and works undertaken to repair and/or maintain the controls. These records are to be kept on the premises.

O5.8 All stockpiled material must be stabilised as soon as practicable if the stockpile has been left in-situ for

greater than 5 days.

O5.9 A water quality sampling point is to be located on the discharge pipe from any sediment basin or other water treatment device and:

a) The licensee must ensure that a sign is located at the discharge point noting the discharge point number identified under this licence; and
b) A safe access path is to be provided to the sampling point to readily allow for the collection of samples.

5 Monitoring and Recording Conditions

M1 Monitoring records

M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.

M1.2 All records required to be kept by this licence must be:
a) in a legible form, or in a form that can readily be reduced to a legible form;
b) kept for at least 4 years after the monitoring or event to which they relate took place; and
c) produced in a legible form to any authorised officer of the EPA who asks to see them.

M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:
a) the date(s) on which the sample was taken;
b) the time(s) at which the sample was collected;
c) the point at which the sample was taken; and
d) the name of the person who collected the sample.

M2 Requirement to monitor concentration of pollutants discharged

M2.1 For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:

M2.2 Water and/ or Land Monitoring Requirements

POINT 1

Pollutant	Units of measure	Frequency	Sampling Method
Oil and Grease	Visible	Special Frequency 1	Visual Inspection
pH	pH	Special Frequency 1	In situ
Total suspended solids	milligrams per litre	Special Frequency 1	Grab sample

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POINT 2

Pollutant	Units of measure	Frequency	Sampling Method
Oil and Grease	Visible	Special Frequency 1	Visual Inspection
pH	pH	Special Frequency 1	In situ
Total suspended solids	milligrams per litre	Special Frequency 1	Grab sample

POINT 3

Pollutant	Units of measure	Frequency	Sampling Method
Oil and Grease	Visible	Special Frequency 1	Visual Inspection
pH	pH	Special Frequency 1	In situ
Total suspended solids	milligrams per litre	Special Frequency 1	Grab sample

POINT 4

Pollutant	Units of measure	Frequency	Sampling Method
Oil and Grease	Visible	Special Frequency 1	Visual Inspection
pH	pH	Special Frequency 1	In situ
Total suspended solids	milligrams per litre	Special Frequency 1	Grab sample

POINT 5

Pollutant	Units of measure	Frequency	Sampling Method
Oil and Grease	Visible	Special Frequency 1	Visual Inspection
pH	pH	Special Frequency 1	In situ
Total suspended solids	milligrams per litre	Special Frequency 1	Grab sample

POINT 6

Pollutant	Units of measure	Frequency	Sampling Method
Oil and Grease	Visible	Special Frequency 1	Visual Inspection
pH	pH	Special Frequency 1	In situ
Total suspended solids	milligrams per litre	Special Frequency 1	Grab sample

POINT 7

Pollutant	Units of measure	Frequency	Sampling Method
Oil and Grease	Visible	Special Frequency 1	Visual Inspection
pH	pH	Special Frequency 1	In situ
Total suspended solids	milligrams per litre	Special Frequency 1	Grab sample

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POINT 8

Pollutant	Units of measure	Frequency	Sampling Method
Oil and Grease	Visible	Special Frequency 1	Visual Inspection
pH	pH	Special Frequency 1	In situ
Total suspended solids	milligrams per litre	Special Frequency 1	Grab sample

M2.3 For the purposes of Conditions M2.1, the term 'Special Frequency 1' means:

(a) Less than 24hours prior to controlled discharge and daily for any controlled discharge.

M3 Testing methods - concentration limits

M3.1 Subject to any express provision to the contrary in this licence, monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area must be done in accordance with the Approved Methods Publication unless another method has been approved by the EPA in writing before any tests are conducted.

M4 Weather monitoring

M4.1 The licensee must monitor forward weather forecasts for wind velocity and rainfall at either the project weather station, or through analysis of equivalent weather information obtained from the Australian Bureau of Meteorology to enable proactive implementation of dust and soil and sediment control measures.

M5 Recording of pollution complaints

M5.1 The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.

M5.2 The record must include details of the following:
a) the date and time of the complaint;
b) the method by which the complaint was made;
c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
d) the nature of the complaint;
e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
f) if no action was taken by the licensee, the reasons why no action was taken.

M5.3 The record of a complaint must be kept for at least 4 years after the complaint was made.

M5.4 The record must be produced to any authorised officer of the EPA who asks to see them.

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M6 Telephone complaints line

M6.1 The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.

M6.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.

M6.3 The preceding two conditions do not apply until two weeks after the date of the issue of this licence.

M6.4 **Notification of Community Complaints Line**

The licensee must ensure that the community notification required by condition M5.2 is undertaken:

(a) by including details on the project website on:

1. how the public can make a complaint on the telephone complaints line; and
2. how complaints will be processed

(b) by clear signage at the boundary of each worksite that contains both the telephone complaints line number and the project website details.
Note: For the purposes of this Condition and Condition M5.1, the telephone complaints line and notification of the telephone complaints line is operated and undertaken by Transport for NSW. The licensee will have staff available to respond to complaints during hours when works are occurring.

M6.5 **Noise and Vibration Complaints**

(a) The licensee must investigate noise and vibration complaints:
(i) within two hours of the complaint being made; or
(ii)in accordance with any documented complaint management agreement between the licensee and the complainant.
(b) The licensee must ensure that any investigation referred to in this condition that identifies works or activities being undertaken on the licenses premises as the likely source of the complaint, includes an offer to the complainant to undertake attended noise or vibration monitoring at their premises unless representative real-time monitoring data was being collected at the time of the complaint.

(c) If the occupant of the dwelling or management personnel of a noise sensitive receiver other than a dwelling accepts the offer of attended noise or vibration monitoring the licensee must undertake that attended monitoring:
(i) As soon as practicable; or
(ii) At a time agreed with the complainant.

M6.6 **Notifying Results of Complaint Investigation**
The licensee must, in respect of each complaint made to the telephone complaints line required by Condition M5.1, advise each complainant of the results of its investigation of their complaint and any proposed remedial action.

M7 Noise monitoring

M7.1 Any noise monitoring must be undertaken in accordance with *Australian Standard AS 2659.1 – 1998: Guide to the use of sound measuring equipment – portable sound level meters,* or any revisions of that standard which may be made by Standards Australia, and the compliance monitoring guidance provided in the *NSW Industrial Noise Policy.*

M7.2 Any vibration monitoring must be undertaken in accordance with the technical guidance provided in the *Environmental Noise Management Assessing Vibration: A Technical Guideline* (DECC, 2006). All vibration monitoring results may be assessed and reported against the acceptable values of human exposure to vibration set out in Tables 2.2 and 2.4 of the guideline.

M7.3 The licensee must undertake noise and vibration monitoring as directed by an authorised officer of the EPA.

6 Reporting Conditions

R1 Annual return documents

R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:

1. a Statement of Compliance,
2. a Monitoring and Complaints Summary,
3. a Statement of Compliance - Licence Conditions,
4. a Statement of Compliance - Load based Fee,
5. a Statement of Compliance - Requirement to Prepare Pollution Incident Response Management Plan,
6. a Statement of Compliance - Requirement to Publish Pollution Monitoring Data; and
7. a Statement of Compliance - Environmental Management Systems and Practices.

At the end of each reporting period, the EPA will provide to the licensee notification that the Annual Return is due.

R1.2 An Annual Return must be prepared in respect of each reporting period, except as provided below.

Note: The term "reporting period" is defined in the dictionary at the end of this licence. Do not complete the Annual Return until after the end of the reporting period.

R1.3 Where this licence is transferred from the licensee to a new licensee:
a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and
b) the new licensee must prepare an Annual Return for the period commencing on the date the application for

the transfer of the licence is granted and ending on the last day of the reporting period.

Note: An application to transfer a licence must be made in the approved form for this purpose.

R1.4 Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on:
a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or
b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.

R1.5 The Annual Return for the reporting period must be supplied to the EPA via eConnect *EPA* or by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').

R1.6 The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.

R1.7 Within the Annual Return, the Statements of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:
a) the licence holder; or
b) by a person approved in writing by the EPA to sign on behalf of the licence holder.

R2 Notification of environmental harm

R2.1 Notifications must be made by telephoning the Environment Line service on 131 555.

Note: The licensee or its employees must notify all relevant authorities of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.

R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which they became aware of the incident.

R3 Written report

R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:
a) where this licence applies to premises, an event has occurred at the premises; or
b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence,
and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.

R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.

R3.3 The request may require a report which includes any or all of the following information:

a) the cause, time and duration of the event;
b) the type, volume and concentration of every pollutant discharged as a result of the event;
c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event;
d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;
e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants;
f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and
g) any other relevant matters.

R3.4 The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.

R4 Other reporting conditions

R4.1 **Daily Complaints Reports**

(a) The licensee must submit by 2:00pm each business day a report to the EPA that provides details of all complaints received in relation to construction activities regulated by the licence on the telephone complaints line required by Condition M5 or through any other means.
(b) The report must:

1. Be submitted to the email address nominated by the EPA; and
2. Include a unique identifier number for each complainant together with the details required by condition M4.2; and
3. Include date and time as reported by the complainant of the event that is the subject of the complaint; and
4. Include an outline of the work or activity that is the subject of the complaint; and
5. Include the complaints received between 12am and 12pm; and
6. If the works have been carried out under Conditions L5.2, L5.3, L5.6, L5.7, or L5.10 the report must include a copy of any assessments required by these conditions unless previously provided to the EPA, and details of how the requirements of these conditions have been met.

(c) The licensee is not required to submit a report for any reporting period during which no complaints have been received.

R4.2 **Noise and Vibration Reports**

(a) Upon request of an authorised officer, the licensee must submit a Preliminary Investigation Report to the EPA in respect of any noise or vibration monitoring undertaken in accordance with the requirements of Condition M6.5
(b) The Preliminary Investigation Report must be submitted to the EPA by 4:30pm on the afternoon of the next working day following any noise or vibration monitoring.
(c) The Preliminary Investigation Report must:

1. Include numerical and/or graphical representation of the noise and vibration monitoring results; and
2. Highlight any detected exceedance of noise limits or noise management levels specified in this licence, relevant noise modelling and any relevant noise guidelines.

R4.3 In the event of any exceedance of the best achievable noise performance objectives identified in Construction Noise and Vibration Impact Statements prepared for the works, the licensee must:

(a) Modify activities and implement all reasonable and feasible measures to prevent a recurrence of the exceedance; and
(b) Submit a Follow-Up Investigation Report to the EPA within 5 working days of any noise or vibration monitoring having been undertaken (unless otherwise approved by the EPA).
(c) The Follow-Up Investigation Report must include:

1. Confirmation of whether noise monitoring has been undertaken in accordance with AS2659 and the compliance monitoring guidance provided in the INP; and
2. Confirmation of whether vibration monitoring has been undertaken in accordance with the guidance provided in *Assessing Vibration: a technical guideline (DEC 2006).*
3. Details of the prevailing meteorological conditions during the period when the monitoring was undertaken; and
4. A map of each noise and vibration monitoring location in relation to the noise source, including relevant distances; and
5. Numerical and graphical representation of the noise and vibration monitoring results; and
6. An analysis of the noise and vibration monitoring results; and
7. Details of any remedial action taken in relation to the matter; and
8. In cases not the subject of remedial action, detailed justification of the decision not to undertake remedial action.

R4.4 **Out of Standard Hours Works - Validation Report**

(a) For activities permitted under Condition L5.6 & L5.7, a validation report must be submitted to the EPA that includes the following detail:

1. Confirmation that the equipment used to undertake the works was as specified in the relevant Construction Noise and Vibration Impact Assessment for the worksite; and
2. A copy of the community notification required under Condition L5.12
3. Noise monitoring as required by L5.8(d)
4. Details of any exceedances of predicted noise levels; and
5. Details of the noise and vibration mitigation measures that were implemented as specified in the relevant Construction Noise and Vibration Impact Assessment for the worksite; and,
6. The justification required under L5.6 & L5.7 for the carrying out of works outside of standard construction hours in L5.1.

(b) The validation report must be submitted to the EPA fortnightly from the commencement of the works permitted by L5.6 & L5.7 by no later than 2 business days from the end of each fortnight.

7 General Conditions

G1 Copy of licence kept at the premises or plant

G1.1 A copy of this licence must be kept at the premises to which the licence applies.

G1.2 The licence must be produced to any authorised officer of the EPA who asks to see it.

G1.3 The licence must be available for inspection by any employee or agent of the licensee working at the premises.

G2 Other general conditions

G2.1 **Environmental Induction**

(a) The licensee must ensure that before any construction work is undertaken, all personnel involved in undertaking that work receive environmental induction training.
(b) The induction training must:

1. Clearly identify the location of all noise sensitive receivers likely to be affected by noise or vibration generated during the course of the work undertaken by those personnel; and
2. Highlight the licence requirements to minimise noise and vibration impacts on noise sensitive receivers.

8 Special Conditions

E1 Community Agreements

E1.1 **Requirements for community agreements**

Any community agreement to permit works to be undertaken outside of standard construction hours (OOHW) under Condition L5.10 must:
(a) be prepared and implemented in accordance with the relevant sections of the Interim Construction Noise Guidelines (DEC 2009), the Industrial Noise Policy (EPA 1999) and AS2346-2010 Guide to noise and vibration control on construction, demolition and maintenance sites;
(b) detail the following:

1. the actual works proposed;
2. any expected impacts in clear, simple English based on noise modelling;

3. the expected duration of the works;
4. any expected benefits for receivers;
5. any other concurrent OOHW that will be occurring; and
6. any other OOHW that will be occurring on the nights preceding and following the proposed works or, if the proposed work precedes or follows a weekend period, any other OOHW that will be occurring on the weekend.

(c) demonstrate that the noise sensitive receivers party to the agreement understand the nature of the works and any predicted impacts; and
(d) be kept for the duration of the agreement and made available to an EPA authorised officer on request.

E1.2 **Consultation and Engagement**

In relation to consulting and engaging with noise sensitive receivers for a community agreement, the following applies:
(a) all noise sensitive receivers predicted by modelling to be impacted by noise greater than 5 dB(A) above RBL must be consulted on any proposed community agreement. This includes noise sensitive receivers that have declined to participate in previous agreements;
(b) all proposed agreements must include details for interpreting services for languages other than English where required; and
(c) If a licensee is unable to contact a noise sensitive receiver after three attempts, including leaving "sorry I missed you" cards explaining the reason for the visit and requesting a return phone call, then the licensee will note that the receiver could not be contacted and the receiver will not be considered to have either agreed or disagreed; and
(d) records of the attempts to contact the receiver will be kept by the licensee.

E1.3 **Agreement thresholds**

(a) The EPA will consider agreements reached between the licensee and a substantial majority of both:

1. noise sensitive receivers predicted to by the licensee to be impacted by noise levels exceeding those specified in Condition L5.2(a) and L5.2(b); and
2. noise sensitive receivers predicted to bythe licensee to be impacted by noise levels above a highly noise affected level of 75dB(A).

E1.4 **Community agreements attained by phone**

Where a community agreement has been reached with noise sensitive receivers over the phone, the following applies:
(a) the phone script used to describe the proposed agreement (including information required under Condition E1.1(b)) is to be provided to the EPA with the community agreement for approval; and
(b) the script must include a clear question requesting receiver agreement to the proposal; and

(c) detailed records are to be maintained by the licensee of all community agreement phone conversations and must be maintained for the duration of the community agreement; and
(d) any noise sensitive receiver who requests a copy of the phone agreement must be supplied with one.

E1.5 **Notification**

All noise sensitive receivers must be advised of any community agreement that has been attained in writing within seven days of the agreement being finalised and must:

(a) include a website link to the project website, specifically to a summary of the approved project agreement; and
(b) include details of the licensees complaints line as requires by condition M6; and
(c) include details of the EPAs Environment Line.

The notification requirements in Condition L5.13 apply to community agreements.

E1.6 **Monitoring**

Validation monitoring must be undertaken for any works that are the subject of a community agreement and must:

(a) be performed by a suitably qualified and experienced person; and
(b) be performed on at least the first 2 nights where OOHW will be undertaken.

E1.7 If validation monitoring undertaken under Condition E1.6 shows that noise levels are higher than those predicted by any noise modelling undertaken as part of the community agreement, work practices must be modified so that measured noise levels do not exceed predicted levels.

E1.8 A validation monitoring plan must be submitted to the EPA for approval as part of the community agreement documentation prior to any OOHW occurring.

E2 Water discharge Point 8 - temporary monitoring

E2.1 Monitoring of the first two discharge events for the following contaminants must be undertaken:

- hydrocarbons, including
  - TRH - Total recoverable hydrocarbons
  - PAH - Polycyclic aromatic hydrocarbons
  - BTEX - benzene, toluene, ethylbenzene and xylene
  - VOC - Volatile organic compounds
  - phenols
- heavy metals
- OCP - Organochlorine pesticides
- OPP - Organophosphorous pesticides

- PCB - Polychlorinated biphenyls

E2.2 The licensee is required to submit a report within 30 days of the second discharge event, comparing the results against the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2018 (ANZG (2018)) default guideline values for toxicants at the 95 per cent species protection level; and the 99th percentile for bio accumulative and persistent toxicants.

E2.3 The report must include additional mitigation options to reduce contaminant levels if monitoring results are above ANZG (2018) guideline levels.

Note: Based on the results of the first two discharge events, EPA may extend monitoring requirements.

E3 Special Dictionary

E3.1

Term	Meaning
AS 2659	means Australian Standard AS 2659.1 – 1988 : Guide to the use of sound measuring equipment – Portable sound level meters
Business day	excludes Saturdays, Sundays, public holidays and rostered days off (RDOs)
Operating hours	means hours during which any construction-related works or activities are being undertaken, including outside of standard construction hours
Construction work	includes all construction work and activities, and all construction-related work and activities, undertaken on the premises.
Day	the period from 0700 and 1800 h (Monday to Saturday) and 0800 to 1800 h (Sundays and Public Holidays) as per the definition in the New South Wales Government' s Industrial Noise Policy.
Erosion controls	works or activities undertaken to protect soil from dislocation by water or wind and includes stabilisation of disturbed areas, the placement of erosion control blankets and the use of soil binders.
Essential utility services	means telephone, electricity, gas and water services.
Evening	the period from 1800 to 2200 h as per the definition in the New South Wales Government's Industrial Noise Policy.
Feasible Noise Abatement Measures	Means actions to reduce noise levels that are capable of being put into practice or of being engineered and are practical to build given project constraints such as safety and maintenance requirements
High noise impact activities and works	means jack hammering, rock breaking or hammering, pile driving, vibratory rolling, cutting of pavement, concrete or steel or other work occurring on the surface that generates noise with impulsive, intermittent, tonal or low frequency characteristics.

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INP	means the New South Wales Industrial Noise Policy published by the EPA in January 2000.
Impulsive noise	has the same meaning as in section 4.2 of the INP.
Interim Construction Noise Guidelines	Interim Construction Noise Guidelines (DECC, July 2009).
Intermittent noise	has the same meaning as in section 4.2 of the INP.
Out of hours	means hours outside those prescribed by condition L5.1.
Noise Management Level (NML)	has the same meaning as "Airborne Noise Management Levels" in the Interim Construction Noise Guideline (DECC 2009)
Night	the period from 2200 to 0700 h (Monday to Saturday) and 2200 to 0800 h (Sundays and Public Holidays) as per the definition in the New South Wales Government' s Industrial Noise Policy.
Noise sensitive receiver	Land uses that are sensitive to noise, such as residential areas, churches, schools and recreation areas.
Practicable and reasonable	has the same meaning as 'reasonable and feasible' in the INP.
Rating Background Level (RBL)	the same meaning as in the Interim Construction Noise Guideline (DECC 2009)
Reasonable noise abatement measures	Means those feasible noise abatement actions that are considered reasonable in the circumstances, based on a judgement that the overall noise benefits outweigh the overall adverse social economic and environmental effects, including the cost of measure. To make such a judgement, consideration is to be given to noise level impacts, noise mitigation benefits, cost effectiveness of noise mitigation and community views.
Residence	A lawful and permanent structure erected in a land-use zone that permits residential use (or for which existing use rights under the EP&A Act apply) where a person/s permanently reside and is not, nor associated with, a commercial undertaking such as caretakers quarters, hotel, motel, transient holiday accommodation or caravan park.
Sediment controls	works or activities undertaken to retain sediment and includes sediment fences, sediment basins, sediment traps and sediment filters.
Soil and water management works	include all measures to control erosion and sediment such as sediment filters, drains, ponds, basins, stormwater run on and runoff controls, site stabilisation works, temporary water crossings and vehicular access controls.
Tonal noise	the same meaning as in section 4.2 of the INP.

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Dictionary

General Dictionary

3DGM [in relation to a concentration limit]	Means the three day geometric mean, which is calculated by multiplying the results of the analysis of three samples collected on consecutive days and then taking the cubed root of that amount. Where one or more of the samples is zero or below the detection limit for the analysis, then 1 or the detection limit respectively should be used in place of those samples
Act	Means the Protection of the Environment Operations Act 1997
activity	Means a scheduled or non-scheduled activity within the meaning of the Protection of the Environment Operations Act 1997
actual load	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
AM	Together with a number, means an ambient air monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
AMG	Australian Map Grid
anniversary date	The anniversary date is the anniversary each year of the date of issue of the licence. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
annual return	Is defined in R1.1
Approved Methods Publication	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
assessable pollutants	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
BOD	Means biochemical oxygen demand
CEM	Together with a number, means a continuous emission monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
COD	Means chemical oxygen demand
composite sample	Unless otherwise specifically approved in writing by the EPA, a sample consisting of 24 individual samples collected at hourly intervals and each having an equivalent volume.
cond.	Means conductivity
environment	Has the same meaning as in the Protection of the Environment Operations Act 1997
environment protection legislation	Has the same meaning as in the Protection of the Environment Administration Act 1991
EPA	Means Environment Protection Authority of New South Wales.
fee-based activity classification	Means the numbered short descriptions in Schedule 1 of the Protection of the Environment Operations (General) Regulation 2009.
general solid waste (non-putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997

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flow weighted composite sample	Means a sample whose composites are sized in proportion to the flow at each composites time of collection.
general solid waste (putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environmen t Operations Act 1997
grab sample	Means a single sample taken at a point at a single time
hazardous waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
licensee	Means the licence holder describe d at the front of this licence
load calculation protocol	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
local authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
material harm	Has the same meaning as in section 147 Protection of the Environment Operations Act 1997
MBAS	Means methylene blue active substances
Minister	Means the Minister administering the Protection of the Environment Operations Act 1997
mobile plant	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
motor vehicle	Has the same meaning as in the Protection of the Environment Operations Act 1997
O&G	Means oil and grease
percentile [in relation to a concentration limit of a sample]	Means that percentage [eg.50%] of the number of samples taken that must meet the concentration limit specified in the licence for that pollutant over a specified period of time. In this licence, the specified period of time is the Reporting Period unless otherwise stated in this licence.
plant	Includes all plant within the meaning of the Protection of the Environment Operations Act 1997 as well as motor vehicles.
pollution of waters [or water pollution]	Has the same meaning as in the Protection of the Environment Operations Act 1997
premises	Means the premises described in condition A2.1
public authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
regional office	Means the relevant EPA office referred to in the Contacting the EPA document accompanying this licence
reporting period	For the purposes of this licence, the reporting period means the period of 12 months after the issue of the licence, and each subsequent period of 12 mo nths. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
restricted solid waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
scheduled activity	Means an activity listed in Schedule 1 of the Protection of the Environment Operations Act 1997
special waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TM	Together with a number, means a test method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.

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TSP	Means total suspended particles
TSS	Means total suspended solids
Type 1 substance	Means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements
Type 2 substance	Means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements
utilisation area	Means any area shown as a utilisation area on a map submitted with the application for this licence
waste	Has the same meaning as in the Protection of the Environment Operations Act 1997
waste type	Means liquid, restricted solid waste, general solid waste (putrescible), general solid waste (non-putrescible), special waste or hazardous waste
Wellhead	Has the same meaning as in Schedule 1 to the Protection of the Environment Operations (General) Regulation 2021.

Ms Claire Miles

Environment Protection Authority

(By Delegation)

Date of this edition: 17-January-2019

End Notes

2	Licence varied by notice	1582625 issued on 23-Jul-2019
3	Licence varied by notice	1587883 issued on 09-Dec-2019
4	Licence varied by notice	1589586 issued on 17-Dec-2019
5	Licence varied by notice	1597193 issued on 07-Jul-2020
6	Licence varied by notice	1601881 issued on 23-Oct-2020
7	Licence varied by notice	1606641 issued on 30-Mar-2021
8	Licence varied by notice	1611789 issued on 25-Aug-2021
9	Licence varied by notice	1618703 issued on 24-Jun-2022
10	Licence varied by notice	1621017 issued on 10-Aug-2022
11	Licence varied by notice	1623358 issued on 07-Oct-2022

Appendix F – Sydney Metro Out-of-Hours Works Application

Out-of-Hours Work Application

Out of Hours Work Application Form

This form is to be used for formal review and approval of Sydney Metro Out of Hours (OOH) work as it may affect Residential and non-Residential receivers. This form can be used in accordance with the *SM ES-PW-317 City & Southwest Out of Hours Work Strategy / Protocol*. Each OOH application and all applicable appendices must be submitted to Sydney Metro as one PDF file at least 15 business days prior to the commencement of the proposed OOH work.

1. OOH Application	
Sydney Metro Project: E.g. Northwest, City & Southwest, West, etc.	
Contract:	
Contractor:	
Application Title: E.g. 'Smith St service relocation works'	
Application Number: E.g. 1, 2, 3, etc.	
Application Date: Original submission date (resubmission date in parentheses if applicable)	
Relevant Planning Approval:	
Environment Protection Licence (EPL): If subject to an EPL, state title and number.	

2. Proposed OOH Work Details	
Description of works, including: • Work methodologies. • List of plant / equipment to be used (worst case scenario). • Location Map (and/or Environmental Control Map) attached as Appendix 1, indicating location of works, plant / equipment locations and receivers (including distance to nearest receiver for noisiest plant / equipment). • Traffic Management Plan and/or Traffic Control Plan if applicable as Appendix 2.	
Timing of works: Including proposed dates / times works are planned to be undertaken outside standard hours.*	
Worst-case number of consecutive occasions affecting the same receiver: Refer to Section 4 for definition of 'occasion'.	
Justification: Demonstrate how the proposed OOH work has been scheduled in accordance with the OOH work period prioritisation list.* Program acceleration is generally not accepted as a justification.	

* Unless specified otherwise in project-specific documentation, the prioritisation of work time periods is as follows:
- **Standard Hours:** 7am to 6pm weekdays and 8am to 1pm Saturdays (note that Standard Hours for works subject to the City & Southwest Sydenham to Bankstown planning approval also include 1pm to 6pm Saturdays).
- **Daytime OOH:** 1pm to 6pm Saturdays and 8am to 6pm Sundays and Public Holidays.
- **Evening OOH:** 6pm to 9pm every day.
- **Night Time OOH:** 9pm to 7am weekday mornings and 9pm to 8am weekend and Public Holiday mornings.

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3. Assessed Noise and Vibration Impacts and Standard Mitigation Measures	
Are the proposed works consistent with a prepared Construction Noise & Vibration Impact Statement (CNVIS)? (Y / N)	
If 'N', skip this section and move to Section 4.	
State the title of the CNVIS and attach the section(s) describing the noise and vibration impacts of the proposed works as Appendix 3.	
Quantitatively summarise the worst-case predicted noise and vibration impacts specific to the proposed OOH work for each OOH period on the nearest receivers and compare these against the respective management levels. **For Night Time OOH Period works, include a review of potential sleep disturbance impacts in accordance with Section 4.3 of the ICNG.**	Worst-case predicted noise impact summary: • • • Worst-case predicted vibration impact summary: • Potential sleep disturbance summary (for night time OOH periods only): •
Using Table 4 and Table 5, indicate in Table 6: • Which Additional Mitigation Measures (AMMs) are applicable for consideration, • Which of those applicable for consideration are planned to be implemented, • For AMMs that are applicable for consideration but not being implemented, justify why the AMM is not being implemented. • For AMMs that are being implemented, provide details on how the AMM is being implemented (e.g. which receivers being offered respite, alternative accommodation, etc.).	

4. Non-Assessed Noise and Vibration Impacts

Skip this section if Section 3 has been completed in full.

A quantitative noise assessment for OOH work is to be carried out in accordance with the *Interim Construction Noise Guideline* (DECC, 2009). This section allows applicants to address these requirements through the following steps:

1) Establishing Rating Background Levels (RBLs) and Noise Management Levels (NMLs).
2) Predicting the anticipated noise levels using a quantitative noise assessment:
   a. Works that are not likely to generate high noise impacts for a significant duration may use a preliminary quantitative noise assessment (facilitated within this form). This ensures that all applications, as a minimum, include a preliminary quantitative noise assessment in accordance with the *Interim Construction Noise Guideline* (ICNG).
   b. Works that are likely to generate high noise impacts for a significant duration may require a detailed quantitative noise assessment (e.g. Construction Noise and Vibration Impact Statement) to be undertaken.
   c. Works that are likely to generate ground-borne or structure-borne vibration and/or noise require specialist advice and assessment.
3) Comparing predicted noise levels against RBLs / NMLs and applying standard mitigation measures as appropriate (i.e. implementing 'all feasible and reasonable' mitigation measures in accordance with the ICNG).
4) Considering additional mitigation measures when predicted noise levels exceed RBLs / NMLs.

The need for a detailed quantitative noise and vibration assessment will be considered by Sydney Metro, the contractor and the Acoustic Advisor / Environmental Representative (if applicable) collectively when the predicted noise levels are anticipated to:

- Exceed an RBL at a residential receiver or an NML at a non-residential receiver by more than 10dBA, **AND**
- Affect the same receiver on 10 or more consecutive **occasions**. An occasion is anytime works are carried out:
  - Between 6pm on a weekday and the start of standard hours the next day, **OR**
  - Between 1pm on a Saturday and 8am on a Sunday (or between 6pm on a Saturday and 8am on a Sunday for works subject to the Sydenham to Bankstown planning approval), **OR**
  - Between 8am on a Sunday or public holiday and the start of standard hours the next day.

A detailed quantitative noise and vibration assessment should generally include:

- Derivation of RBLs for residential receivers and/or derivation of NMLs for non-residential receivers based on noise monitoring at representative locations and local sensitivities.
- Detailed noise predictions for daytime, evening and night time OOH periods (as applicable) in accordance with Section 4.5 of the ICNG (including an outline of timing, duration and predicted noise levels for each OOH period).
- For Night Time OOH Period works, a review of potential sleep disturbance impacts in accordance with Section 4.3 of the ICNG.
- Detailed predictions of vibration levels for sensitive receivers.

Please complete the following Steps 1 to 4.

Step 1: RBLs / NMLs	If RBLs for residential receivers or NMLs for non-residential receivers have already been established (e.g. in an Environmental Impact Statement, Review of Environmental Factors, detailed quantitative noise assessment or Construction Noise and Vibration Impact Statement for other work activities), enter into Table 3 and attach the supporting evidence as Appendix 3. If no RBLs / NMLs have been established, use Table 1 to estimate and enter into Table 3.
Step 2: Predicted Anticipated Noise Levels	If predicted anticipated noise levels have already been established (e.g. in an Environmental Impact Statement, Review of Environmental Factors, detailed quantitative noise assessment), enter the predicted anticipated noise levels into Table 3 and attach the supporting evidence as Appendix 3. If predicted anticipated noise levels have not already been established, use Table 2 to estimate anticipated noise aspects for the noisiest plant / equipment and enter into Table 3. In Table 3, use these values to calculate the anticipated predicted noise levels.
Step 3: Exceedances and Mitigation Measures	Compare the anticipated predicted noise levels to the applicable RBLs / NMLs, calculate the exceedances and enter into Table 3. In Section 5, provide a description of the standard mitigation measures that are planned to be implemented in order to mitigate the noise impacts (and vibration impacts if relevant) as much as 'feasible and reasonable' in accordance with the ICNG.
Step 4:	Use Table 4 and the exceedances in Table 3 to determine the applicable Additional Mitigation Measures for consideration. Use

Consideration of Additional Mitigation Measures	Table 6 to indicate which of these measures are applicable for consideration, which will be implemented and provide justification / details accordingly.

5. Standard Mitigation Measures	
Outline the standard noise mitigation measures that will be implemented during the proposed OOH work: I.e. Implementation of all 'feasible and reasonable' mitigation measures in accordance with the ICNG):	• • •
Outline the standard vibration mitigation measures that will be implemented during the proposed OOH work: I.e. Implementation of all 'feasible and reasonable' mitigation measures in accordance with the ICNG):	•

Table 1: Noise RBLs and NMLs

Skip this section RBLs and NMLs have already been established in other documentation.			
Sensitive Receiver Category	**Estimated RBLs (dBA)**		
Residential	**Daytime OOH**	**Evening OOH**	**Night Time OOH**
Urban (e.g. city hubs, near busy roads, near industrial activity)	**55**	**50**	**45**
Suburban	**45**	**40**	**35**
Quiet, rural or isolated	**40**	**35**	**30**
Non-Residential	**ICNG NMLs (dBA)**		
Industrial facilities	**75** (only applicable when in use)		
Offices or retail	**70** (only applicable when in use)		
Health and educational facilities	**55** (only applicable when in use)		

Table 2: Predicted Noise Level Aspects

Skip this section if predicted noise levels have already been established in other documentation.		
Noise Aspect	**Select the most applicable value for each noise aspect below and enter into Table 3.**	**dBA**
1. Plant / Equipment Noise Level at 10m Including non-continuous use reduction (-5dBA) and annoying activity penalty (+5dBA) for as per ICNG (refer to ICNG Appendix B for predicted noise level data) Underline indicates vibratory generating plant / equipment	Impact sheet piling rig	100
	Hand-held tamper, excavator with hammer, rock-breaker, driven / vibratory piling, concrete saw, diamond saw, air track drill, large dozer, hand-held rail grinder	95
	Jackhammer, rock crusher, angle grinder, pneumatic hammer, medium dozer, tracked loader, impact wrench	90
	Mainline tamper, ballast regulator, dynamic track stabiliser, vibratory roller, mainline rail grinder, ballast train (pour / fill ballast), chainsaw, tub grinder / large mulcher, scraper, grader, super-sucker / vacuum truck, large backhoe / wheeled front-end loader, bored piling, pavement profiler, fixed crane, tracked excavator	85
	Small bulldozer, small excavator, tower crane, truck-mounted crane, forklift, bobcat, skid-steer front-end loader, road truck / truck and dog, dump truck, concrete truck / pump / mixer, compressor, non-vibratory / large pad foot roller, whacker packer / compactor, water cart, pavement laying machine, asphalt truck and sprayer, line marking truck, standard penetration testing, welder, pin puller	80
	Concrete vibrator, cherry-picker scissor lift / elevated work platform / Franna crane, small backhoe, front end loader, fence post driver, electric drill rig, hand held rattle gun, generator (diesel / petrol), spreader	75

	Lighting tower, medium-rigid truck / semi-trailer, welding equipment, tracked excavator, small front end loader	70
	Light vehicle, hand-tools (no impact), small cement mixer, attenuated generator (inside housing), tracked excavator	65
2. Multiple Plant	More than one of the noisiest plant being used simultaneously at roughly the same location	+5
3. Local Screening	Existing screening between site and receiver (buildings, cuttings, canopies, etc.)	- 5
	Temporary screening to be implemented near work site	- 10
	Acoustic shed or enclosure	- 25
4. Distance Attenuation	< 10 metres	0
	10 to 20 metres	- 5
	20 to 35 metres	- 10
	35 to 60 metres	- 15
	60 to 100 metres	- 20
	100 to 180 metres	- 25
	180 to 350 metres	- 30
	350 to 1,000 metres	- 40

Table 3: Predicted Noise Levels and Exceedances of RBLs and/or NMLs (dBA)

Skip this section if Section 3 has been completed in full.										
Period (only complete as applicable for each period)	**Noisiest Plant / Equipment** (state the noisiest plant / equipment to be used during each applicable OOH period)	**Receiver Type** (state 'Res' or 'Non-Res' as applicable for closest receiver to noisiest plant / equipment)	Enter the most applicable values from Table 2, then add to determine the Predicted Noise Level				**Predicted Noise Level** (1 + 2 + 3 + 4)	**RBL** (for Res)	**NML** (for Non-Res)	**Exceedance** (Predicted Noise Level minus RBL for Res or NML for Non-Res)
			1. Plant / Equipment Noise Level	**2. Multiple Plant / Equipment**	**3. Local Screening**	**4. Distance Attenuation**				
Daytime OOH *										
Evening OOH *										
Night Time OOH *										

* Refer to OOH period timings under Section 2 of this form.

Table 4: Additional Mitigation Measures (AMM) requiring Consideration for Implementation

OOH Period	**AMMs that must be considered for implementation** (apply the exceedances from Table 3 to the two OOH period categories below as applicable)			
	<= 10 dBA Exceedance	**10 to <= 20 dBA Exceedance**	**20 to <= 30 dBA Exceedance**	**> 30 dBA Exceedance**
Daytime OOH Period	–	LB	M, LB	M, IB, LB, PC, RO, SN
Evening and Night Time OOH Periods	–	M, LB	M, IB, LB, PC, SN, RO	M, IB, LB, PC, SN, RO, AA*

* AA is only applicable to Night Time OOH periods.

Table 5: List of Additional Mitigation Measures (AMM)

AMM Abbrev.	AMM	AMM Descriptions and Guidance
LB	Letterbox-drop (generic to the project)	A newsletter is generally produced and distributed to the local community via letterbox-drop and the project mailing list. These newsletters provide an overview of current and upcoming works across the project and other topics of interest. The objective is to engage, inform and provide project-specific messages. The geographic extent of letterbox-drops is generally centred on the immediate surrounding community within 200 metres from the works site. For works that are subject to the Sydenham to Bankstown planning approval, these will include an indicative schedule of likely OOH work for at least the upcoming two month period.
M	Monitoring	Where it has been identified that specific construction activities are likely to exceed the relevant Rating Background Levels (RBL) and/or Noise Management Levels (NMLs), monitoring may be conducted at the affected receiver(s) or a nominated representative location (typically the nearest receiver where more than one receiver have been identified). Monitoring can be in the form of either unattended logging or operator attended surveys. The purpose of monitoring is to inform the relevant personnel when the RBL/NML has been exceeded so that additional management measures may be implemented.
IB	Individual Briefings	Individual briefings are used to inform stakeholders about the impacts of high noise activities and mitigation measures that will be implemented. Communications representatives would visit identified stakeholders at least 48 hours ahead of potentially disturbing construction activities. Individual briefings provide affected stakeholders with personalised contact and tailored advice, with the opportunity to comment on the project.
PC	Phone calls (and/or emails)	Phone calls and/or emails (with specific notifications attached) detailing relevant information would be made to identified/affected stakeholders within seven days of proposed work. The objective of the phone calls and/or emails is to support letterbox-drop and specific notifications. Phone calls and/or emails provide affected stakeholders with personalised contact and tailored advice, with the opportunity to provide comments on the proposed work and specific needs.
SN	Specific Notifications (specific to the OOH work)	Specific notifications are letterbox-dropped to identified stakeholders no later than 7 days prior to out of hour construction activities commencing that are likely to exceed the RBLs/NMLs. Specific notifications may be produced by Sydney Trains or by Sydney Metro (or on behalf of Sydney Metro by a contractor as approved by Sydney Metro): - Sydney Trains specific notifications cover all works being undertaken by various parties (including Sydney Metro) during designated rail possession periods. These specific notifications are delivered 14 days prior to works commencing and are delivered to all properties located within 250m of the proposed works. - Sydney Metro specific notifications focus on proposed Sydney Metro works being undertaken outside of designated rail possession periods and are only produced in the absence of any Sydney Trains notifications covering the proposed works. These notifications are delivered 7 days prior to works commencing and are delivered to all properties located within 100m of day works and within 200m of night works. All notifications are emailed to all registered stakeholders on site-specific email distribution lists. For works that are subject to the Sydenham to Bankstown planning approval, these will include indicative information on the type of OOH work, location, duration, expected noise characteristics, expected noise level and likely mitigation and management measures.
RO	Respite Offer	The purpose of a project specific respite offer is to provide residents subjected to lengthy periods of noise and/or vibration impacts respite during OOH periods. Respite offers are offers made to affected receivers to provide a period of either no or limited noise impacts. This can be in the form of stopping or limiting works onsite or offering affected receivers dinner/movie vouchers. The first priority is to implement a period of no or limited noise impacts. If this cannot be achieved, dinner/movie vouchers may be offered on a case-by-case basis.
AA	Alternative Accommodation *(residential only)*	Alternative accommodation options may be provided for residents living in close proximity to construction works that are likely to incur unreasonably high impacts during night time OOH periods. Alternative accommodation will be considered on a case-by-case basis.

Table 6: Consideration of Additional Mitigation Measures (AMM)

Additional Mitigation Measures	Applicable for Consideration? Y / N (refer to Table 4)	To be Implemented? Y / N	Justification / Details For AMMs that are applicable for consideration but not being implemented, justify why the AMM is not being implemented. For AMMs that are being implemented, provide details on how the AMM is being implemented (e.g. which receivers being offered RO, AA, etc.).
LB			
M			
IB			
PC			
SN			
RO *			
AA			

* For OOH work that is subject to the Sydenham to Bankstown approval and RO is required for consideration, include in the 'Justification / Comments' column how community consultation influenced the decision to implement or not implement RO in accordance with Condition E23. If RO is being implemented, include how community consultation influenced the manner in which RO is being implemented.

6. Consideration Against Relevant Vibration Criteria		
Using Table 2, indicate whether any vibratory plant / equipment is planned to be used for the proposed works (Y / N)		
If 'N', skip this section and move to Section 7.		
'People' Criterion	Are the proposed works anticipated to have any perceptible sleep disturbance impacts? (Y / N)	
'Structures' Criterion	Are the proposed works anticipated to generate greater than 7.5mm/s vibration impacts on surrounding structures (generally within 25 metres of works)? (Y / N)	
'Sensitive Equipment' Criterion	Are the proposed works anticipated to impact sensitive equipment located in surrounding non-residential receivers? (Y / N)	
If 'Y' is answered to ANY of the above criteria AND the impacts affect the same receiver for more than one consecutive occasion (refer to Section 4 for 'occasion' definition), the need to prepare a detailed quantitative assessment will be considered collectively by Sydney Metro, the contractor and the Acoustic Advisor / Environmental Representative (if applicable).		

7. City & Southwest Construction Noise & Vibration Strategy Addendum Mitigation Measures
If the proposed OOH work is part of the City & Southwest project, identify any mitigation measures to be implemented that have arisen from the City & Southwest Construction Noise & Vibration Strategy Addendum.

8. Cumulative Impacts	
Document the relevant details of <u>any</u> other OOH work (Sydney Metro or otherwise) that will impact the same receivers as those being impacted by these proposed works either concurrently or within 3 days of the start or end of these proposed works.	
If other works have been identified in the row above, how have the proposed works been coordinated to ensure appropriate respite is provided?	

9. Community Consultation	
What community consultation has been undertaken already?	
What community consultation is planned to be undertaken?	
If drafted already, attach applicable Community Notification as Appendix 4.	

10. Contractor's Signature				
Contractor's Identification of Risk Level: If subject to the Chatswood to Sydenham (C2S) or Sydenham to Bankstown (S2B) planning approval and not subject to an EPL, provide Contractor's Identification of Risk Level (refer to the *City & Southwest OOH Works Strategy / Protocol* for guidance).	Circle:	LOW	or	HIGH
Contractor's Signature:				
Name:				
Title:				
Contact Number:				
Date:				

11. Contractor's Contact Details		
Contractor Personnel	**Name**	**Mobile**
Manager Environment:		
Manager Communications:		
Contractor's Representative:		
Contractor's 24hr contact person:		

C2S / S2B Planning Approval Determination Page

	Step 1 – Endorsement from Sydney Metro Director Public Communications or Contractor's Communications Manager	Step 2 – Risk Identification / Endorsement from the AA under the C2S Planning Approval or from the ER under the S2B Planning Approval	Step 3 – If works are under Sydney Trains EPL, approval from Sydney Metro Director of Planning, Environment and Sustainability. If works are not under an EPL, approval from either the ER or the Secretary of the NSW Department of Planning & Environment
Risk Level:	*N/A*	*If not subject to an EPL, circle Risk Level as:* ***LOW*** *or* ***HIGH*** *If works are HIGH Risk Level and after 9pm, Sydney Metro submits application to the Secretary of the NSW Department of Planning & Environment for approval.*	*N/A*
Signature:	*Approved Road Occupancy Licence / Road Opening Permit (if applicable) must be sighted prior to endorsement.*		
Name:			
Role:			
Date:			
Comments: (including AA / ER Risk Level comments if applicable)			
Conditions:			

Generic Determination Page (i.e. not subject to C2S or S2B planning approvals)

	Step 1 – Sydney Metro Director of Project Communications	**Step 2 – Acoustic Advisor** (may be optional depending on planning approval or contract requirements)	**Step 3 – Environmental Representative** (may be optional depending on planning approval or contract requirements)	**Step 4 –Sydney Metro Director of Planning, Environment & Sustainability** (only required if not approved already)
Action:	Endorsement	Circle: Endorsement or Approval	Circle: Endorsement or Approval	Approval
Signature:	*Approved Road Occupancy Licence / Road Opening Permit (if applicable) must be sighted prior to endorsement.*			
Name:				
Date:				
Comments:				
Conditions:				

Appendix 1: Location Map (and/or Environmental Control Map)

Appendix 2: Traffic Management Plan and/or Traffic Control Plan

(if applicable)

Appendix 3: Supporting Evidence for Noise & Vibration Impacts (e.g. Construction Noise & Vibration Impact Statement, noise assessment, etc.)

(if applicable)

Appendix 4: Community Notification

(if applicable and already drafted)

Appendix G – Consultation Records

SWM3 Consultation CoA C3 & C8

Agency	Comment	Project Response
Canterbury Bankstown City Council	Provide Council with details of the complaint management system and a direct contact in order for community concerns to be documented and forwarded onto the ARA for investigation and action.	Refer to Section 3.8.4 of the SWM3 CEMP. Sydney Metro has prepared an Overarching Community Communication Strategy (OCCS) in accordance with CoA B2 to provide an approach to stakeholder and community communications. Sydney Metro's OCCS details the Complaints Management System, which includes a Complaints Register, which has been developed for the Project, in accordance with the requirements of AS 4269: Complaints Handling and CoA B5, B6, B7, B8 and B9. The Sydney Metro 24-hour Enquiries Line can be reached on; 1800 171 386. Refer to Section 2.3 of the SWM3 CNVMP JHLORJV are working under Environmental Protection Licence (EPL) 21147 for the SWM3 Scope of works. Accordingly the Appropriate Regulatory Authority for the Project is the NSW Environmental Protection Authority (EPA). JHLORJV will interface with Council through the Traffic and Transport Liaison Group (TTLG) and Traffic Control Group (TCG) meetings as well as through the interface representatives of each organisation.
Inner West Council	While the developments are likely to have amenity impacts, the measures presented in the report will minimise the impacts to sensitive receivers. No further comments, Council is satisfied that this plan is appropriate.	NA

Appendix H – Site Request Form (as part of procurement process)

SITE REQUEST FORM.xlsx Business

SITE REQUEST FORM

SELECT – BOOKING REQUEST	
Project Name	
Site Location	
Scope of Works (CSR, OHW, ect)	
Environment : Is there an opportunity to select a less noisy piece of plant for the task without compromising productivity (ie smaller plant or capacity)?	
Environment: Does the plant 'Sound Power Levels' (SWL) comply with Table 11 of the CNVS? (refer to *Table 11 of the SMCNVS* tab)	
Sustainability Rating (SWMC Only)	
Wet Hire / Dry Hire If Wet Hire, please advise Prestart Address:	
On Hire (Start) / Float Date	
Expected Off Hire Date	
Preferred Supplier/s	
Has booking already been made with supplier? (If so who from the supplier has confirmed the booking with you)	
Plant / Equipment Required	
Delivery / Collection Address (Including Gate Numbers, Street / Cross Street & Suburb)	
Site Contact/s	
Additional comments or instructions for Hire Controller / Supplier	

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Table 11 of the SM CNVS

7.3. Maximum Allowable Plant Sound Power Levels

Plant or equipment operating on Sydney Metro project construction sites shall have an operating sound power level (SWL) which is no higher than the corresponding SWL presented in **Table 11**. The SWLs presented in **Table 11** have been compiled from a selection of field measurements conducted between 2004 and 2008 of plant and equipment operating on large construction projects throughout NSW and are therefore considered to representative of plant and equipment SWLs which are readily achieved by current plant and equipment normally used in the construction industry.

Plant and equipment with SWLs higher than those presented in **Table 11** would be deemed to be emitting an excessive level of noise and would not be permitted to operate Sydney Metro project construction sites.

Table 11: Maximum Allowable Sound Power Levels for Construction Equipment

Equipment	Maximum Allowable Sound Power Level (dB) LAmax	Maximum Allowable Sound Pressure Level (dB) LAmax at 7 m
Excavator Hammer	118	93
Excavator (approx. 3 tonne)	90	65
Excavator (approx. 6 tonne)	95	70
Excavator (approx. 10 tonne)	100	75
Excavator (approx. 20 tonne)	105	80
Excavator (approx. 30 tonne)	110	85
Excavator (approx. 40 tonne)	115	90

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Dump Truck (approx. 15 tonne)	108	83
Concrete Truck	112	87
Concrete Pump	109	84
Concrete Vibrator	105	80
Bored Piling Rig	110	85
Bored Piling Rig	110	85
Scraper	110	85
Grader	110	85
Vibratory Roller (approx. 10 tonne)	114	89
Vibratory Pile Driver	121	96
Impact Piling Rig	134	109
Compressor (approx. 600 CFM)	100	75
Compressor (approx. 1500 CFM)	105	80
Concrete Saw	118	93
Jackhammer	113	88
Generator	104	79
Lighting Tower	80	55
Flood Lights	90	65
Cherry Picker	102	77
Mobile Crane	110	85

Where an item of construction equipment is not listed in **Table 11**, generic sound power levels presented in **Table 12** may be adopted.

Table 12: Generic Equipment or System Sound Power Level Limit[1]

Equipment	Maximum Allowable Sound Power Level (dB) LAmax	Maximum Allowable Sound Pressure Level (dB) LAmax at 7 m
Motorised (<25kW)	90	65
Motorised (<50kW)	95	70
Motorised (<100kW)	100	75
Motorised (<200kW)	105	80
Motorised (>200kW)	110	85
All other Auxiliary Equipment or Systems	90	65

Note 1: Sound Power Levels in dBA relative to 10 pW.

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