NOISE AND VIBRATION MANAGEMENT PLAN

Sydney Metro SWM4

Design and Construction of Errant and Hostile Vehicle Mitigation Treatments for the Southwest Metro Project

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1 INTRODUCTION

1.1 Context and Scope of this Sub-plan

This Noise and Vibration Management Plan (NVMP or Plan) covers strategies, systems and procedures to ensure the Construction of Errant and Hostile Vehicle Mitigation Treatments for the Southwest Metro Project (hereafter known as the 'Project') meets the environmental obligations and targets for the construction activities as set out in the Contract. This NVMP forms part of the Construction Environmental Management Plan (CEMP) and is an integral part of the Martinus Management System (MMS) and activities that are anticipated to occur during the construction phase of 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 Martinus proposes to manage noise and vibration during the construction of the Project. Operational management measures do not fall within the scope of this Plan and therefore are not included.

This NVMP and relevant Construction Noise and Vibration Impact Statements (CNVIS) form 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 known Conditions of Approval and any applicable Environmental Protection Licence (EPL) 12208 conditions (for works carried out under a rail possession).

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

The NVMP shares 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:

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

This NVMP does not mitigate and manage impacts from other aspects outside the discipline of acoustics (i.e. ground movement or subsidence). In terms of vibration, only the direct effect of vibration on buildings is considered within this NVMP. This approach corresponds to, and is consistent with, the appropriate standards referenced in this NVMP. The indirect effects on the building structure due to ground movement, the movement of loose objects within buildings and the possibility of damage to sensitive equipment, are not within the scope of this NVMP. Where detailed knowledge of the quality of soil or ground movement is required, expert advice should be obtained from a geotechnical engineer or equivalent qualified discipline.

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 NVMP addresses the Construction of Errant and Hostile Vehicle Mitigation Treatments for the Southwest Metro Project. Please refer to Section 1 of the CEMP for the Project Description.

1.3 NVMP and Supporting Documents

This NVMP has been developed to inform the assessment of works to be carried out by Martinus. A Construction Noise and Vibration Impact Statement (CNVIS) will be prepared to assess the potential noise and vibration impacts of the works. 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 Martinus 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 additional assessment will be

included in the CNVIS (as an updated document or addendum report) prior to commencement of those different works.

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

Martinus will also prepare works plans and out of hours works (OOHW) applications in accordance with the Sydney Metro City and Southwest Out of Hours Works Strategy/Protocol (SM-17-00005396) which has been prepared to satisfy CoA E25 and REMM NVC16, which describe in more detail the plant and activities to be scheduled. 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.

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.

1.4 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:

- Canterbury-Bankstown Council
- Inner West Council

A summary of the consultation is provided in Table 1 and in Appendix D.

Table 1: Consultation carried out in the development of this Plan (TO BE COMPLETED)

CoA	Agency Consultation	Requirements and date submitted	Key issues raised	Response	NVMP Section Reference
C6	Department of Planning, Housing and Infrastructure (DPHI)				
C3(a) C8(a)	Canterbury-Bankstown Council	Requirement: Review and comment on this NVMP Date submitted: 12/07/2024	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.	Community Manager contact details and complaints management procedure for the project have been shared with CBC.	N/A
C3(a) C8(a)	Inner West Council	Requirement: Review and comment on this NVMP Date submitted: 12/07/2024	While the developments are likely to have amenity impacts, the measures presented in Section 8 of the report will minimise the impacts to sensitive receivers	Noted.	N/A
			In addition to the provided six-monthly Construction Monitoring Reports, we also request that a report outlining the complaints being received and the actions taken as a result be provided.	Martinus will provide a report summarising the complaints received and the actions taken as a result.	Section 9.5

2 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 targets are presented in Table 1.

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 8. 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 8.12
Avoid structural damage to buildings or heritage items as a result of construction vibration	Predicted and/or measured vibration levels from construction activities all meet agreed vibration criteria (refer Section 6.7)
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 8 and the Additional Mitigation Measures Matrix (Section 8.12)
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 8.5

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

3 ENVIRONMENTAL REQUIREMENTS

This NVMP 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 Construction Environmental Management Framework v3.2 (2017); and
- Sydney Trains Environment Protection Licence 12208.

3.1 Legislation, Standards, Policies and Guidelines

Martinus ensures compliance with all relevant legislation and aims to employ best practice environmental management procedures for the construction of the Project. Table 3 below details the legislation and planning instruments considered during development of this Plan.

Table 3: Relevant legislation, standards, policies and guidelines

Type	Items
Legislation and regulations	• Environmental Planning and Assessment Act 1979 • Protection of the Environment Operations Act 1997 (POEO Act) • Protection of the Environment Operations (Noise Control) Regulation 2008
Standards	• British Standard BS6472-2008, Evaluation of human exposure to vibration in buildings (1-80Hz) • British Standard BS7385.2-1993, Evaluation and measurement of vibration in buildings • German Standard DIN4150-2016, Structural vibration Part 3: Effects of vibration on Structures • Australian Standard AS2436:2010 Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites • Australian Standard AS/NZS 2107:2016 Acoustics - Recommended design sound levels and reverberation times for building interiors • Australian Standard AS/NZS ISO 3100:2009 Risk Management – Principals and Guidelines
Policies and guidelines	• Sydney Metro City & Southwest Construction Noise and Vibration Strategy (Sydney Metro CNVS, 2016) • Sydney Metro City and Southwest Out-of-Hours Works Strategy/Protocol (Sydney Metro OOHWP, 2019)

	• Interim Construction Noise Guideline (ICNG) (DECC 2009a) • Assessing Vibration: a technical guideline (DECC 2006) • NSW Road Noise Policy (RNP) (DECCW 2011) • Noise Policy for Industry (NSW EPA 2017). • NSW EPA Assessing Vibration – a Technical Guideline (AVTG, 2006 – for human exposure) • NSW EPA Approved methods for measurements and analysis of environmental noise (NSW EPA 2022)

3.2 Conditions of Approval

This NVMP has been developed to satisfy the requirements of CoAs C1 and C3. The CoAs and REMMs relevant to this NVMP are listed in Appendix A. In accordance with CoA C4, the relevant requirements of the CEMF have also been included. Appendix A also provides a cross reference to demonstrate where the CoA, REMM or CEMF requirement is addressed in this NVMP or other management documents.

In the Assessment Report for Sydney Metro City and Southwest – Sydenham to Bankstown Upgrade, the Department of Planning and Environment (DPE) considers that the EIS has adequately assessed noise and vibration issues and that they can generally be managed through the CoAs, REMMs and CEMF requirements in Appendix A. Therefore, no further assessment of noise and vibration impacts has been undertaken for this NVMP.

Martinus will adhere to conditions identified within environmental licenses, permits and approvals and these requirements will be reflected in this NVMP.

3.3 Environmental Protection Licence

Due to the nature of the works, construction of the Project does not qualify as a scheduled activity. Therefore, Martinus is not required to obtain an EPL for the Construction of the Project.

In the case Martinus applies for an EPL for the Project, then this is administered by the EPA and may have different or additional noise and vibration management conditions to the CoAs. In this case, the Project's NVMP and relevant CNVISs will be updated to incorporate the requirements of the EPL.

For the Project's activities that are carried out as part of a rail possession of the Sydney Trains operational heavy rail network, the Sydney Trains EPL 12208 will apply. The works will be managed in accordance with the railway track maintenance clauses presented in the table in Appendix A.

3.4 Roles and Responsibilities

The roles and responsibilities for each of the nominated Project Team representatives with respect to noise and vibration management are as follows in Table 4.

Table 4: Roles and Responsibilities

Role	Responsibility
Project Director (Project Leader)	• Ensure that sufficient resources are allocated for the implementation of this NVMP; • 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 NVMP; and

	• Authorise all monitoring reports and any revisions to this NVMP.
Site Foreman (Site Superintendent)	• Oversee the overall implementation of this NVMP; • 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; and • Manage deliveries to mitigate noise impacts.
Project Environmental Manager	• Oversee the implementation of this NVMP; • Consider and advise senior management on compliance obligations; • 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 NVMP; and • Ensure Construction activity records/ monitoring records/incident reports are kept and maintained on-site.
Communication and Stakeholder Relations Manager	• Leadership and management of the Communications, Stakeholder and Community Relations Team; • Build and maintain effective working relationship with Sydney Metro's representative and Stakeholder and Community Liaison team; • Develops and oversees the implementation of the Contract Specific Community Communication Strategy and Sub-plans; • 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 Contract Specific Community Communications Strategy and key activities are integrated into the project schedule; • Attends the Sydney Metro 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 the Project (subject to media protocols);

	• Required to be on call 24 hours based on the team rotation; and • 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 Contract Specific Community Communication's Strategy and requirements; • Implementation of the Contract Specific Community Communications Strategy and any relevant Sub-plans. • 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; and • Maintain the Consultation Manager database and generate reports as required. •
Site personnel and Subcontractors	• Understand and implement mitigation as required in the NVMP and any additional required measures identified during Construction; and • Participate in (or conduct if authorised) relevant training to implement the requirements of this NVMP.
Martinus' Noise and Vibration Monitoring Personnel **(incl. Acoustic Consultants)**	• Responsible for carrying out noise and vibration monitoring to support the contractor and in accordance with the construction noise and vibration monitoring plan. Also responsible for updating the CNVIS as required; • Undertake relevant training where required, to implement this NVMP; • Ensure regular maintenance and calibration of monitoring equipment; and • 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: • 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 • 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, assist the Department in the resolution of community complaints; • 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 • 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.

It is noted that the site team, including Martinus' 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 Martinus, the primary contact being the Environmental Manager.

4 EXISTING ENVIRONMENT AND SENSITIVE RECEIVERS

4.1 Existing Environment

The proposed Errant and Hostile Vehicle Mitigation Treatments are to be carried out along the Southwest Metro corridor. The Southwest corridor is located in predominantly suburban residential areas with mixed use near the stations, including commercial, residential, childcare 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 to recommended levels consistent with the guidance in the ICNG.

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

Background noise monitoring locations from the EIS are summarised in Table 5. Note that the background noise monitoring results use to establish noise targets in NCA 01 and NCA 02 were reported incorrectly within the SSI 8256 Environmental Impact Station (EIS). 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 the discrepancies, were used. These new monitoring locations were equally as appropriate or better for representing each NCA. Detailed maps of each NCA can be found in Appendix B of this NVMP.

Table 5: Background noise monitoring

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
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

4.2 Sensitive Receivers

The Project has the potential to impact nearby receivers that may be sensitive to noise and vibration. The type of receivers that may be impacted by the Project are outlined below and in Appendix B.

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

Detailed Land Use Survey maps were prepared in accordance with CoA E18 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 as a result of the Project, refer Appendix B.

Additional detailed land use surveys will be undertaken to confirm any changes in sensitive land user(s) as the construction program progresses. Any changes to the receiver types resulting from additional surveys will be included in Appendix B.

4.3 Heritage Properties

The Sydney Metro Construction Noise and Vibration Standard (CNVS) states that heritage buildings and structures should be assessed according to the cosmetic damage screening criteria and should not be assumed to be more sensitive to vibration unless found to be structurally unsound. The locations of heritage-listed buildings and the EIS assessment of vibration impacts are as follows:

- Marrickville Railway Station
- Dulwich Hill Railway Station
- Hurlstone Park Railway Station
- Canterbury Railway Station
- Campsie Railway Station
- Belmore Railway Station
- Lakemba Railway Station
- Wiley Park Railway Station
- Punchbowl Railway Station
- Bankstown Railway Station

The Project's Heritage Management Plan contains further information about the identified heritage items.

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 Martinus in consultation with a heritage specialist.

5 ENVIRONMENTAL ASPECTS AND POTENTIAL IMPACTS

5.1 Proposed Construction Works

The likely works scenarios, locations, plant, duration, and equipment sound power levels will be presented in the detailed works plan tables in the CNVIS (Section 7.2).

Construction works associated with the Project are expected to run from August 2024. As construction works will occur in the Sydney Trains operational rail corridor or station precincts, they will mostly take place during rail possessions overnight, on weekends, and in some cases over extended periods of more than one week.

The main plant and equipment expected to be used for construction include bobcats, compressors, concrete pumps, concrete trucks / agitators, diamond saws, excavators, franna crane, generators, hand tools, mobile cranes (50 tonnes), piling rigs (bored), rollers (non-vibratory), scissor lifts, semi-trailers, trucks, water tankers and welding equipment.

Indicative work site areas are shown in Appendix C.

Table 6: Proposed Construction Works

Activity	Details	Indicative Time Frame	Plant
Ancillary facilities - site establishment	Martinus does not intend on establishing any new Ancillary Facilities for EHVMT. In the event that a new ancillary facility is required to be established, this subplan would be revised.		
Ancillary facility - operation	Martinus will look to utilise existing Ancillary Facilities established throughout and adjacent to the southwest corridor. Provisions on using these facilities will be added in future revisions of this plan.	August 2024 – September 2025	Light Vehicles, Watercart, Streetsweeper, Franna crane, Delivery trucks, Handtool – powered, Excavator 21-25T with bucket
Anti-throw screens and anti-vehicle bollards installation	Martinus will be installing anti-throw screens and anti-vehicle bollards across all 15 bridges that intersect the southwest corridor. (Reference to detailed design document to be	August 2024 – September 2025	Mobile crane 100 (to mobilise larger cranes) Mobile crane, EWP, Lighting tower, Vacuum Truck, Asphalt miller, Asphalt Paver, Kerb machine, Road Saw, Line removing truck, Concrete Agitator, Concrete pump, Franna crane, Generator,

	provided once finalised).		Excavator 21-25T with bucket, Excavator 21-25T with rockhammer, Smooth drum roller , Backhoe, Delivery trucks, Handtool – powered, EWP
Safety improvements	Martinus will be installing anti-vehicle safety mitigation fencing along the southwest corridor from Sydenham to Bankstown. (Reference to detailed design document to be provided once finalised).	August 2024 – September 2025	Franna crane, EWP, Handtool – powered, Backhoe, Welding equipment

5.2 Potential Impacts

Refer to Appendix C of the CEMP for the risk assessment prepared for this Project.

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.

6 CONSTRUCTION NOISE AND VIBRATION OBJECTIVES

6.1 Construction Hours

The CoAs acknowledge the need to carry out works outside standard construction hours.

CoA E19 defines standard Sydenham to Bankstown hours of work as:

- Monday to Friday 7am to 6pm and Saturdays 8am to 6pm;

Exceptions for highly noise intensive work (refer Section 6.4) are in accordance with E24:

- 8am to 6pm Monday to Friday and 8am to 1pm Saturday.

In accordance with CoA E20, notwithstanding CoA E19 and E24, work may be undertaken outside the hours specified in the following circumstances:

- For the delivery of materials required by the NSW Police Force or other authority for safety reasons; or
- 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
- Where different construction hours are permitted or required under an EPL in force in respect of the Project; or
- Work approved under an Out of Hours Works Protocol for work not subject to an EPL as required by CoA E25; or
- Construction that causes $L_{Aeq(15minute)}$ noise levels:
    - No more than 5dB(A) above the rating background level at any residence in accordance with the ICNG, and
    - No more than the 'Noise affected' noise management levels specified in Table 3 of the ICNG at other sensitive land uses, and
    - 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 AVTG, and
    - 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 AVTG.
- Where a negotiated agreement has been reached with a substantial majority of sensitive receivers who are within the vicinity of and may be potential affected by the particular Construction, and the NML 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 week before the commencement of activities.

In accordance with CoA E21, on becoming aware of the need for emergency work in accordance with Condition E20(b), Martinus must notify the ER and the EPA (if a EPL applies) of the need for that work. Martinus must use best endeavours to notify all noise and/or vibration affected sensitive receivers of the likely impact and duration of those works.

This Project does require evening and night work throughout the construction program, particularly to reduce impacts on the operational Sydney Trains railway along the Sydenham to Bankstown route. The Sydney Trains EPL 12208 applies to works carried out under a rail possession.

EPL12208 Condition O13.1 adopts the EPA ICNG standard work hours on Saturdays (8am to 1pm). Out of hours works applications must be prepared and approved for Saturday 1pm to 6pm work if carried out under EPL 12208 under a rail possession, but not if the work is carried out outside a rail possession and in accordance with CoA E19.

E19 states that works must not be undertaken on Sundays or Public Holidays, however this would not apply for weekend works or extended periods carried out under rail possessions when EPL 12208 would apply. The CoA E24 restriction on highly noise intensive work (as outlined in Section 6.4) does not apply to works under a possession although reasonable and feasible efforts are to be made to conduct highly noise-intensive works during less sensitive periods where possible.

Any works planned to occur outside standard work hours must be assessed and approved in advance in accordance with Sydney Metro's approved City and Southwest Out of Hours Works Strategy/Protocol.

For works conducted outside standard construction hours, the following time periods are considered in order of least noise-sensitive to most noise-sensitive for typical residential receivers:

- Saturday afternoon 1pm to 6pm – least noise-sensitive
- Sunday day 8am to 6pm
- Monday to Sunday evening 6pm to 10pm
- Monday to Sunday night before midnight 10pm to midnight
- Monday to Friday early morning "shoulder period" 6am to 7am
- Monday to Sunday night after midnight 10pm to 6am Monday to Friday, or 10pm to 8am Saturday and Sunday – most noise sensitive

These priorities are generally represented in the CoAs and EPL clauses which relate to restrictions on high impact works.

The break-down of noise-sensitive periods is a useful tool for planning out of hours works using Sydney Metro's City and Southwest Out of Hours Works Strategy/Protocol. Noise impacts can be effectively managed by determining the most practical sequence of events which can also limit noisier activities to less noise-sensitive times.

6.2 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* and Vibration Management Levels (VMLs) in accordance with relevant guidelines and standards. Refer to Section 3.1 for a list of guidelines and standards referenced in the CNVS.

6.3 Airborne Construction Noise

The three primary noise metrics used to describe construction noise emissions in the modelling and assessments are:

$L_{A1(1minute)}$ The typical 'maximum noise level for an event', used in the assessment of potential sleep disturbance during night-time periods. Alternatively, assessment may be conducted using the L_{Amax} or maximum noise level

$L_{Aeq(15minute)}$ The 'energy average noise level' evaluated over a 15-minute period. This parameter is used to assess the potential construction noise impacts.

$L_{Aeq(15/9hr)}$ The 'energy average noise level' evaluated over a 15-hour Day (7am to 10pm) or 9-hour Night (10pm to 7am) period. This parameter is used to assess the potential construction noise impacts from road traffic noise.

$L_{A90(11/4/9hr)}$ The 'background noise level' in the absence of construction activities. This parameter represents the average minimum noise level during the 11-hour 7am to 6pm daytime, 4-hour 6pm to 10pm evening and 9-hour 10pm to 7am night-time periods respectively. The $L_{Aeq(15minute)}$ construction noise management levels are based on the L_{A90} background noise levels.

The subscript 'A' indicates that the noise levels are filtered to approximate normal human hearing characteristics (A weighted).

6.3.1 Residential Receivers

Table 7 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 7: 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 1.00 pm	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 $L_{Aeq(15minute)}$ is greater than the noise affected level, the proponent would apply all feasible and reasonable work practices to minimise noise.

Time of Day	Management Level $L_{Aeq(15minute)}$	How to Apply
No work on Sundays or public holidays	Highly noise affected 75 dB	The highly noise affected level represents the point above which there may be strong community reaction to noise. It is not considered a Noise Management Level, where respite would be considered.
Outside recommended standard hours	Noise affected RBL + 5 dB	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.

For residential receivers, the external NMLs can be revised as follows:

- Where a building has been constructed or modified to meet the Infrastructure SEPP, and it can be demonstrated or reasonably assumed that the windows are fixed or kept closed, a 20dB noise reduction may be considered. Therefore, the external NML be increased by 10dB. Sydney Metro and the ER must endorse the application of this revision prior to implementation.
- Higher levels of attenuation may be adopted, if agreed with Sydney Metro and 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 NMLs can be increased by more than 10dB, 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 due to 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 8.12).

Based on the background noise levels measured by SLR for the EIS, the applicable airborne NMLs are as presented in Table 8.

Table 8: Project specific residential NMLs

NCA	Day 7am-6pm		Evening 6pm-10pm		Night 10pm-7am	
	RBL dBA	NML dBA $L_{Aeq15min}$	RBL dBA	NML dBA $L_{Aeq15min}$	RBL dBA	NML dBA $L_{Aeq15min}$
NCA 01 – Marrickville **(10 Leofrene Avenue, Marrickville 2204)**	38	48	38	43	33	38

NCA 02 – Marrickville (18 Randall Street, Marrickville 2204)	38	48	38	43	33	38
NCA 03 Hurlstone Park (3 Commons Street Hurlstone Park, Hurlstone Park Station)	38	48	38	43	34	39
NCA 04 – Hurlstone Park (9 Canberra Street, Hurlstone Park 2193)	40	50	40	45	35	40
NCA 05 – Canterbury (5 South Parade, Canterbury 2193)	36	46	36	41	32	37
NCA 06 – Campsie (34 North Parade, Campsie 2194)	45	55	42	47	35	40
NCA 07 – Belmore (10 Acacia Street, Belmore 2192)	41	51	41	46	35	40
NCA 08 – Lakemba (17 The Boulevarde, Lakemba 2195)	47	57	47	52	41	46
NCA 09 – Lakemba (66 Railway Parade, Lakemba 2195)	44	54	44	49	36	41
NCA 10 – Punchbowl (42 Urunga Parade, Punchbowl 2196)	47	57	47	52	41	46
NCA 11 – Bankstown (90 South Terrace, Bankstown 2200)	47	57	47	52	39	44
NCA 12 – Bankstown (258 South Terrace, Bankstown 2200)	54	64	51	56	42	47

NCA 13 – Bankstown (17 Weigand Avenue, Bankstown 2200)	42	52	42	47	39	44

It is noted that the daytime and evening NML is less than, or similar to, the existing ambient noise level in many of the receiver locations near the station worksites. This is not unexpected, but it does mean that any noise monitoring method would need to consider whether the construction noise can be measured above the ambient noise.

6.3.2 Other Sensitive Receivers

Error! Reference source not found. presents airborne NML for non-residential noise-sensitive land uses. T he 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 9: NMLs at non-residential sensitive land uses

Land Use	NML $L_{Aeq(15min)}$	Where NML applies	Referenced from:	Assumed facade loss (conservative)[1]	External equivalent NML - $L_{Aeq(15min)}$
Studio building (music recording studio)	25 dB(A)	Internal noise level	AS2107 'maximum'	20 dB(A)	45 dB(A)
Studio building (film or television studio)	30 dB(A)	Internal noise level	AS2107 'maximum'	20 dB(A)	50 dB(A)
Cinema space, theatre, auditorium	35 dB(A)	Internal noise level	AS2107 'maximum'	20 dB(A)	55 dB(A)
Hotel (Sleeping areas: Hotels near major roads)	40 dB(A)	Internal noise level	AS2107 'maximum'	20 dB(A)	60 dB(A)
Classrooms at schools and other educational institutions	45 dB(A)	Internal noise level	ICNG	10 dB(A)	55 dB(A)
Childcare centre (sleeping areas)	40 dB(A)	Internal noise level	AAAC - guideline for Child Care Centre Acoustic Assessment	10 dB(A)	50 dB(A)

Hospital wards and operating theatres	45 dB(A)	Internal noise level	ICNG	20 dB(A)	65 dB(A)
Places of worship	45 dB(A)	Internal noise level	ICNG	10 dB(A)	55 dB(A)
Library (reading areas)	45 dB(A)	Internal noise level	AS2107 'maximum'	20 dB(A)	65 dB(A)
Hotel (bars and lounges)	50 dB(A)	Internal noise level	AS2107 'maximum'	20 dB(A)	70 dB(A)
Community centres – Municipal Buildings	50 dB(A)	Internal noise level	AS2107 'maximum'	10 dB(A)	60 dB(A)
Restaurant, bar (Bars and lounges/ Restaurant)	50 dB(A)	Internal noise level	AS2107 'maximum'	20 dB(A)	70 dB(A)
Passive recreation (e.g. area used for reading, meditation)	60 dB(A)	External noise level	ICNG	-	60 dB(A)
Active recreation (e.g. sports fields)	65 dB(A)	External noise level	ICNG	-	65 dB(A)
Commercial premises (including offices and retail outlets)	70 dB(A)	External noise level	ICNG	-	70 dB(A)
Industrial premises	75 dB(A)	External noise level	ICNG	-	75 dB(A)
Notes: 1) These assumed façade losses are conservative and can be revised following site inspections by a qualified acoustic consultant.					

6.4 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. Where predicted noise levels exceed the HNA level, all reasonable and feasible mitigation measures are to be applied to the works, with expected impacts to be communicated with affect receivers, adhering to any proposed respite periods.

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 8.11).

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" when these works result in an exceedance of the applicable Noise Management Level at the same receiver.
There is no definition in the CoA SSI 8256 for "Highly Noise Intensive Works" mentioned in Condition E24. Sydney Metro has adopted the following definition for "Highly Noise Intensive Works", based upon definitions within CoA issued by NSW Department of Planning, Housing and Infrastructure (DPHI) for other SSI projects. For the purpose of this NVMP, Highly Noise Intensive Works are construction activities which are defined as annoying under the ICNG, these include:

- Use of power saws, such as used for cutting timber, rail lines, masonry, road pavement or steel work;
- Grinding metal, concrete or masonry;
- Rock drilling
- Line drilling;
- Vibratory rolling;
- Rail tamping and regulating;
- Bitumen milling or profiling;
- Jackhammering, rock hammering or rock breaking; and
- Impact piling.

For the Project works, the following plant and activities have therefore been identified as being potentially used and therefore subject to timing restrictions in accordance with CoA E24:

- Road or concrete / diamond saw;
- Jackhammer.

Restrictions on timing of highly noise intensive or high noise impact generating works are summarised in Table 10 below.

Table 10: Restrictions on highly noise intensive works

	Conditions apply if the predicted noise exceeds the NML[1]		
	CoA E24	EPL 12208	REMM NVC6
Precedence	Except as permitted by an EPL	During rail possessions, EPL12208 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;	O13.2 The licensee may undertake maintenance activities outside of the hours specified in Condition	Noise intensive plant would not be used during the night-time period (10pm to 7am) unless:

	Conditions apply if the predicted noise exceeds the NML[1]		
	CoA E24	EPL 12208	REMM NVC6
	(b) between the hours of 8:00 am to 1:00 pm Saturday	O13.1: a) to provide safe and reliable train services or a safe working environment; […] c) for the delivery of oversized plant or structures that require special arrangements or authorisation to be lawfully transported along public roads.	• 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 Saturday and Sunday works must be observed, unless there is a weekend rail possession or shutdown, when EPL12208 applies.
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.	No specific requirements.	
Assessment and Notification	Assessment and notification in accordance with Sydney Metro's CNVS and CCS.	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: a) identify noise sensitive	

	Conditions apply if the predicted noise exceeds the NML[1]		
	CoA E24	EPL 12208	REMM NVC6
		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 *Interpretation*: Assessment requirements are in line with the CNVS and this NVMP / CNVIS.	
Notification	Assessment and notification in accordance with Sydney Metro's CNVS and CCS.	O13.4 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. *Interpretation*: Notification requirements similar to CNVS apart from timing – assume that 7 days' notice is required per the CNVS to be consistent with other Sydney Metro works.	
Note: 1) The applicable NML is the highly noise affected NML defined in Table 2 of the ICNG.			

6.5 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 + 10 dBA – (CF*)
- External sleep awakening level of 65 dBA - CF (assuming open windows).

* Where CF is the Leq to Lmax Correction Factor nominated in the CNVIS for the relevant construction scenario

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 (65dBA - CF).

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 at least 75 dBL_{Amax} because it is based on an internal Sleep Awakening noise level of 55 dBL_{Amax} and a conservative building façade loss of 20 dB.

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 8.

6.6 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 6.5, 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} (assuming an open window).

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.

6.7 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.

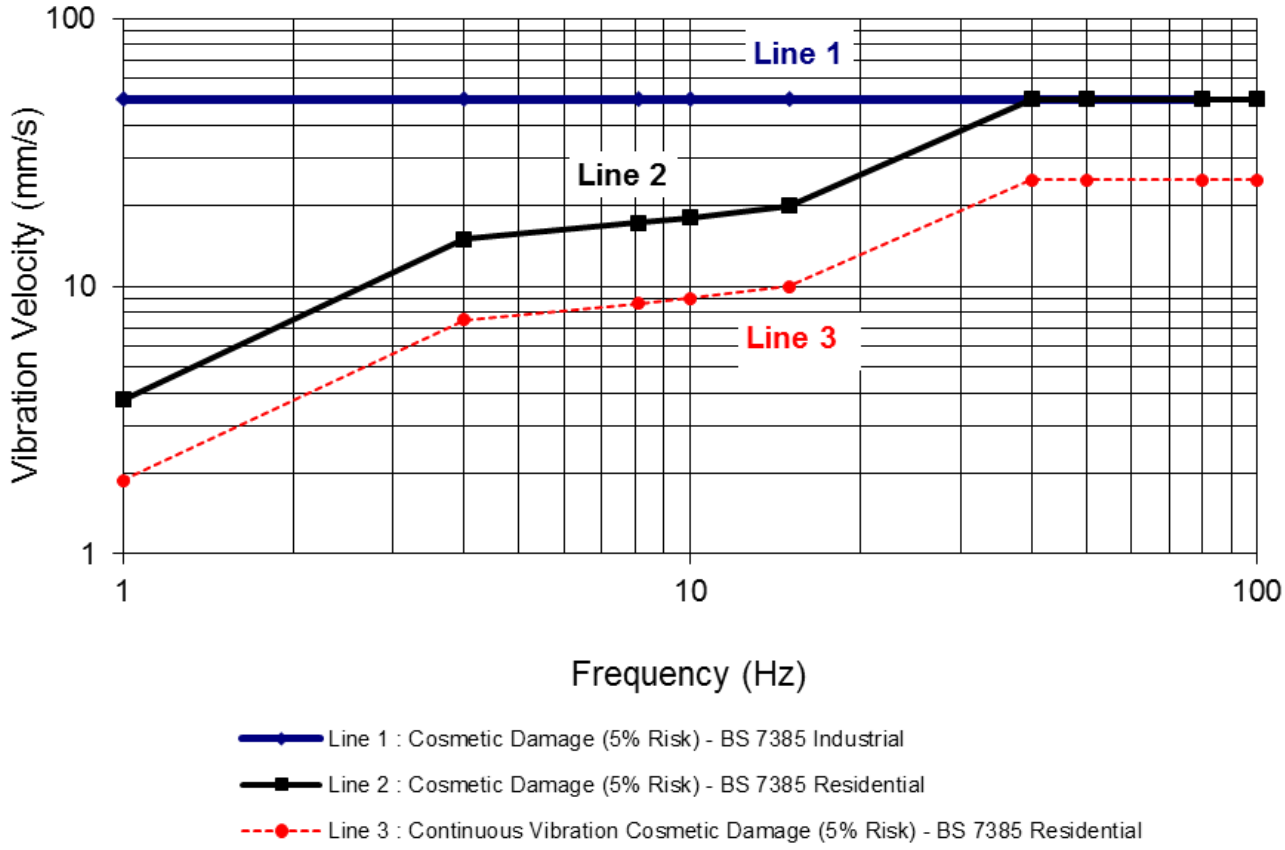
The recommended limits (guide values) for transient vibration to ensure minimal risk of cosmetic damage to residential and industrial buildings are presented numerically in

Table 11 and graphically in Figure 1. These vibration goals are applicable to relevant structures, building elements or facades with the potential of being affected by vibration impacts.

Table 11: 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 1: Graph of Transient Vibration Guide Values for Cosmetic Damage



The Standard goes on to state that the vibration values given in

Table 11 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 11, 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 11 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 11 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 11 as listed below:

- Reinforced or framed structures: 25.0 mm/s ppv
- Unreinforced or light framed structures: 7.5 mm/s ppv
- Heritage structures (screening criterion): 2.5 mm/s ppv

As noted in BS 7385, heritage buildings and structures should not be assumed to be more sensitive to vibration, unless structurally unsound. A conservative vibration damage screening level (peak component particle velocity) for heritage buildings/structures can be set to 2.5 mm/s (the more stringent criterion in the German Standard DIN 4150-2016 Structural Vibration Part 3: Effects of Vibration on Structures). This screening level will allow potentially impacted heritage structures to be identified. If a heritage structure is predicted to be exposed to vibration levels above the conservative vibration screening level of 2.5mm/s, further investigation would be undertaken to determine whether the structure is structurally unsound. Where a heritage building/structure is deemed to be sensitive to vibration impacts (i.e. structurally unsound), the more stringent DIN 4150-2016 Group 3 guideline values can be applied. Otherwise, structural damage vibration limits based on BS 7385 can be applied.

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 vibration objectives.

6.8 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 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 12 below are used in Sydney Metro projects as the Vibration Management Level.

Table 12: 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.

To assess the potential for vibration impact on human comfort, an initial screening test will be done based on peak velocity units, as this metric is also used for the cosmetic building damage vibration assessment. This screening test is a conservative approach since it is based on the continuous vibration velocity criteria (i.e. vibration that continues uninterrupted for a defined assessment period) whilst construction works are mostly intermittent. The initial screening test for vibration disturbance to building occupants, based on the peak particle velocity (ppv, mm/s) are presented in Table 13. If the predicted vibration exceeds the initial screening test, the total estimated Vibration Dose Value (i.e. eVDV) will be determined based on the level and duration of the vibration event causing exceedance.

Table 13: Construction vibration disturbance to building occupants – initial screening test

Place and Time	Peak particle velocity (mm/s) – maximum
Residential buildings 16 hr day	0.56
Residential buildings 8 hr night	0.40
Offices, when in use	1.10
Workshops, when in use	2.20

6.9 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 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.

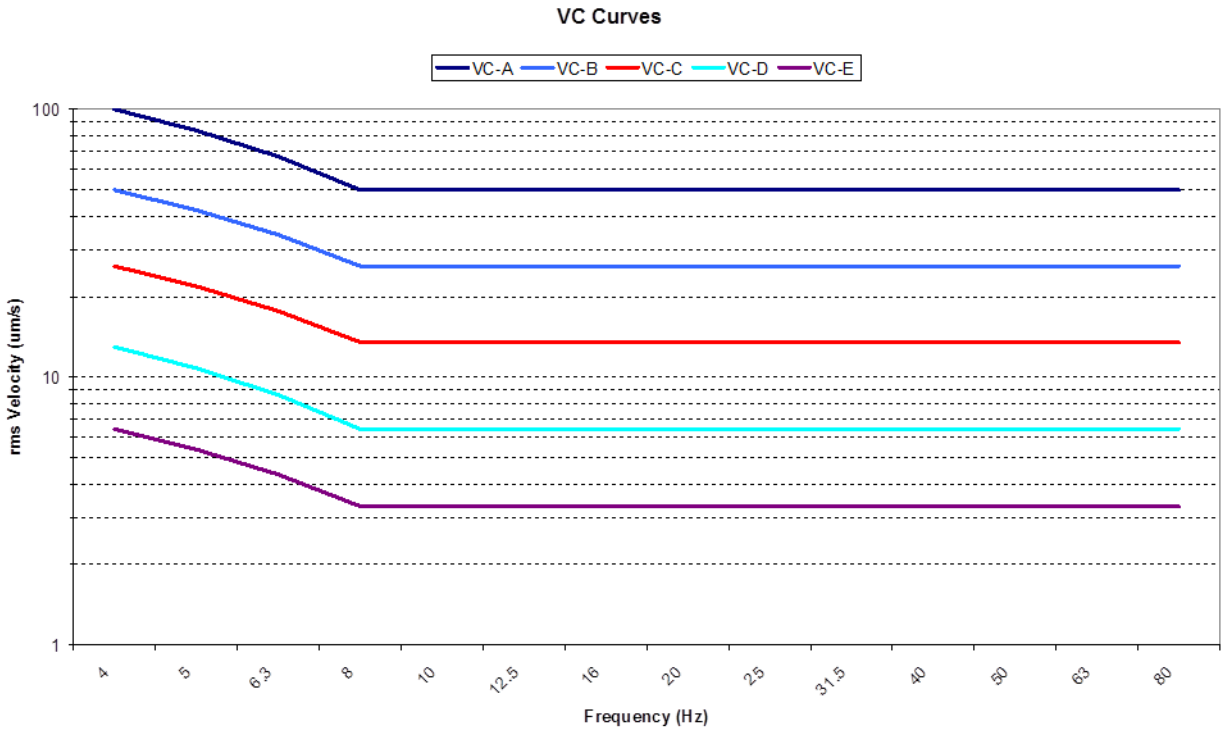
Table 14: Application and Interpretation of generic Vibration Criterion (VC) curves

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.

Figure 2: Vibration Criterion (VC) Curves



6.10 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 6.7 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 15 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.

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 15: 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%	

6.11 Ground-Borne Noise

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:

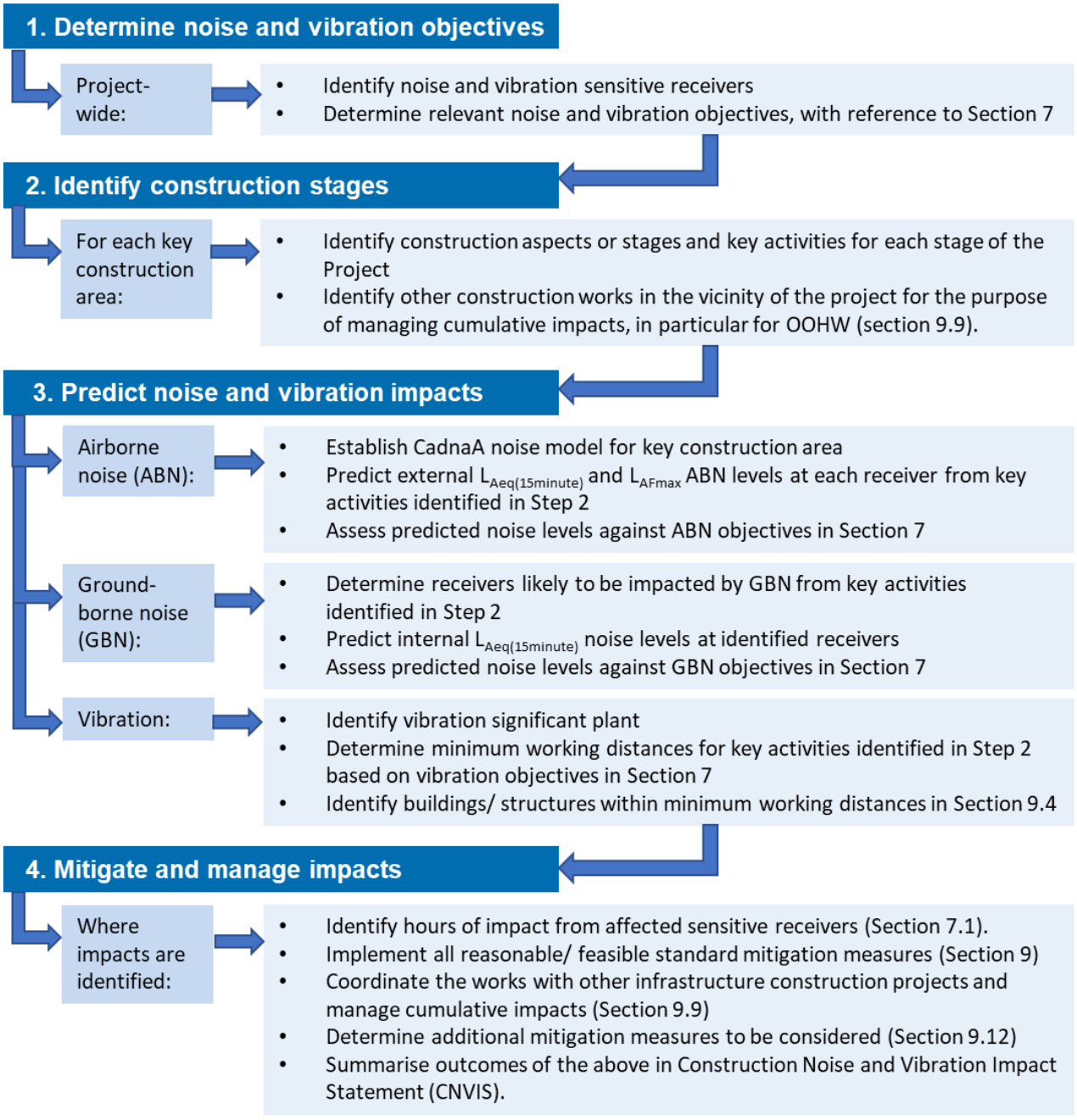
- Day (7.00 am to 6.00pm)
  Internal Residential: 45 dB LAeq(15minute)
  Internal Commercial: 50 dB LAeq(15minute)
- Evening (6.00 pm to 10.00pm)
  Internal Residential: 40 dB LAeq(15minute)
  Internal Commercial (if in use during Evening hours): 50 dB LAeq(15minute)
- Night-time (10.00 pm to 7.00 am)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

7 CONSTRUCTION NOISE AND VIBRATION ASSESSMENT

7.1 Method For Evaluation and Assessment of Impacts

The process of assessment of construction noise and vibration impacts is detailed in Figure 3. This process will form the basis of the assessments that will be prepared prior to construction works commencement. Where significant new/additional activities and/or significant changes to site layout or construction methodology are proposed, additional assessment as per this section will be undertaken. Site-specific or activity-specific noise assessments will be prepared to assess all construction activities and ancillary facilities for the Project.

Figure 3: Process for assessing and managing construction noise and vibration



7.2 Construction Noise and Vibration Impact Statements (CNVIS)

The Construction Noise and Vibration Impact Statements (CNVIS) will be a key site management tool providing clear instructions for managing each construction worksite. Each CNVIS will be prepared before any works that result in noise and vibration impacts commence at the relevant construction worksite. The CNVIS will be progressively prepared for the construction phase to identify noise and vibration impact predictions and applicable management measures. Any construction work identified in the CNVIS as exceeding the noise management levels and/ or vibration criteria established in Section 6 must be managed in accordance with this NVMP.

All CNVIS will be prepared by an appropriately qualified and experienced acoustic consultant.

Each CNVIS would set out the mitigation and management measures required for the construction stage, through consultation with affected sensitive receivers. They will address:

- Scope of work covered by CNVIS
- Justification for OOHW (where required)
- Nearest noise and vibration sensitive receivers, based on the land use survey
- Construction noise and vibration objectives
- Construction noise and vibration impact assessment
- Mitigation options and preferred management measures and
- Noise and vibration monitoring requirements.

Construction noise and vibration impacts associated with a construction worksite would be assessed by identifying the construction activities for each worksite and stage of the Project, including likely plant and equipment. Construction noise and vibration from the activities would be predicted and assessed against the noise and vibration criteria to identify the risk of impact. Where there is a risk of impact, all reasonable and feasible noise and vibration management measures would be recommended to reduce or manage the impacts as much as practicable.

Physical noise mitigation measures such as noise barriers and acoustic enclosures around fixed plant will be outlined in the CNVIS. Furthermore, specific management measures such as a staging of works, respite periods and community notification will also be summarised, and implemented.

The CNVIS will identify the sensitive receivers that Martinus is required to notify regarding upcoming works. This notification will include the likely noise and vibration impacts during the assessed works, the duration of impact and any additional mitigation (e.g. respite periods) that may be required to manage noise and vibration impacts.

Monitored noise and vibration levels will be verified against the predictions made in the relevant CNVIS. This will allow for ongoing review and where necessary, update of the predictive model and a feedback mechanism to construction planning will ensure ongoing noise and vibration risks are identified and managed appropriately.

A detailed CNVIS will be prepared under the NVMP including all construction works described in Section 5 of this NVMP and Section 1 of the CEMP.

7.3 Gatewave Noise And Vibration Management Tool

A 3D construction noise and vibration management tool (GATEWAVE, www.gatewave.com.au) has been developed specifically for the Project. This software will allow specific work areas and activities to be assessed as construction works progress. It also allows cumulative noise impact from other aspects of the Project to be assessed and managed in accordance with CoA E26.

GATEWAVE incorporates ground elevation contours, building heights, the built environment and atmospheric conditions to predict construction noise in accordance with the International Standard ISO 9613-2:2024 implementing quality standard ISO 17534-1:2015. All noise and vibration receivers identified by the land use survey are integrated into GATEWAVE where the land use will be maintained and kept up to date on a progressive basis.

The Project environment team would use GATEWAVE to manage construction noise and vibration impact by defining specific work areas/activities as construction progresses and identifying:

- Sensitive receivers where predicted noise levels are above the NMLs so that, where there are residual impacts even after all feasible and reasonable mitigation measures have been adopted, mitigation and management measures can be applied in accordance with this NVMP
- Buildings/structures within minimum working distances established for cosmetic damage and human annoyance so that appropriate mitigation and management measures can be applied in accordance with this NVMP.

Noise and vibration monitoring data would be collected throughout the delivery of the Project. This feedback loop would ensure the prediction tool is verified and adjusted as required to ensure accuracy across the Project.

GATEWAVE generates a noise and vibration assessment that will be used to support OOHW applications.

8 NOISE AND VIBRATION MANAGEMENT AND MITIGATION

8.1 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 8 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 6.1).

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 8.3).

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 9).

The following table outlines the management and mitigation measures that will be undertaken as far as practicable during construction to mitigate the potential impacts associated with noise and vibration.

Table 16: Noise and Vibration Management Measures

Management and Mitigation Measures	Responsibilities
Training will be provided to all Martinus contractors and subcontractors on noise and vibration management and mitigation measures through the project induction, Toolbox Talks, prestart meetings and targeted training as required. This will include approved working hours, locations of sensitive receptors, and Out of Hours Work (OOHW) approval process.	Project Manager Environment Team
Locate mobile and fixed plant (e.g., generators), and go lines as far as practicable away from the nearest potential receptors.	Supervisor
Consider alternative low noise/vibration construction methodologies where practical when working within close proximity to sensitive receivers.	Project Manager

Operation hours: Where possible and practicable noisy activities (e.g. use of mobile plant, saw cutting, hydraulic hammering) will align with standard work hours.	Supervisor
Any works outside of standard working house will be in accordance with Out of Hours Work Approval. If required, monitoring shall be undertaken to verify compliance with obligations and noise modelling (if applicable).	Environment Team
Where it is necessary for noise and vibration generating activities to occur outside standard daytime working hours, potentially impacted receptors will be notified at least once week in advance of the activities. The notification will include, the time, date and duration of the scheduled construction and maintenance activities, reasons for construction and maintenance activities being carried out, access routes for workers and equipment, nature of construction and maintenance activities being undertaken.	Project Manager
Noise and vibration monitoring will be undertaken to validate modelling and confirm work is within the allowable limits as required. Where noise monitoring identifies noise impact occurring at a sensitive receptor, additional mitigation measures such as screening, barriers, bunds, alternative machinery will be employed where necessary.	Environmental Team
Regularly service vehicles, plant and equipment such that noise emissions comply with manufacturer's specifications.	All Project Personnel
Plant and equipment will be switched off when not required. Machines that might have intermittent use will be shut down between work periods or will be throttled down to a minimum.	All Project Personnel
All machinery and plant will be used in accordance with manufacturer's specifications. Equipment will be sited away from noise sensitive areas.	All Project Personnel
Piling activities will be confined to general work hours where practicable. If piling is to occur on a Sunday or Public holiday, notification for out of hours work and approval will be required.	Project Manager Supervisor
Acoustic covers will be used on engines where available.	Supervisors

8.2 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.
- The noise levels of plant and equipment items are to be considered in Martinus' procurement and rental decisions and in any case cannot be used on site unless compliant with the criteria.
- Regular inspection and maintenance of all plant and machinery used for the Project by Martinus, 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.
- Martinus 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 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.
- Martinus will minimise the use of high noise generating equipment such as diamond or concrete saws and hydraulic breaker / tamping, and limit to less sensitive times (refer also Section 6.4).
- Martinus 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).
- Martinus will use electric pumps instead of diaphragm air pumps.
- Martinus will use electric equipment instead of diesel such as electric chainsaws and generators where possible.
- Martinus will use “silent” lighting towers and generators where feasible to minimise continuous noise.
- Martinus will use pulverisers instead of conventional concrete breaking methods for demolition where possible
- Delivery vehicles are to be fitted with straps rather than chains for unloading, wherever feasible and reasonable.
- Tray-back utility vehicles are to have resilient mat or carpet to minimise impact noise.

8.3 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 10 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.

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 6.4).

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.

Solid hoarding for the services building worksites have been considered in accordance with CoA A21. This is unlikely to be necessary as the temporary site buildings themselves provide shielding for adjacent receivers.

Acoustic enclosures or sheds are not considered to be a reasonable option for the Project 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.

8.4 Vibration Control Strategies

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

Martinus will 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 surface to remove in pieces, instead of jackhammer

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.

Recommended minimum working distances presented in the following sections provide a conservative screening method for indicating buildings and structures where there is a risk of vibration impact. Vibration monitoring would be carried out to confirm the minimum working distances at specific sites, where vibration significant plant is required to operate within or near the recommended minimum working distances.

8.4.1 Human Exposure Minimum Working Distances

Many building occupants assume that building damage is occurring when they feel vibration or observe rattling of loose objects, however the level of vibration at which people perceive vibration or at which loose objects may rattle is far lower than vibration levels that can cause damage to structures. At properties near the construction works, nearby receivers may be able to feel vibration when vibration-generating equipment is being utilised. For this reason it is appropriate to identify properties where there is a probability of adverse comment so that impacts can be managed.

Recommended minimum working distances for typical vibration intensive construction equipment for human comfort (response) are shown in Table 17. These recommended distances relate to continuous vibration and are presented as a guide only. For most construction activities, vibration emissions are intermittent in nature and for this reason, higher vibration levels occurring over shorter time periods are allowed (see Section 6.8).

Table 17: Recommended minimum working distances (m) – human comfort (response)

Vibration significant plant item	Critical area	Residence (Day)	Residence (Night)	Office	Workshop
Concrete saw	15	10	10	5	5
Excavator (tracked) ≤ 5t + hydraulic hammer	25	20	20	15	10
Excavator (tracked) ≤ 15t + hydraulic hammer	30	20	25	15	10
Excavator (tracked) ≤ 35t + hydraulic hammer	40	25	30	20	15
Percussive drill (small)	20	10	15	5	5
Piling rig – bored (rock)	20	15	15	10	10
Piling rig – bored (soft ground)	10	10	10	5	5

Piling rig - vibratory driven	305	170	225	100	55
Pneumatic hammer (jackhammer)	25	15	20	10	5
Terrain leveller	30	15	20	5	5
Vibratory roller (11t) padfoot - High vibration	120	70	90	40	25
Vibratory roller (11t) padfoot - Low vibration	110	60	80	35	20
Vibratory roller (13t) smooth drum - High vibration	105	55	75	30	15
Vibratory roller (13t) smooth drum - Low vibration	75	40	55	20	10
Wacker packer	20	10	15	5	5

8.4.2 Buildings And Structures Minimum Working Distance

Recommended minimum working distances to reduce the risk of cosmetic damage to buildings or structures from typical vibration intensive construction equipment are presented in Table 18. These are aimed at reducing the risk of cosmetic damage (as per BS 7385:1993 and DIN 4150-3:2016) and are based on the vibration screening criteria set in Section 6.7.

Unlike noise, vibration cannot be readily predicted. The minimum working distances below are indicative and will vary depending on the plant item, building types and foundations and local geotechnical conditions. Vibration monitoring would be carried out to confirm the site-specific minimum working distances for this Project.

Table 18: Recommended minimum working distances (m) – cosmetic damage

Vibration significant plant item	Reinforced or frame structures (BS7385)[2]	Unreinforced or light framed structures (BS7385)[2]	Structurally unsound heritage structures (DIN 4150-3)[3]
Concrete/ road saw	5	5	5
Excavator (tracked) ≤ 15t + hydraulic hammer	5	5	10
Excavator (tracked) ≤ 35t + hydraulic hammer	5	10	10
Excavator (tracked) ≤ 50t + hydraulic hammer	5	10	20
Drill Rig	5	5	10
Pneumatic hammer (jackhammer)	5	5	5

Piling rig – bored (rock)	5	5	5
Piling rig – bored (soft ground)	5	5	5
Piling rig - impact hammer (high)	15	30	65
Piling rig - impact hammer (typical)	10	15	35
Piling rig - vibratory driven	10	20	50
Terrain leveller	5	5	5
Vibratory roller ≤ 25t padfoot	5	10	20
Vibratory roller ≤ 13t smooth drum - High vibration	5	5	15
Vibratory roller ≤ 13t smooth drum - Low vibration	5	5	10
Wacker packer	5	5	5

Notes:

1. Minimum working distances are in 5m increments only to account for the intrinsic uncertainty of this screening method

2. Minimum working distance based on vibration screening criterion which reduced the cosmetic damage levels set by BS7385 by 50% due to potential dynamic magnification.

3. A building condition inspection should determine whether a heritage item is structurally unsound.

8.4.3 Vibration Monitoring Procedures

Attended vibration measurements are required at the commencement of vibration generating activities to confirm that vibration levels satisfy the criteria for that vibration generating activity. Where there is potential for exceedances of the criteria further vibration site law investigations would be undertaken to determine the site-specific minimum working distances for that vibration generating activity.

REMMS NVC3 and NVC4 require a more detailed assessment of structures located within the site-specific Minimum Working Distances presented in Section 8.4.2. 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.

For vibration measurements to monitor risks of damage to structures, in accordance with the CNVS Appendix, the transducer mounting plates would be installed at the base of the building or structure, at the location closest to the construction works. The monitoring locations would be on a stiff part of the building or structure (at the foundations) on the side of the structure adjacent to the subject construction works.

- If the vibration-generating works are to be conducted inside the minimum working distances, first establish whether an alternative method can be used to reduce vibration. For example, reducing the size of a vibratory roller will typically reduce the impact zone.

- If the final works method is still within the applicable minimum working distance, carry out attended vibration monitoring at the commencement of vibration-generating works to establish the local site law for vibration propagation, and to re-assess whether levels are expected to exceed applicable vibration criteria. Start the vibration-generating works at as large a distance as possible from the sensitive structure, and move closer with caution while taking attended vibration measurements.
- If the attended noise monitoring determines that vibration levels may exceed the site screening level, install a vibration logger which is capable of sending automated SMS messages to the Site Manager when Alert levels are exceeded. The monitoring is to be carried out with appropriate equipment so as to provide results that are readily comparable to the preliminary survey and relevant criteria (i.e. PPV).
- If the Alert level is exceeded, the Site Manager is to monitor the works and vibration levels to ensure that the Alarm level is not exceeded. An exceedance of the “Amber alert” (i.e. 70% of the vibration criteria) will not require the excavation activities to cease, but rather alert the Construction Manager to proceed with caution at a reduced force or load.
- If the “Red alert” (i.e. 100% of the vibration criteria) is approached or exceeded, the Site Manager is to stop all nearby construction works immediately and reassess methods. Examples of measures to manage vibration on site include using smaller hammer attachments on excavators, or using concrete saws to introduce a structural disconnection and thereby reduce vibration transmission.
- If the “Red alert” is exceeded, the frequency content of the measured vibration and peak component particle velocity (pcpv) levels will be assessed by a suitably qualified specialist and compared against the applicable Standards to determine whether the vibration levels comply with the Standard (based on the frequency content of the vibration signal). A suitably qualified specialist must endorse the conclusions of such an investigation.
- If the “Red alert” is exceeded, once works are approved to continue, attended structural damage vibration monitoring must be carried out by a suitably qualified specialist. This monitoring would provide direct feedback to the operators and appropriate modification of construction techniques.
- If the “Red alert” is exceeded, a condition survey is to be conducted of the structure or item, in consultation with the Structural and Acoustic Engineers (as required).

For vibration monitoring of construction works at structures/building, double-sided sticky tape (compliant with the requirements of ISO 5348-2021) will be used to temporarily attach the vibration monitor (if required) at locations specified by the acoustic engineer/consultant to capture the relevant working plant to verify if established working distances are adequate to avoid cosmetic damage to the structure/building.

8.5 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:

- 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 8.12).

Martinus 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 Martinus 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 Martinus 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, Martinus 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 Martinus 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 Martinus 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, Martinus 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, Martinus will consult with the affected receiver(s) to determine if alternate arrangements can be made, at no cost to the affected institution.

Martinus 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 Martinus 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.

8.6 Standard Construction Hours and Out-Of-Hours Work

As explained in Section 6.1, CoA E19 defines Sydenham to Bankstown standard construction hours as 7am to 6pm Monday to Friday, and 8am to 6pm Saturday.

CoA E24 requires that “highly noise intensive works” (refer Section 6.4) are only carried out between 8am and 6pm Monday to Friday and 8am to 1pm 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 Sydney Trains’ EPL 12208 applies (refer Section 6.4).

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 C 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 12208 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.

24-hour, 7-days a week work 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 12208 would apply.

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 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 Sydney Trains' EPL 12208 during a rail possession), or through Sydney Metro's Out-of-Hours Work Strategy/Protocol. E22 also states that other out-of-hours works can be undertaken with the approval of an EPL (such as EPL 12208 during a rail possession), or through Sydney Metro's Out-of-Hours Works Strategy/Protocol for work not subject to an EPL. Refer to Appendix A for a list of EPL 12208 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-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 OOHW Application is provided in Appendix C. This Application includes both qualitative and quantitative construction noise and vibration assessment components, and allows Martinus 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 8.5.

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 10.00 pm and 7.00 am.

- 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.

8.7 Site Environment Induction and Training

In accordance with NVC2, all employees, contractors and subcontractors are to receive an environmental induction. The site induction would 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.

8.8 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 8.5).

8.9 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 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:

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

Martinus 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 8.10), other infrastructure projects and urban renewal projects.

It is useful to understand other contractors’ respite requirements and where feasible adhere to the same respite periods. A common example is where one contractor’s EPL restricts concrete sawing to before midnight, while another has no timing restrictions on concrete saws.

If it is not feasible to adhere to the same restrictions, and if it is not a compliance issue, it may be necessary for the concrete sawing (in this example) to take place outside of the other contractors’ permitted hours. In this case it would be essential to inform the local receivers of the planned works, and explain why the timing restrictions they may expect does not need to be observed by this particular contractor.

The Out-of-Hours Works Application includes a requirement to identify concurrent works in the area, and to demonstrate efforts to manage cumulative impacts.

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

- Consider noise levels when works occur concurrently, as this may change the additional mitigation measures which are considered (refer Section 8.11 and 8.12);
- Identify other contractors’ agreed hours of respite and make efforts to align the proposed works with the agreed respite hours, or negotiate for changed respite periods, or else provide robust justification for not being able to observe the same respite period;
- 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 is also a requirement for CoA E26. Refer to Section 8.10 for provision of respite and coordination with other contractors.

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.

8.10 Utility Coordination and Respite

Related to cumulative impacts and provision of aligned respite periods described in Section 8.9, 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 Place Manager and Utility Coordination Manager will be able to assist in helping Martinus 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 Martinus to liaise directly with other Sydney Metro contractors to coordinate works and proposed respite periods.

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, Martinus must be able to justify why the Project 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 Martinus and be provided to the ER within one week - should this evidence be requested by the ER.

8.11 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 – would be explored and have been included in this Strategy. The Additional Mitigation Measures (AMM) to be applied are outlined in Table 20.

Table 19: Additional Mitigation Measures

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	RO

	to movie or dinner vouchers may be considered as the Place Manager is familiar with the local community.	
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

8.12 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 20, Table 21 and

Table 22) 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 19).

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. However, during works under a rail possession, in accordance with EPL12208 O13.1, Saturday 1-6pm is considered “out of hours”.

Table 20: AMM matrix – Airborne construction noise

Time Period		Mitigation Measures			
		Predicted LAeq (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 CoA E19) Sat (8.00 am - 1.00 pm EPL)				
	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 CoA E19) Sat (1.00 pm - 10.00 pm EPL)				
	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

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 been provided (either by the project, past projects or independently designed and built) with at-property treatments which allow windows to be fixed or kept closed, 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 21: AMM matrix – Ground borne construction noise

Time Period		Mitigation Measures		
		Predicted LAeq(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 CoA E19) Sat (8.00 am - 1.00 pm EPL)			
	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 CoA E19) Sat (1.00 pm - 10.00 pm EPL)			
	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 22: 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 CoA E19) **Sat (8.00 am - 1.00 pm EPL)**	
	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 CoA E19) **Sat (1.00 pm - 10.00 pm EPL)**	
	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 20). The requirements for AMM will be refined as Martinus 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.

8.13 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 would be determined and described Martinus’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 Martinus’ 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.

9 CONSTRUCTION NOISE AND VIBRATION MONITORING PROGRAM

9.1 Baseline Data

Baseline noise data is available from the extensive noise surveys carried out by SLR for the EIS in late 2016. The data is still relevant for the Project.

Several 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.

9.2 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 would 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 8.11.

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 Minimum Working Distances provided in Section 6.7.

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.

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 6.3);
- 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 CNVIS;
- Meet the requirements of the CNVS AMM to consider monitoring when predicted levels exceed trigger levels defined in the CNVS (refer Section 8.12).

Generally, noise and vibration monitoring which is triggered by the CNVS AMM are to be carried out in a location representing the receiver. Martinus 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 levels.

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 it is also important to note the value provided by attended monitoring due to the operator's ability to make 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 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. 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. Note, the vibration transducer fixing method to the structure will need to be approved by a heritage consultant.

9.2.1 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 10m 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.

9.2.2 Vibration Monitoring

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.

If any vibration-generating works take place within the Minimum 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 minimum 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 Minimum Working Distances are considered to be conservative. If site conditions are atypical and the vibration levels are higher than expected, then the Minimum Working Distance is to be extended to reflect the site conditions. Sydney Metro is to be advised of any extended site-specific Minimum 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 would be conducted at the nearest sensitive receivers whenever vibration generating activities need to take place inside the applicable minimum-working distances. Where more than one building falls within the Minimum 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, 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 the requirements outlined in ISO 5348-2021, and also meet the heritage requirements of being removable without leaving any permanent markings or damage to the building fabric.

Locations of proposed vibration monitoring, both attended and unattended, must be provided to Sydney Metro for review and consultation as required, at least one week prior to the vibration-generating works commencing. This information can be provided in Out-of-Hours Works Applications, or separately if the works are proposed to be carried out during Standard work hours.

9.2.3 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 Minimum Working Distances (refer Section 8.4.2).

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 8.4.2 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. Martinus 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 6.7. 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 Minimum Working Distances of vibration-generating works, the potentially affected buildings also require a Condition survey. The Minimum 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 Minimum 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.

Martinus 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 would be compiled into a report by Martinus 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 Martinus. 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.

9.3 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 presented to be able to compare the measured levels with those predicted in the relevant CNVIS and the applicable NML or VML.

Martinus' acoustic consultant or environmental personnel must provide details of their proposed equipment, methodology and reporting format or template to Sydney Metro for review, prior to carrying out any surveys.

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

As stated in the CNVS, all acoustic instrumentation used in the monitoring programme will be designed to comply with the requirements of AS IEC 61672.1:2004 Electroacoustics – Sound level meters – Specifications and carry current National Association of Testing Authorities (NATA) or manufacturer calibration certificates. The instrumentation must be installed, operated and maintained by suitably qualified or trained personnel. The instruments must be externally calibrated at regular intervals.

Airborne noise measurement metrics and metre settings are as follows:

- As a minimum, LAeq(15min/event) noise levels should be recorded, to allow direct comparison against NMLs. The measured level may need to be corrected to an equivalent distance to the receiver location in order to compare directly with the NML, which applies at the receiver.
- Attended measurements may also report LAeq(event) levels to provide useful information about particular activities, or to limit measurements to when construction noise events are clearly audible and measurable above extraneous ambient noise. This also allows direct comparison between measured levels for particular plant and activities against the assumed noise levels used in predictions. The measured levels may need to be corrected by distance to compare with data sheets (e.g. correct to a sound pressure level at 10m). This is a useful measurement to understand whether plant or activities are significantly louder than predicted, and therefore whether actions are required to check the plant.
- In addition, statistical measures may be measured and recorded, such as;
    - LAmax (maximum event level), can be compared against Sleep Disturbance or Sleep Awakening Levels. This needs to be measured at the receiver location, or corrected to an equivalent distance to the receiver location
    - LA10(15min) (highest 10% of noise). The construction LA10 is no longer used in NSW to assess construction noise, but it is a useful indicator of "typical noisiest" event levels.
    - LA90(15min) (lowest 10% of noise) should be measured in the absence of construction noise, to verify the background noise levels.

- These A-weighted airborne noise measurements are to be taken using the Fast response setting on the sound level meter or noise logger.

Vibration measurements shall be carried out in accordance with the CNVS Appendix, which describes requirements for construction vibration monitoring instrumentation used for the identification of structural and cosmetic damage. It should be noted that equipment specifications detailed in the Appendix of the CNVS may not be suitable for the measurement of all vibration impacts such as human comfort and or the measurement of vibration impacts to sensitive equipment. Prior to any measurement being conducted the contractor must ensure that the monitoring equipment being proposed is suitable for the type of measurement being conducted.

For Sydney Metro projects, vibration is to be measured using the Fast response setting. Vibration is generally measured using a vibration logger which records Peak Particle Velocity (PPV) levels which can be directly compared with the VMLs for vibration effects on structures.

Attended measurements may also be carried out and this is recommended if there are vibration-sensitive equipment such as medical imaging equipment, in order to measure r.m.s. vibration levels to directly compare with the applicable VMLs for sensitive equipment. If vibration monitoring is conducted for human comfort assessments, then it is typically accepted for PPV vibration loggers to be used as a screening measure, although the VMLs for human comfort are based on a Vibration Dose Value (VDV), rather than a continuous vibration level. 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 workday. 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.

9.4 Frequency of Monitoring

Vibration monitoring is to be conducted whenever vibration-generating works take place within the site-specific Minimum Working Distance of sensitive receivers, as described in Section 8.4.

The Project Environmental Manager will consider implementing noise monitoring whenever the predicted works noise levels exceed the trigger levels listed in the AMM matrices (Section 8.11). If Martinus is of the opinion that noise monitoring is not required during out-of-hours works, then justification is to 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;
- To monitor vibration for human comfort and structural effects as required by the CNVS (refer Section 8.12);
- If requested by an authorised officer of the EPA for works undertaken under EPL 12208 (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 Martinus, or by Sydney Metro's acoustic representatives.

9.5 Reporting

In accordance with C9(g), Martinus will submit noise and vibration monitoring reports to Sydney Metro and the Environment Representative for their review.

The requirements of the reports are described in Sections 9.2 to 9.3 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.

The Construction Monitoring Report will encompass other environmental aspect reports, and would not be limited to noise and vibration monitoring. Martinus' Construction Monitoring Report would 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 as well as summary of complaints received and actions taken as a result. 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 (if an EPL 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 Sydney Trains' EPL 12208 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.
- For works carried out under a rail possession under EPL 12208, when requested by an authorised officer of the EPA, O13.6 requires that the Contractor must provide written reasons to demonstrate that works undertaken outside the standard hours specified in EPL 12208 O13.1 comply with the licence.
- For works carried out under a rail possession under EPL 12208, when requested by an authorised officer of the EPA, the Contractor must provide information as described in O13.5 to describe any proposed out-of-hours works, including a contact name and number of a responsible person who will be on site during the works.

9.6 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 6.4);
- 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, Martinus 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 Martinus in the 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 9.5.

Where the measured noise or vibration exceeds the predicted levels, Martinus 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, Martinus' acoustic consultant will investigate the reasons for this and update the noise model as required.

Monitoring results are to be reviewed by Martinus' 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.

Martinus' 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.

9.7 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 1.4 and Appendix E for consultation carried out in the development of this program.

10 NVMP ADMINISTRATION

10.1 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 23 below.

Table 23: 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	ER Endorsement
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 Noise and vibration assessment prepared using Gatewave EPL 12208	ER Endorsement and Approval Sydney Metro Approval (if OOHW are occurring under EPL 12208) EPA (Information to be provided on request)
Construction identified as affecting buildings	Site activities	Building Condition Survey conducted by an appropriate professional nominated by Martinus	Martinus' Construction Manager

10.2 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 are:

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

10.3 Records

Records are to be maintained for:

- Records of community enquiries and complaints, and Martinus' 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 – Martinus' Site Manager;
- Dilapidation or Condition surveys – Martinus' Site Manager;
- Works activities including Emergency Works – Martinus' Site Manager;
- Out of Hours Works Applications reviews, correspondence and approvals – Sydney Metro, Martinus, 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 – Martinus' 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, Martinus, Independent Auditor (where required), Environment Representative;
- Noise and vibration potential and actual incidents – Sydney Metro, Martinus, Independent Auditor, Environment Representative.

APPENDICES

APPENDIX A – Other Conditions of Approval, Revised Environmental Mitigation Measures and CEMF Requirements Relevant to this Plan

Conditions of Approval relevant to the development of this Plan

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 1.3 Appendix E	**This Plan has been prepared in accordance with this condition and describes how Martinus proposes to manage noise and vibration during construction of the Project. This plan has been provided to CoCB for consultation.**
C4	The CEMP Sub-plans must be prepared in accordance with the CEMF	This Table	**This table 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 1.3 Appendix E	**This Plan has been provided to CoCB for consultation. Refer to Section 1.3 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.	Refer to section 1.2 of the CEMP	**This Noise and Vibration Management Plan will not be submitted any later than one (1) month before Construction.**
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	Refer to section 1.2 of the CEMP	**Construction has not commenced until the CEMP and all CEMP Sub-plans have been approved by DPHI. The CEMP and Sub-plans are being implemented for the duration of construction.**

	Sub-plans for that stage have been approved by the Planning Secretary.		
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 1.3 Section 9 Appendix E	**This Plan has been prepared in accordance with this condition and describes how Martinus proposes to manage noise and vibration during construction of the Project. This plan has been provided to CoCB for consultation. The Noise and Vibration Monitoring Program is incorporated in Section 9 of this this Plan.**
C9	Each Construction Monitoring Program must provide:	Section 4	**Details of all monitoring of the Project to be undertaken, including the parameters, frequency and location of monitoring is outlined in this Section of this Plan.**
	(a) details of baseline data available; (b) details of baseline data to be obtained and when;	Section 4	**Details of baseline noise and vibration data available, and how and when further baseline data is to be obtained is outlined in Section 4 of this Plan.**
	(c) details of all monitoring of the project to be undertaken;	Section 4	**Details of all monitoring of the Project to be undertaken, including the parameters, frequency and location of monitoring is outlined in this Section of this Plan.**
	(d) the parameters of the project to be monitored;	Section 4	**Details of the parameters of the project to be monitored are outlined in this Section of this Plan.**
	(e) the frequency of monitoring to be undertaken;	Section 4	**Details of the frequency of monitoring to be undertaken is outlined in this Section of this Plan.**
	(f) the location of monitoring;	Section 4	**Details of the location of monitoring to be undertaken is outlined in this Section of this Plan.**

	(g) the reporting of monitoring results;	Section 4	**The reporting of monitoring results is outlined in this Section of this Plan.**
	(h) procedures to identify and implement additional mitigation measures where results of monitoring are unsatisfactory; and	Section 4	**The procedures to identify and implement additional mitigation measures where results of noise and vibration monitoring are unsatisfactory are outlined in this Section of this Plan.**
	(i) any consultation to be undertaken in relation to the monitoring programs.	Section 1.3 Appendix E	**Consultation undertaken in relation to the monitoring program is detailed in this Section 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 1.3 Appendix E	**The Noise and Vibration Monitoring Program has been prepared in accordance with this condition and describes how Martinus propose to monitor noise and vibration during construction of the Project.**
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 3.4	**The Noise and Vibration Monitoring Program will be endorsed by the ER.** **The Noise and Vibration Monitoring Program was submitted to DPHI as part of this NVMP, for approval no later than one month prior to the commencement of Construction.**
C12	Construction must not commence until the Planning Secretary has approved all of the required Construction Monitoring Programs.	Section 9	**Construction did not commence until the CEMP and Sub-plans, including relevant construction monitoring programs have been approved by DPE.**
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 9	**The Noise and Vibration Monitoring Program is being implemented for the duration of construction as detailed in Section 9 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 9.5	**Section 9.5 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 9	**The Noise and Vibration Monitoring Program is incorporated in Section 9 of this this Plan.**
Construction Environmental Management Framework			
9.2(a)	Principal Contractors 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:**
	Identification of work areas, site compounds and access points,	Appendix C	**Work areas, site compounds and access points described in this NVMP and presented in Appendix C – Worksite Maps**
	Identification of sensitive receivers and relevant construction noise and vibration goals,	Section 4.1 Appendix B Section 6	**Sensitive receiver types are described in Section 4.1 and are identified individually in the NVMP Appendix B (Land Use Map)** **Construction noise and vibration goals are presented in Section 6**
	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 8	**CNVS noise and vibration mitigation measures relevant to the scope of works are presented in Section 8 of this Plan.**
	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 5.1	**Section 5.1 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.**

	Identification of feasible and reasonable procedures and mitigation measures to ensure relevant vibrations and blasting criteria are achieved, including a suitable blast program.	Section 8.4 Section 8.4.2 Section 0	**Section 8.4 describes vibration controls to minimise vibration impacts, and Section 8.4.2 and Section 0 describe vibration monitoring and building condition survey requirements.** **Blast program is not applicable to the proposed works.**
	Community notification provisions specifically in relation to blasting	Section 8.5	**Community notification requirements are covered in Section 8.5 (Community Consultation and Management) and 8.11 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.**
	The requirements of any applicable EPL conditions.	Section 3.3 Section 6.1	**Not applicable. Refer to Section 3.3**
	Additional requirements in relation to activities undertaken 24 hours of the day, 7 days per week.	Section 6.1	**Section 6.1 of this Plan describes permissible hours of work under the Conditions of Approval (for works carried out under a rail possession).** **24-hours a day, 7-days a week work is not anticipated for the proposed Station upgrade works.**
	Pre-construction compliance requirements and hold points.	Section 10.1 Section 8.4.2 Section 0	**Section 10.1 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 8.4.2 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 0 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.
	The responsibilities of key project personnel with respect to the implementation of the plan.	Section 3.4	**Roles and responsibilities are listed in Section 3.4 of this Plan.**
	Noise monitoring requirements.	Section 9 Section 8.12	**Section 9 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 8.12).**
	Compliance record generation and management.	Section **Error! Reference source not found.** Section 8.5 Section 9.5	**Section** Error! Reference source not found. **describes requirements for record-keeping.** **Section 8.5 also describes requirements for keeping records of complaints and community consultation.** **Section 9.5 describes requirements for noise and vibration monitoring reports.**
	Community consultation requirements.	Section 8.5 Section 8.11	**Section 8.5 describes community consultation requirements** **Section 8.11 includes Additional Mitigation Measures which include community notification requirements based on predicted noise levels.**
	An Out of Hours Works Protocol applicable to all construction methods and sites.	Section 8.6 Appendix C	**Section 8.6 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 C.**

Other relevant Conditions of Approval

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: 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: 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 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; assess the impacts of minor ancillary facilities as required by Condition A19 of this approval; 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	**The interface between the ER and this Plan are outlined in:** **Section 3.4** **Section 8.11** **Section 9.4** **Section 9.5** **Section 9.6** **Section 10.1**

	Secretary and, if satisfied such amendment is necessary, approve the amendment. This does not include any modifications to the terms of this approval; and 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.	
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 3.10.3** **Section 9.5**
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 9.5**
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 4.1** **Appendix B**
E19	Work must only be undertaken during the following 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.	**Section 6.1** **Section 8.6**
E20	Notwithstanding Conditions E19 and E24 Work may be undertaken outside the hours specified in the following circumstances: for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or 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	**Section 6.1** **Section 8.6**

	where different Construction hours are permitted or required under an EPL in force in respect of the CSSI; or Work approved under an Out-of-Hours Work Protocol for Work not subject to an EPL as required by Condition E25; or Construction that causes LAeq(15 minute) noise levels: 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 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 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 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 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. 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 6.1**
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: 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 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	**Section 6.1** **Section 8.5** **Section 8.6** **Section 8.9** **Section 8.11**

	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 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 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.	**Appendix C**
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 schedule of likely Out-of-Hours Work for a period no less than two (2) months; he potential work, location and duration; 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 6.1** **Section 8.5** **Section 8.6** **Section 8.9** **Section 8.11** **Appendix C**
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: between the hours of 8:00 am to 6:00 pm Monday to Friday; between the hours of 8:00 am to 1:00 pm Saturday; and 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.	**Section 6.4** **Section 8.6**
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	**Sydney Metro Out Of Hours Works Strategy/Protocol** **Section 6.1**

	are not subject to an EPL. The Protocol must be approved by the Planning Secretary before commencement of the Work. The Protocol must: 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; 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; identify procedures to facilitate the coordination of Out-of-Hours Work approved by an EPL to ensure appropriate respite is provided; identify an approval process that considers the risk of activities, proposed mitigation, management, and coordination, including where: low risk activities and high risk activities that cease by 9pm can be approved by the ER, and all other high risk activities must be approved by the Planning Secretary; and identify Planning Secretary, EPA and community notification arrangements for approved Out-of-Hours Work, which may be detailed in the Community Communication Strategy.	**Section 8.5** **Section 8.6** **Section 8.9** **Section 8.11** **Appendix C**
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: reschedule Work to provide respite to impacted noise sensitive receivers so that the respite is achieved in accordance with Condition E23; or consider the provision of alternative respite or mitigation to impacted noise sensitive receivers; and provide documentary evidence to the ER in support of any decision made by the Proponent in relation to respite or mitigation.	**Section 8.10**
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 7**
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 8.5** **Section 8.6**

E29	Mitigation measures must be implemented with the aim of achieving the following Construction noise management levels and vibration criteria: Construction 'Noise affected' noise management levels established using the Interim Construction Noise Guideline (DECC, 2009); vibration criteria established using the 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 they are "applicable to Australian conditions"; and 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 3** **Section 6** **Section 8**
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 6.7** **Section 8.5** **Section 8.6**
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	**CoA E32 is not relevant to the Project as station works are not near locations where operational noise mitigation is identified**

	commencement of Construction which would affect the identified sensitive receivers, the report must be submitted to the Planning Secretary for information.	

Revised Environmental Mitigation Measures relevant to the development of this NVMP

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	**Section 7**
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: relevant project specific and standard noise and vibration mitigation measures relevant licence and approval conditions permissible hours of work any limitations on high noise generating activities location of nearest sensitive receivers designated loading/unloading areas and procedures site opening/closing times (including deliveries).	Design/pre-construction	**Section 8.7**
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 8.4**

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 6.7** **Section 0**
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: The provision of noise barriers around each construction site. The coincidence of noisy plant working simultaneously close together would be avoided. Residential grade mufflers would be fitted to all mobile plant. Non-tonal reversing alarms would be fitted to all permanent mobile plant. High noise generating activities would be scheduled for less sensitive periods considering the nearby receivers, where reasonable and feasible. The layout of construction sites would consider opportunities to shield receivers from noise. Stationary noise sources would be enclosed or shielded whilst ensuring that the occupational health and safety of workers is maintained. Loading and unloading of materials/deliveries is to occur as far as possible from noise sensitive receivers. Select site access points and roads as far as possible away from noise sensitive receivers. Dedicated loading/unloading areas to be shielded if close to noise sensitive receivers wherever feasible and reasonable. Use quieter and less vibration emitting construction methods where feasible and reasonable. The noise levels of plant and equipment must have operating Sound Power Levels compliant with the criteria in the Construction Noise and Vibration Strategy.	Construction	**Section 8** **All example NVC5 mitigation measures will be considered in the development of CNVIS assessments.**

	Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site. Where feasible and reasonable, the offset distance between noisy plant items and nearby noise sensitive receivers would be as great as possible. Where reasonable and feasible heavy vehicle movements would be limited to daytime and evening hours, with night-time movements avoided where possible. Active community consultation and the maintenance of positive, cooperative relationships with schools, local residents and building owners and occupiers, through: periodic notification or work activities and progress (e.g. regular letterbox drops, e-consult) specific notification (letter-box drop) prior to especially noisy activities comprehensive website information project information and construction response telephone line email distribution lists.		
NVC6	Noise intensive plant for, 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.	Construction	**Section 6.1** **Section 6.4** **Section 8.6**
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 8.5**
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 8.5**
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.	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:**

	Alternative accommodation arrangements would be offered and discussed with residents on a case-by-case basis.		**Section 8.11** **Section 8.12**
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 6.4** **Section 8.6** **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 6.4** **Section 8.11** **Section 9.2**
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 6** **Section 0**
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	**Ground borne noise management levels expected to be below airborne noise levels, therefore risk of ground-borne noise levels is low.**
NVC14	Reasonable and feasible mitigation measures would be implemented where power supply works would result in elevated noise levels at receivers. This could include: carrying out works during the daytime period when in the vicinity of residential receivers where out of hours works are required, scheduling the noisiest activities to occur in the evening period (up to 10pm) use of portable noise barriers around particularly noisy equipment.	Construction	**This NVMP** **Section 8** **No power supply works are proposed in this Project's station upgrade 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 Martinus. The sections below only address the construction haulage vehicles component of this REMM.** **Section 6.6**

			Section 8.13
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 Out of Hours Works Strategy/Protocol** **Section 6.1** **Section 8.5** **Section 8.6** **Section 8.9** **Section 8.11** **Appendix C**

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

CEMF Section	CEMF Requirement	Document Reference
3.7(a)	Prior to the commencement of construction Martinus will offer Pre-construction Building Condition Surveys, in writing, to the owners of buildings where there is a potential for construction activities to cause cosmetic or structural damage. If accepted, Martinus will produce a comprehensive written and photographic condition report produced by an appropriate professional prior to relevant works commencing.	**Section 0** **Section 10.1** **Table 23**
5.1(a)	Standard working hours are between 7am – 6pm on weekdays and 8am – 1pm on Saturdays.	**Section 6.1 - Note via the Project CSSI-8256 Standard hours on Saturday is between 0800-1800 and shall apply to the Project.**
5.1(b)	Works which can be undertaken outside of standard construction hours without any further approval include: Those which have been described in respective environmental assessments as being required to take place 24/7. For example, tunnelling and underground excavations and supporting activities will be required 24/7 Works which are determined to comply with the relevant Noise Management Level at sensitive receivers	**Section 6.1**

	The delivery of materials outside of approved hours as required by the Police or other authorities (including RMS) for safety reasons Where it is required to avoid the loss of lives, property and / or to prevent environmental harm in an emergency Where written agreement is reached with all affected receivers.	
5.1(c)	Martinus may apply for EPA approval to undertake works outside of normal working hours under their respective Environment Protection Licences	**Section 6.1**
5.2(a)	Martinus will consider the following in the layout of construction sites: 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 Aim to minimise the requirement for reversing, especially of heavy vehicles.	**Section 8.1** **Section 8.2** **Section 8.3** **Section 8.6**
9.1(a)	Construction Noise and Vibration Management Objectives The following noise and vibration management objectives will apply to construction: Minimise unreasonable noise and vibration impacts on residents and businesses; Avoid structural damage to buildings or heritage items as a result of construction vibration; Undertake active community consultation; and Maintain positive, cooperative relationships with schools, childcare centres, residents and building owners.	**Section 6**
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 7**
9.2(c)	Noise and vibration monitoring would be undertaken for construction as specified in the CNVS and the EPL.	**Section 9**
9.2(d)	The following compliance records would be kept by Martinus: Records of noise and vibration monitoring results against appropriate NMLs and vibration criteria; and	**Section 9.5**

	Records of community enquiries and complaints, and the Contractor's response.	
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: Construction hours will be in accordance with the working hours specified in Section 5.1; 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 6.1** **Section 8.6** **Section 8.3** **Section 8.1** **Section 8**

EPL 12208 Clauses relevant to this NVMP

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 8.7** **Section 8.8**
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 8.6**
Standard railway maintenance hours		
O13.1	Maintenance activities must be undertaken:	**Section 6.1**

	between the hours of 7:00am and 6:00pm Monday to Friday between the hours of 8:00am and 1:00pm Saturday; and not on Sunday or public holidays, unless an exception in condition O13.2 or condition O13.3 applies.	**Section 8.6**
Exception to standard railway maintenance hours		
O13.2	The licensee may undertake maintenance activities outside of the hours specified in Condition O13.1: to provide safe and reliable train services or a safe working environment; or for emergency works; or for the delivery of oversized plant or structures that require special arrangements or authorisation to be lawfully transported along public roads.	**Section 6.1** **Section 8.6** **Requirements are aligned with the Sydney Metro CNVS and this NVMP** **Out of Hours Works Protocol to be applied – refer Section 8.6**
Exception to standard railway maintenance hours for low noise impact generating works		
O13.3	The licensee may undertake maintenance activities outside of the hours specified in Condition O13.1, if the activities do not exceed: 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 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. 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.	**Requirements are aligned with the Sydney Metro CNVS and this NVMP** **Out of Hours Works Protocol to be applied – refer Section 8.6**

	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.	
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: identify noise sensitive receivers that may be affected; identify hours of work for the proposed activities; identify noise impacts at noise sensitive receivers; select and apply reasonable and feasible work practices to minimise noise impacts; and 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.	**Requirements are aligned with the Sydney Metro CNVS and this NVMP** **Out of Hours Works Protocol to be applied – refer Section 8.6**
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;	**Section 9.5** **Covered in Sydney Metro procedures for interaction with NSW government agencies.**

	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.	
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 9.5** **Covered in Sydney Metro procedures for interaction with NSW government agencies.**

APPENDIX B – Construction Noise and Vibration Impact Assessment

RENZO TONIN & ASSOCIATES
inspired to achieve

Acoustics
Vibration
Structural Dynamics

SOUTHWEST METRO – CONVERSION AND STATION WORKS PACKAGE 4 (SWM4)

Construction Noise and Vibration Impact Statement - Errant and Hostile Vehicle Mitigation Treatments for the Southwest Metro Project works

31 May 2024

Martinus Rail

TN794-01 1-02F01 CNVIS SWM4 (r2)

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1 Introduction

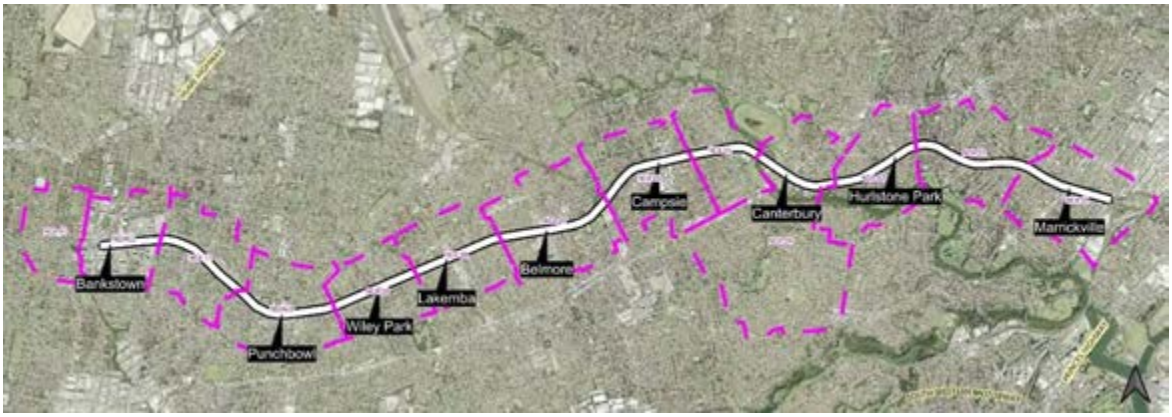
1.1 Purpose and application

This Construction Noise and Vibration Impact Statement (CNVIS) has been prepared on behalf of Martinus Rail in accordance with the Sydney Metro City & Southwest Construction Noise and Vibration Strategy (CNVS)[1] for Southwest Metro Conversion and Stations Works (SWM). This CNVIS has been prepared to satisfy Planning Approval (SSI 8256) Condition E27 and the CNVS, including specific mitigation measures to be implemented for the duration of the assessed works, identified through consultation with affected sensitive receiver(s).

1.2 Overview

The SWM Works (the Project) are part of the Sydney Metro City & Southwest, a new 30km metro line extending metro rail from the end of Sydney Metro Northwest at Chatswood under Sydney Harbour, through new CBD stations and southwest to Bankstown. The Project site is located on the T3 Bankstown line between approximately 800 metres west of Sydenham Station in Marrickville, to approximately one kilometre west of Bankstown Station in Bankstown. An overview of the construction work locations for Sydney Metro SWM Works is presented in Figure 1.1.

Figure 1.1: Overview of Sydney Metro SWM construction works between Sydenham and Bankstown



The aim of this assessment is to minimise the impact of construction noise and vibration on sensitive receivers and demonstrate compliance with relevant Conditions of Approval, the Environmental Impact Statement (EIS)[3], the Submissions Report [4] and the Construction Noise and Vibration Management Plan (CNVMP) (document reference MR-EE-002).

1.3 Scope of this CNVIS

This CNVIS provide a quantitative noise and vibration assessment of activities and/ or locations where construction work will occur. It updates details presented in the EIS Noise and Vibration Technical Paper [3], to include the more detailed information available at the detailed design and construction planning stage of the Project.

This CNVIS provides a noise and vibration assessment of the construction activities associated with the SWM Package 4 (SWM4) works, which involves the installation of errant and hostile vehicle mitigation treatments for the Southwest Metro Project between approximately 800 metres west of Sydenham Station in Marrickville, to approximately one kilometre west of Bankstown Station in Bankstown. The SWM4 works include:

- Ancillary facilities – site establishment
- Ancillary works – operation
- Station and corridor works – Anti-throw screens and anti-vehicle bollards installation
- Station and corridor works – safety improvements

The works covered by this CNVIS will be undertaken in accordance with the Construction Environmental Management Plan (CEMP) incorporating the CNVMP.

1.4 Quality assurance

The work documented in this report was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian Standard / NZS ISO 9001.

Appendix A contains a glossary of acoustic terms used in this report.

2 Construction works and hours

2.1 Construction works addressed in this CNVIS

2.1.1 Construction works

This CNVIS provides an assessment of noise and vibration impacts from activities associated with SWM4 Works. The worksite locations are depicted in APPENDIX B. The works include:

Table 2.1: Summary of construction works addressed in this CNVIS

Work area	Worksite	Work activities	Worksite location (reference)
Ancillary facilities	- Laydown areas	- Site establishment - Site operation	See Section 0
Station overbridges	- Punchbowl Station - Wiley Park Station - Belmore Station - Lakemba Station - Canterbury Station - Hurlstone Park Station - Dulwich Hill Station - Marrickville Station	- Bridge barrier - Anti-throw screen/ anti-vehicle bollard installation - Safety improvements	See Section 0
Non station overbridges	- Stacey Street - Moreton Street - Loch Street - Melford Street - Garnet Street - Albemarle Street - Livingstone Road	- Bridge barrier - Anti-throw screen/ anti-vehicle bollard installation - Safety improvements	See Section 0
Corridor works	- 66 locations within corridor	- Safety improvements	See Section 0

The proposed works, likely plant and equipment and indicative Project timing are summarised in APPENDIX C. Works are planned to occur during standard construction hours, however due to the proximity of the works area to the existing rail corridor, some works will need to occur under Rail Possession or during rail shutdown, as outlined in Section 2.2 and APPENDIX C.

2.1.2 Construction traffic

The Project will generate additional traffic movements in the form of:

- Light vehicle movements generated by construction personnel travelling to and from work
- Heavy vehicle movements generated by delivery vehicles bringing materials, plant and equipment to the worksite or removing waste material from the worksite.

Construction traffic on-site (i.e. within the Project footprint) is included as part of the construction noise assessment of the works activities identified in Section 5 and APPENDIX C. 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's activities. Construction traffic noise is addressed in Section 8.

2.1.3 Cumulative construction impacts

Condition of Approval E26 requires work undertaken for the delivery of the CSSI, including those undertaken by third parties (such as utility relocations) to be coordinated to ensure respite periods are provided.

All concurrent Sydney Metro construction site works have been considered and addressed in Section 9.5 of this CNVIS. Potentially concurrent construction activities within the vicinity of the SWM4 worksites have also been considered, as discussed in Section 9.5.

2.2 Construction hours

Construction hours for the Project are outlined in Conditions of Approval E19, E20 and E24. Table 2.2 below consolidates the information provided in these Conditions regarding construction working hours for the Project.

Table 2.2: Working hours for construction worksites

CoA	Construction Activity	Monday to Friday	Saturday	Sunday / Public holiday
E19	Standard construction	07:00 to 1800	08:00 to 18:00	No work[1]
E20(a)	Delivery of materials required by the NSW Police Force or other authority for safety reasons	18:00 to 07:00[2]	18:00 to 08:00[2]	08:00 to 0:700[2]
E20(b)	Where it is required in an emergency	18:00 to 07:00[2]	18:00 to 08:00[2]	08:00 to 0:700[2]
E20(c)	Different construction hours permitted or required under an EPL	18:00 to 07:00[2]	18:00 to 08:00[2]	08:00 to 0:700[2]
E20(d)	Work approved under an Out-of-Hours Work Protocol	18:00 to 07:00[2]	18:00 to 08:00[2]	08:00 to 0:700[2]
E20(e)	Low noise impact work[3]	18:00 to 07:00[2]	18:00 to 08:00[2]	08:00 to 0:700[2]
E20(f)	Where a negotiated agreement has been reached	18:00 to 07:00[2]	18:00 to 08:00[2]	08:00 to 0:700[2]
E24	Highly noise intensive works[4]	08:00 to 18:00 (plus respite[4])	08:00 to 13:00 (plus respite[4])	No work[1]

Notes:

1. No work unless permitted and approved.
2. Hours limited to those specified in the OOHW permit/ variation to work hours approval
3. Construction that causes $L_{Aeq(15\ minute)}$ noise levels no more than 5dB(A) above the Rating Background Level (RBL) at any residence; and/or no more than the 'noise affected' NMLs specified in Table 3 of the ICNG at other sensitive land user(s). Construction that causes continuous/impulsive/intermittent vibration values at the most affected residence, no more than the preferred values for human exposure to vibration, specified in Table 2.2 and Table 2.4 of the AVTG.
4. Minimum respite from highly noise intensive works of not less than one (1) hour between each continuous block of works not exceeding three (3) hours.

2.2.1 Justification for OOHW

Construction works will be undertaken where reasonable and feasible during standard construction hours. However, overbridge works and corridor works will need to be undertaken outside standard construction hours due to safety or quality control considerations, or to comply with regulatory requirements.

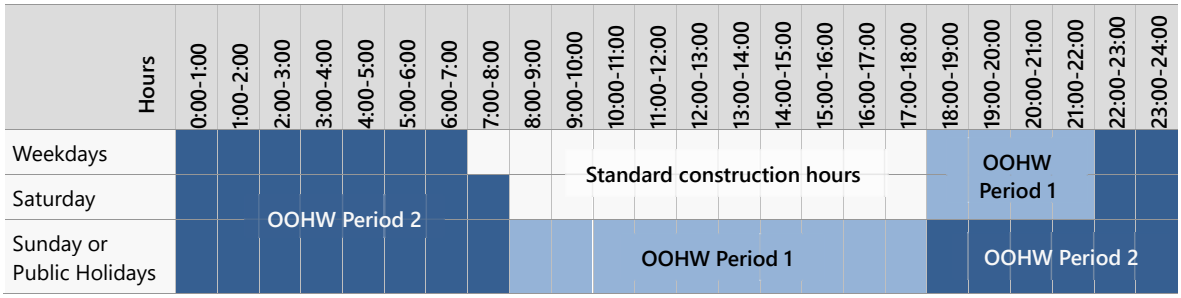
The overbridge activities are located on main thoroughfares. As such, it would be dangerous to workers, pedestrians and traffic users respectively to complete these activities so a Road Occupancy License (ROL) is required, which may not be granted during standard hours. In addition, the works are required to be out of hours due to some services and utilities being located in a trough as opposed to a trench. Lifting the trough lids creates risks for debris falling into the rail corridor from the overbridge. To minimise this risk, some of the works are proposed during rail corridor possessions. Corridor works will need to be undertaken during rail corridor possessions for safety requirements. The possessions are required to be at night to minimise risks to, and increase the safety of, workers and the general public.

Out-of-hours work under CoA E20(c) would be undertaken through the Sydney Metro's City and Southwest Out of Hours Works Strategy/Protocol [2] (OOHW Protocol) prepared for the project.

2.2.2 Assessment periods

The standard hours and out of hours work (OOHW) periods for construction works are depicted in Table 2.3. The OOHW periods are further defined as OOHW Period 1 and 2, based on the CNVS [1].

Table 2.3: Assessment periods



Construction traffic is assessed over a fifteen-hour day period, between 7am and 10pm (typically standard hours plus OOHW Period 1) and a nine-hour night period, between 10pm and 7am (typically OOHW Period 2). This is consistent with the NSW Road Noise Policy [7] and the CNVS [1].

3 Existing environment

3.1 Land use survey

To assess and manage construction noise and vibration impact, a Land Use Survey has been undertaken to satisfy Condition E18. The Land Use Survey identifies existing land use and development along the Project corridor, including a mix of residential, commercial and industrial uses; along with other noise and vibration-sensitive businesses, such as Hotels, medical or dental surgeries, places of worship and childcare facilities, to satisfy Condition of Approval E28.

Heritage receivers have been identified in the CNVMP and in the land use survey in APPENDIX B.

The Land Use Survey is maintained in a Geographic Information System (GIS) established for the Project and was used in the preparation of this CNVIS. The land use surrounding each worksite at the time of issue of this CNVIS is identified on aerial photographs in APPENDIX B. The land use revision date is shown in the top left corner of the drawings.

3.2 Noise catchment areas

Further to the Land Use Survey, residential areas have been divided into Noise Catchment Areas (NCAs) based on those established in the EIS [3] for the Project. NCAs group individual sensitive receivers by common traits, such as existing noise environment and location in relation to the SWM Works. NCAs relevant to each worksite are identified in APPENDIX B.

3.3 Baseline noise monitoring

Baseline noise monitoring was conducted for the EIS and is discussed and presented in the CNVMP. The Rating Background Levels (RBLs) for the day, evening and night assessment periods are summarised in Table 3.1. The monitoring locations are identified on the land use and worksite maps presented in APPENDIX B.

Table 3.1: Summary of baseline noise monitoring data from EIS

NCA	Reference Monitoring ID	Area	Day 7:00 am-6:00 pm		Evening 6:00 pm-10:00 pm		Night 10:00 pm-7:00 am	
			RBL	$L_{Aeq(15min)}$	RBL	$L_{Aeq(15min)}$	RBL	$L_{Aeq(15min)}$
NCA 01	B.02	Marrickville	38	59	38	58	33	51
NCA 02	B.03	Marrickville	38	57	38	57	33	53
NCA 03	B.06	Hurlstone Park	38	56	38	53	34	49
NCA 04	B.07	Hurlstone Park	40	53	40	50	35	47
NCA 05	B.09	Canterbury	36	57	36	57	32	54
NCA 06	B.10	Campsie	45	55	42	55	35	54
NCA 07	B.13	Belmore	41	49	41	47	35	46
NCA 08	B.14	Lakemba	47	65	47	63	41	60

NCA	Reference Monitoring ID	Area	Day 7:00 am-6:00 pm		Evening 6:00 pm-10:00 pm		Night 10:00 pm-7:00 am	
			RBL	$L_{Aeq(15min)}$	RBL	$L_{Aeq(15min)}$	RBL	$L_{Aeq(15min)}$
NCA 09	B.16	Lakemba	44	56	44	55	36	51
NCA 10	B.19	Punchbowl	47	57	47	54	41	53
NCA 11	B.20	Bankstown	47	65	47	64	39	60
NCA 12	B.22	Bankstown	54	64	51	63	42	60
NCA 13	B.23	Bankstown	42	56	42	55	39	52

Source: 2017 Sydney Metro Sydenham to Bankstown - Technical Paper 2: Noise and Vibration Report [3].

4 Construction noise and vibration objectives

Construction noise and vibration objectives are detailed in the CNVS Section 2 and the CNVMP. A summary of the objectives as applicable to the SWM Works is provided in Table 4.1.

Table 4.1: Summary of construction noise and vibration objectives

Impact	Relevant guideline	Construction noise/ vibration objective
Airborne noise	NSW Interim Construction Noise Guideline (ICNG) [5] CNVS [1]	Construction noise management levels (NMLs) for residential receivers are based on long-term noise logging conducted on behalf of Sydney Metro to quantify ambient noise levels for the EIS [3]. During standard construction hours, a highly affected noise objective of $L_{Aeq(15min)}$ 75dB(A) applies at all residential receivers. The NMLs for 'other' sensitive receivers are from the ICNG, as reported in Section 5.3 of the CNVS. Receivers are considered 'noise affected' where construction noise levels are greater than the noise management levels identified in Table B.1 of APPENDIX B. Where construction activities are described in the ICNG as being particularly annoying, a +5dB(A) correction must be added to the activity noise. Construction related activities that could exceed the NMLs shall be identified and managed in accordance with the noise and mitigation and management measures set out in Section 9.
Sleep disturbance	ICNG refers to the NSW Road Noise Policy (RNP) [7] CNVS [1]	Initial screening level defined sleep disturbance event: • L_{AFmax} ≤ RBL + 15 dB OR 55 dB(A) whichever is higher. Where noise events are found to exceed the initial screening level, identify whether events are above the external sleep awakening level of L_{AFmax} 65 dB(A) (assuming open windows). If the Sleep Awakening Level is exceeded, then sleep disturbance is to be reviewed in more detail, including: • Consideration of whether windows are open or can be kept closed. • Apply external sleep awakening level of L_{AFmax} 75 dB(A) (assuming closed windows and a conservative building façade loss of 20 dB).
Ground-borne noise	NSW Interim Construction Noise Guideline (ICNG) [5] CNVS [1]	Receivers are considered 'ground-borne noise affected' where construction noise levels are greater than the noise management levels identified in Table B.2 of APPENDIX B.
Construction traffic	ICNG refers to the NSW Road Noise Policy (RNP) [7] CNVS [1]	Construction traffic impact initial screening test: • Traffic noise levels increase ≤ 2 dB(A) because of construction traffic Where traffic noise levels increase by more than 2 dB(A): • 60 dB $L_{Aeq(15hour)}$ day and 55 dB $L_{Aeq(9hour)}$ night for freeway/arterial/sub-arterial roads • 55 dB $L_{Aeq(1hour)}$ day and 50 dB $L_{Aeq(1hour)}$ night for existing local roads.

Impact	Relevant guideline	Construction noise/ vibration objective
Vibration – disturbance to building occupants	NSW 'Environmental Noise Management Assessing Vibration: A Technical Guideline' (AVTG) [8] CNVS [1]	To assess the potential for vibration impact on human comfort, an initial screening test will be done based on peak velocity units, as this metric is also used for the cosmetic damage vibration assessment. The initial screening test values are: • Critical areas - 0.28 mm/s (day or night) • Residential buildings - 0.56 mm/s (15h day); 0.40 mm/s (9h night) • Offices, schools, educational institutions and places of worship - 1.10 mm/s (day or night) • Workshops - 2.20 mm/s (day or night). If the predicted vibration exceeds the initial screening test, the total estimated Vibration Dose Value (i.e. eVDV) will be determined based on the level and duration of the vibration event causing exceedance as detailed in Section 5.4.1 of the CNVS and Section 2.4 of the AVTG.
Vibration – damage to buildings	British Standard BS 7385-2:1993 'Evaluation and measurement for vibration in buildings'[12] German Standard DIN 4150-3: 2016-12, Structural vibration - Effects of vibration on structures [13] CNVS [1]	A conservative vibration damage screening level (peak component particle velocity) per receiver type is detailed in Section 2.4 of the CNVS and outlined below: • Reinforced or framed structures: 25.0 mm/s • Unreinforced or light framed structures: 7.5 mm/s. Heritage buildings and structures found to be structurally unsound (following inspection) would adopt a more conservative vibration damage screening level (peak component particle velocity): • Heritage structures (structurally unsound): 2.5 mm/s (initial screening level). Where the predicted and/or measured vibration is greater than shown above, a more detailed analysis of the building structure, vibration source, dominant frequencies and dynamic characteristics of the structure will be completed to determine the applicable vibration limit.
Vibration – sensitive structures & utilities (e.g. tunnels, pipelines etc)	CNVS [1]	Specific vibration goals would be determined on a case-by-case basis. Liaison with the structure or utility's owner would be undertaken to determine acceptable vibration levels.
Sensitive scientific and medical equipment	ASHRAE Applications Handbook (SI) [14] and AS 2834 Computer Accommodation [15]	Where vibration sensitive equipment is potentially affected by construction works, vibration limits for the operation of the equipment will be taken from manufacturer's data or provided by the equipment owner. Where this is not available, the following generic Vibration Criterion (VC) curves apply: • Computer Areas 0.7 mm/s, rms* 1.0 mm/s, peak • Medical 0.1 mm/s, rms* 0.14 mm/s, peak • Vibration criterion curve VC-A 0.05 mm/s, rms* 0.07 mm/s, peak • Vibration criterion curve VC-B 0.025 mm/s, rms* 0.03 mm/s, peak * Measured in one-third octave bands over the frequency range 8 to 100 Hz

5 Construction airborne noise impacts

5.1 Noise prediction methodology

Assessment of airborne noise impacts from the construction works were determined by predicting noise levels using a Cadna-A computer noise model developed for this project. The Cadna-A noise model incorporates ground elevation contours, building heights, the built environment, and atmospheric conditions to predict the contribution of each noise source at identified sensitive receiver locations and allows for the prediction of the total noise from a worksite for the various construction stages.

Key details regarding the construction work locations, the likely plant and equipment, and hours of operation were informed by the Design and Construction Teams.

A summary of the noise model input parameters is detailed in Table 5.1.

Table 5.1: Summary of noise modelling parameters

Parameters	Inputs
Calculation method	ISO 9613-2:1996 implementing quality standard ISO 17534-1:2015
Location of noise sources	0.5m to 2m above the ground depending on the equipment or plant in use
Height of receivers	1.5m above ground level to represent 1.5m above ground floor level Additional 3m height for every additional floor assessed (i.e. 4.5m above ground for first floor, 7.5m for second floor etc.)
Ground topography	1m digital ground contours
Sound power levels of plant and equipment	Detailed in Table C.1 in APPENDIX C. Activity timing, number of plant and hours of operation also in Table C1.
Ground absorption	0.5
Noise barriers and screening	Noise barriers are being installed as part of these works and are therefore not included in the noise predictions. Existing buildings providing shielding to receivers has been included in the noise model.
Noise source corrections	Noise source penalty corrections have been applied in accordance with Section 4.5 of the NSW Interim Construction Noise Guideline (INCG).

The noise predictions in this report represent a realistic worst-case scenario when construction occurs at a works location close to residences and other sensitive receivers. At each receiver, noise levels will vary during the construction period based on:

- the position of equipment within the worksite and distance to the receiver;
- the construction activities being undertaken;
- the noise levels of plant items and equipment
- any obstacles located between the noise source and the receiver.

5.2 Predicted noise levels

Detailed predicted L_{Aeq} noise levels for all receivers in each NCA are presented in Table D.1 of APPENDIX D. The predicted noise levels in Table D.1 of APPENDIX D are the maximum predicted noise levels for each activity, as noted in Section 5.1 and the maximum noise levels for each building, taking all building facades and floor levels into consideration. Actual noise levels will often be less than the predicted levels presented in this report.

The predicted noise levels in Table D.1 of APPENDIX D have been compared to the noise management levels (NMLs). A receiver is considered construction noise affected when the predicted construction noise level is above the NML. Table 5.3 present a summary of the number of residential receivers and 'other sensitive receivers (respectively) likely to be noise affected by the proposed activities. The tables are colour coded to indicate how much the predicted noise level is above the NML and the corresponding perceived noise impact, based on the CNVS, as noted in Table 5.2.

Table 5.2: Key to the predicted construction noise results tables

Assessment	Time of day	Key			
$L_{Aeq(15min)}$	Standard hours[1]	0-10 dB(A) over NML (light blue) Clearly audible	11-20 dB(A) over NML (mid blue) Moderately intrusive	>20 dB(A) above NML (dark blue) Highly intrusive	
	Outside standard hours	1-5 dB(A) above NML (green)	6-15 dB(A) above NML (yellow)	16-25 dB(A) above NML (orange)	>25 dB(A) above NML (purple)
Sleep disturbance	Night only	L_{Amax} above RBL plus 15 dB,		L_{Amax} above 65 dB(A) (purple)	

Table 5.3 summarises the number of construction noise affected residential receivers (i.e. receivers where predicted L_{Aeq} noise levels construction works are above the NML) and the likely perceived noise impact.

Table 5.3: Number of receiver buildings over the airborne noise management level (each NCA) – residential receivers

Construction activity	Assessment reference	Highly noise affected > 75 dB(A)	Day (standard hours)			Day (OOH)				Evening				Night				Sleep disturbance	
		LAeq	LAeq			LAeq				LAeq				LAeq				LAmax	
		Standard hours	1 – 10 dB(A)	11 – 20 dB(A)	> 20 dB(A)	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	Screening	Awakening
NCA01																			
Ancillary facilities – site establishment (typical activities)	AC-T	**0**	128	22	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ancillary facilities – site establishment (high impact activities)	AC-H	**33**	568	331	70	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ancillary facilities – site operation	AC-O	**0**	128	22	11	186	128	22	11	186	128	22	11	186	128	22	11	119	20
Bridge barrier, anti-screens and anti-vehicle bollards installation (typical activities)	BR-T	**4**	197	36	5	297	197	36	9	297	197	36	9	297	197	36	9	291	36
Bridge barrier, anti-screens and anti-vehicle bollards installation (High impact activities)	BR-H	**30**	527	436	73	326	527	436	103	326	527	436	103	326	527	436	103	994	345
Bridge barrier, anti-screens and anti-vehicle bollards installation (Hydro-demolition)	BR-HD	**103**	552	543	242	0	552	543	345	0	552	543	345	0	552	543	345	1198	539
Corridor work – safety improvements	CW	**1**	115	23	11	246	115	23	12	246	115	23	12	246	115	23	12	120	24
NCA02																			
Ancillary facilities – site establishment (typical activities)	AC-T	**18**	276	102	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ancillary facilities – site establishment (high impact activities)	AC-H	**141**	647	753	155	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ancillary facilities – site operation	AC-O	**18**	276	102	21	384	276	102	39	384	276	102	39	384	276	102	39	320	79
Bridge barrier, anti-screens and anti-vehicle bollards installation (typical activities)	BR-T	**6**	358	54	10	608	358	54	16	608	358	54	16	608	358	54	16	506	54

Construction activity	Assessment reference	Highly noise affected > 75 dB(A)	Day (standard hours)			Day (OOH)				Evening				Night				Sleep disturbance	
		LAeq	LAeq			LAeq				LAeq				LAeq				LAmax	
		Standard hours	1 – 10 dB(A)	11 – 20 dB(A)	> 20 dB(A)	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	Screening	Awakening
Bridge barrier, anti-screens and anti-vehicle bollards installation (High impact activities)	BR-H	**46**	642	859	131	51	642	859	177	51	642	859	177	51	642	859	177	1655	600
Bridge barrier, anti-screens and anti-vehicle bollards installation (Hydro-demolition)	BR-HD	**177**	141	989	423	0	141	989	600	0	141	989	600	0	141	989	600	1707	1036
Corridor work – safety improvements	CW	**14**	308	130	24	414	308	130	38	414	308	130	38	414	308	130	38	427	105
NCA03																			
Ancillary facilities – site establishment (typical activities)	AC-T	**1**	205	43	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ancillary facilities – site establishment (high impact activities)	AC-H	**59**	586	684	104	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ancillary facilities – site operation	AC-O	**1**	205	43	15	360	205	43	16	360	205	43	16	360	205	43	16	186	37
Bridge barrier, anti-screens and anti-vehicle bollards installation (typical activities)	BR-T	**0**	197	38	7	515	197	38	7	515	197	38	7	515	197	38	7	298	37
Bridge barrier, anti-screens and anti-vehicle bollards installation (High impact activities)	BR-H	**32**	656	657	68	29	656	657	100	29	656	657	100	29	656	657	100	1396	371
Bridge barrier, anti-screens and anti-vehicle bollards installation (Hydro-demolition)	BR-HD	**100**	122	950	271	0	122	950	371	0	122	950	371	0	122	950	371	1436	757
Corridor work – safety improvements	CW	**0**	174	44	6	294	174	44	6	294	174	44	6	294	174	44	6	188	31
NCA04																			
Ancillary facilities – site establishment (typical activities)	AC-T	**0**	62	12	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Construction activity	Assessment reference	Highly noise affected > 75 dB(A)	Day (standard hours)			Day (OOH)				Evening				Night				Sleep disturbance	
		LAeq	LAeq			LAeq				LAeq				LAeq				LAmax	
		Standard hours	1 – 10 dB(A)	11 – 20 dB(A)	> 20 dB(A)	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	Screening	Awakening
Ancillary facilities – site establishment (high impact activities)	AC-H	**17**	822	147	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ancillary facilities – site operation	AC-O	**0**	62	12	1	74	62	12	1	74	62	12	1	74	62	12	1	57	6
Bridge barrier, anti-screens and anti-vehicle bollards installation (typical activities)	BR-T	**2**	65	12	1	128	65	12	3	128	65	12	3	128	65	12	3	96	17
Bridge barrier, anti-screens and anti-vehicle bollards installation (High impact activities)	BR-H	**15**	1270	177	16	227	1270	177	31	227	1270	177	31	227	1270	177	31	1375	180
Bridge barrier, anti-screens and anti-vehicle bollards installation (Hydro-demolition)	BR-HD	**50**	971	833	67	439	971	833	117	439	971	833	117	439	971	833	117	1602	329
Corridor work – safety improvements	CW	**0**	59	9	1	69	59	9	1	69	59	9	1	69	59	9	1	58	7
NCA05																			
Ancillary facilities – site establishment (typical activities)	AC-T	**0**	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ancillary facilities – site establishment (high impact activities)	AC-H	**0**	428	58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ancillary facilities – site operation	AC-O	**0**	3	0	0	30	3	0	0	30	3	0	0	30	3	0	0	1	0
Bridge barrier, anti-screens and anti-vehicle bollards installation (typical activities)	BR-T	**0**	0	0	0	2	0	0	0	2	0	0	0	2	0	0	0	1	0
Bridge barrier, anti-screens and anti-vehicle bollards installation (High impact activities)	BR-H	**0**	142	2	0	506	142	2	0	506	142	2	0	506	142	2	0	126	0

Construction activity	Assessment reference	Highly noise affected > 75 dB(A)	Day (standard hours)			Day (OOH)				Evening				Night				Sleep disturbance	
		LAeq	LAeq			LAeq				LAeq				LAeq				LAmax	
		Standard hours	1 – 10 dB(A)	11 – 20 dB(A)	> 20 dB(A)	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	Screening	Awakening
Bridge barrier, anti-screens and anti-vehicle bollards installation (Hydro-demolition)	BR-HD	**0**	581	68	1	0	581	68	1	0	581	68	1	0	581	68	1	189	1
Corridor work – safety improvements	CW	**0**	57	18	3	88	57	18	3	88	57	18	3	88	57	18	3	64	5
NCA06																			
Ancillary facilities – site establishment (typical activities)	AC-T	**4**	32	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ancillary facilities – site establishment (high impact activities)	AC-H	**30**	244	70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ancillary facilities – site operation	AC-O	**4**	32	7	0	40	32	7	4	40	32	7	4	48	49	9	8	49	17
Bridge barrier, anti-screens and anti-vehicle bollards installation (typical activities)	BR-T	**0**	31	12	0	49	31	12	0	49	31	12	0	79	49	14	3	81	25
Bridge barrier, anti-screens and anti-vehicle bollards installation (High impact activities)	BR-H	**23**	329	69	0	181	329	69	23	181	329	69	23	260	352	113	32	464	176
Bridge barrier, anti-screens and anti-vehicle bollards installation (Hydro-demolition)	BR-HD	**58**	395	253	0	209	395	253	58	209	395	253	58	182	397	329	92	602	311
Corridor work – safety improvements	CW	**3**	112	34	0	103	112	34	3	103	112	34	3	127	156	48	7	187	73
NCA07																			
Ancillary facilities – site establishment (typical activities)	AC-T	**0**	128	31	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ancillary facilities – site establishment (high impact activities)	AC-H	**63**	1040	361	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ancillary facilities – site operation	AC-O	**0**	128	31	3	169	128	31	3	169	128	31	3	169	128	31	3	127	27

Construction activity	Assessment reference	Highly noise affected > 75 dB(A)	Day (standard hours)			Day (OOH)				Evening				Night				Sleep disturbance	
		LAeq	LAeq			LAeq				LAeq				LAeq				LAmax	
		Standard hours	1 – 10 dB(A)	11 – 20 dB(A)	> 20 dB(A)	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	Screening	Awakening
Bridge barrier, anti-screens and anti-vehicle bollards installation (typical activities)	BR-T	**0**	19	1	0	55	19	1	0	55	19	1	0	55	19	1	0	28	1
Bridge barrier, anti-screens and anti-vehicle bollards installation (High impact activities)	BR-H	**1**	1055	72	2	517	1055	72	3	517	1055	72	3	517	1055	72	3	1001	75
Bridge barrier, anti-screens and anti-vehicle bollards installation (Hydro-demolition)	BR-HD	**12**	990	705	21	62	990	705	33	62	990	705	33	62	990	705	33	1417	259
Corridor work – safety improvements	CW	**4**	126	51	2	226	126	51	6	226	126	51	6	226	126	51	6	168	57
NCA08																			
Ancillary facilities – site establishment (typical activities)	AC-T	**0**	89	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ancillary facilities – site establishment (high impact activities)	AC-H	**90**	562	153	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ancillary facilities – site operation	AC-O	**0**	89	14	0	89	89	14	0	89	89	14	0	89	89	14	0	78	45
Bridge barrier, anti-screens and anti-vehicle bollards installation (typical activities)	BR-T	**0**	46	4	0	45	46	4	0	45	46	4	0	45	46	4	0	60	37
Bridge barrier, anti-screens and anti-vehicle bollards installation (High impact activities)	BR-H	**24**	366	71	0	406	366	80	15	406	366	80	15	406	366	80	15	392	223
Bridge barrier, anti-screens and anti-vehicle bollards installation (Hydro-demolition)	BR-HD	**86**	738	184	0	166	738	202	68	166	738	202	68	166	738	202	68	610	392
Corridor work – safety improvements	CW	**0**	103	42	0	124	103	42	0	124	103	42	0	124	103	42	0	130	83

Construction activity	Assessment reference	Highly noise affected > 75 dB(A)	Day (standard hours)			Day (OOH)				Evening				Night				Sleep disturbance	
		LAeq	LAeq			LAeq				LAeq				LAeq				LAmax	
		Standard hours	1 – 10 dB(A)	11 – 20 dB(A)	> 20 dB(A)	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	Screening	Awakening
NCA09																			
Ancillary facilities – site establishment (typical activities)	AC-T	**0**	53	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ancillary facilities – site establishment (high impact activities)	AC-H	**36**	540	121	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ancillary facilities – site operation	AC-O	**0**	53	11	0	68	53	11	0	68	53	11	0	68	53	11	0	48	17
Bridge barrier, anti-screens and anti-vehicle bollards installation (typical activities)	BR-T	**1**	17	1	0	13	17	1	1	13	17	1	1	13	17	1	1	19	8
Bridge barrier, anti-screens and anti-vehicle bollards installation (High impact activities)	BR-H	**8**	497	24	0	401	497	24	8	401	497	24	8	401	497	24	8	400	84
Bridge barrier, anti-screens and anti-vehicle bollards installation (Hydro-demolition)	BR-HD	**19**	752	212	2	47	752	212	21	47	752	212	21	47	752	212	21	732	183
Corridor work – safety improvements	CW	**3**	122	64	0	118	122	64	3	118	122	64	3	118	122	64	3	178	90
NCA10																			
Ancillary facilities – site establishment (typical activities)	AC-T	**1**	32	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ancillary facilities – site establishment (high impact activities)	AC-H	**47**	434	102	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ancillary facilities – site operation	AC-O	**1**	32	18	0	57	32	18	1	57	32	18	1	57	32	18	1	41	27
Bridge barrier, anti-screens and anti-vehicle bollards installation (typical activities)	BR-T	**0**	1	0	0	10	1	0	0	10	1	0	0	10	1	0	0	1	0

Construction activity	Assessment reference	Highly noise affected > 75 dB(A)	Day (standard hours)			Day (OOH)				Evening				Night				Sleep disturbance	
		LAeq	LAeq			LAeq				LAeq				LAeq				LAmax	
		Standard hours	1 – 10 dB(A)	11 – 20 dB(A)	> 20 dB(A)	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	Screening	Awakening
Bridge barrier, anti-screens and anti-vehicle bollards installation (High impact activities)	BR-H	**0**	275	11	0	546	275	11	0	546	275	11	0	546	275	11	0	208	88
Bridge barrier, anti-screens and anti-vehicle bollards installation (Hydro-demolition)	BR-HD	**4**	991	110	0	349	991	112	2	349	991	112	2	349	991	112	2	451	208
Corridor work – safety improvements	CW	**0**	62	35	0	108	62	35	0	108	62	35	0	108	62	35	0	87	59
NCA11																			
Ancillary facilities – site establishment (typical activities)	AC-T	**0**	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ancillary facilities – site establishment (high impact activities)	AC-H	**7**	265	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ancillary facilities – site operation	AC-O	**0**	5	2	0	15	5	2	0	15	5	2	0	15	5	2	0	5	4
Bridge barrier, anti-screens and anti-vehicle bollards installation (typical activities)	BR-T	**2**	24	7	0	41	24	8	1	41	24	8	1	41	24	8	1	39	29
Bridge barrier, anti-screens and anti-vehicle bollards installation (High impact activities)	BR-H	**26**	420	48	0	501	420	52	22	501	420	52	22	501	420	52	22	427	230
Bridge barrier, anti-screens and anti-vehicle bollards installation (Hydro-demolition)	BR-HD	**65**	835	231	0	177	835	249	47	177	835	249	47	177	835	249	47	676	427
Corridor work – safety improvements	CW	**2**	102	16	0	99	102	17	1	99	102	17	1	99	102	17	1	103	62
NCA12																			
Ancillary facilities – site establishment (typical activities)	AC-T	**0**	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Construction activity	Assessment reference	Highly noise affected > 75 dB(A)	Day (standard hours)			Day (OOH)				Evening				Night				Sleep disturbance	
		LAeq	LAeq			LAeq				LAeq				LAeq				LAmax	
		Standard hours	1 – 10 dB(A)	11 – 20 dB(A)	> 20 dB(A)	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	Screening	Awakening
Ancillary facilities – site establishment (high impact activities)	AC-H	**6**	10	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ancillary facilities – site operation	AC-O	**0**	3	0	0	3	3	0	0	3	3	0	0	3	5	1	0	5	6
Bridge barrier, anti-screens and anti-vehicle bollards installation (typical activities)	BR-T	**2**	2	0	0	1	2	1	1	1	2	1	1	0	2	2	1	5	5
Bridge barrier, anti-screens and anti-vehicle bollards installation (High impact activities)	BR-H	**5**	17	0	0	53	17	2	3	53	17	2	3	104	38	1	4	31	43
Bridge barrier, anti-screens and anti-vehicle bollards installation (Hydro-demolition)	BR-HD	**11**	110	0	0	113	110	7	4	113	110	7	4	84	171	17	5	75	97
Corridor work – safety improvements	CW	**0**	4	0	0	3	4	0	0	3	4	0	0	3	7	0	0	5	7
NCA13																			
Ancillary facilities – site establishment (typical activities)	AC-T	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ancillary facilities – site establishment (high impact activities)	AC-H	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ancillary facilities – site operation	AC-O	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bridge barrier, anti-screens and anti-vehicle bollards installation (typical activities)	BR-T	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bridge barrier, anti-screens and anti-vehicle bollards installation (High impact activities)	BR-H	**0**	0	0	0	7	0	0	0	7	0	0	0	7	0	0	0	0	0

Construction activity	Assessment reference	Highly noise affected > 75 dB(A)	Day (standard hours)			Day (OOH)				Evening				Night				Sleep disturbance	
		LAeq	LAeq			LAeq				LAeq				LAeq				LAmax	
		Standard hours	1 – 10 dB(A)	11 – 20 dB(A)	> 20 dB(A)	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	Screening	Awakening
Bridge barrier, anti-screens and anti-vehicle bollards installation (Hydro-demolition)	BR-HD	**0**	14	0	0	225	14	0	0	225	14	0	0	225	14	0	0	2	0
Corridor work – safety improvements	CW	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

5.2.1 Standard construction hours

The results summarised in Table 5.3 show that residential and other sensitive receivers are expected to be construction noise affected by the SWM Works during standard construction hours. Residential receivers close to the worksites may be highly noise affected (i.e exposed to construction noise above $L_{Aeq(15min)}$ 75 dB(A)).

Mitigation and management measures to reduce construction noise levels towards the standard construction hours NML are summarised in Section 9.

5.2.2 Out of hours work

The results summarised in Table 5.3 show that there will be construction noise affected residential receivers where works are undertaken outside standard construction hour especially during high noise impact activities.

5.2.3 Sleep disturbance

The results summarised in Table 5.3 show that there are residential receivers expected to experience construction noise levels above the sleep disturbance criteria by the SWM Works during the night period due to the close proximity of residential receivers to the work site.

6 Ground-borne noise assessment

Due to the nature of the SWM4 works, which are surface works, airborne noise is expected to be much higher than ground-borne noise levels at the nearest sensitive receivers. On this basis, the potential impact of ground-borne noise from construction activities is expected to be negligible.

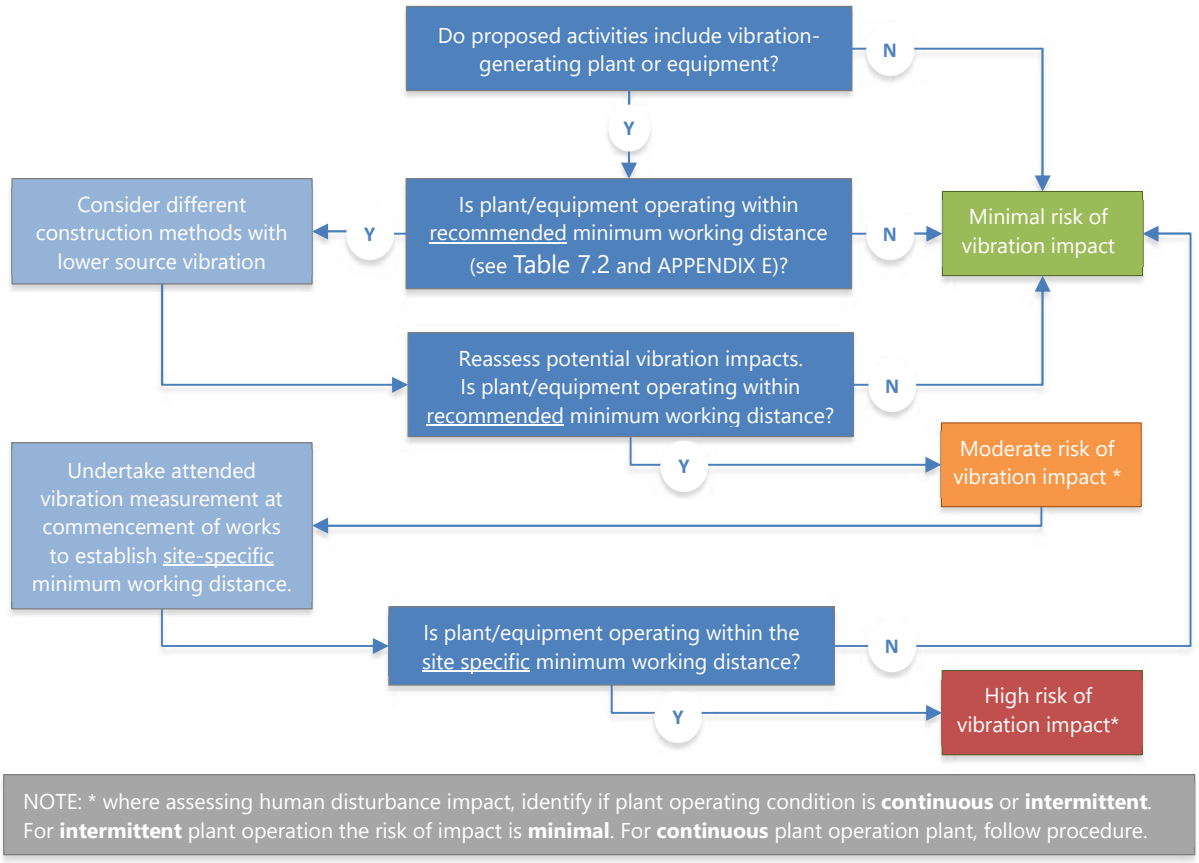
As such, the risk of annoyance due to ground-borne noise is considered low and has not been addressed further in this CNVIS.

7 Construction vibration impacts

7.1 Vibration assessment methodology

Assessment of vibration impacts from the SWM4 works were determined by identifying vibration significant plant items likely to be used for each activity at each worksite. Potential vibration generated to receivers is dependent on the separation distance between plant and equipment, the intervening soil and rock strata, dominant frequencies of vibration, and the receiver structure. Potential vibration impact is assessed by determining recommended minimum working distances for vibration intensive plant based on ground-borne vibration versus distance prediction algorithms for each plant item. The recommended minimum working distance represents the distance within which there is a risk of vibration impact (building damage or human disturbance). Figure 7.1 below summarises the risk matrix used to assess vibration impact.

Figure 7.1: Vibration impact assessment risk procedure



7.1.1 Vibration intensive activities

From the plant and equipment listed in APPENDIX C, the SWM Works activities with dominant vibration generating plant and equipment include:

Table 7.1: SWM vibration intensive activities and plant items

Activity/ work area	Aspect	Vibration intensive plant	Plant operating conditions (continuous/ intermittent)
Ancillary facilities	Site establishment	Smooth drum roller	Continuous
	Site operation	-	-
Station and non-station overbridges	Anti-throw screen/ anti-vehicle bollard installation	Smooth drum roller	Continuous
		Excavator 21-25T w rockhammer	Intermittent
		Bored piling rig	Continuous
Station and non-station overbridges; Corridor works	Safety improvements	-	-

7.1.2 Minimum working distances for vibration intensive plant

The recommended minimum working distances for vibration intensive plant in Table 7.2 are taken from a database of vibration levels measured at various sites or obtained from other sources (e.g. BS5228-2:2009). They are not specific to the Project works as 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.

Site specific minimum working distances for vibration significant plant items must be measured on site where plant and equipment is likely to operate close to or within the recommended minimum working distances for cosmetic damage (Table 7.2).

Table 7.2: Recommended minimum working distances (m) for managing vibration impact based on screening criteria

Vibration sensitive receiver	Minimum working distances for vibration intensive plant, m			
	Bored Piling Rig (Bauer BG36)	Excavator 35t (with hammer attachment)	Roller <13t Smooth (low vibration mode)	Roller <13t Smooth (high vibration mode)
Structural damage to buildings				
Reinforced or frame structures (Line 1)[1]	5	5	5	5
Unreinforced or light framed structures[1, 2]	5	5	5	5
Structurally unsound heritage structures[1, 2]	5	15	10	15
Disturbance to building occupants				
Critical areas[4,7]	20	40	75	105
Residences – Day	15	25	40	55
Residences – Night	15	30	55	75
Offices[6,7]	10	20	20	30
Workshops[7]	10	15	10	15

Notes: 1. Initial screening test criteria reduced by 50% due to potential dynamic magnification in accordance with BS7385.

2. In accordance with CNVMP, a site inspection should determine whether a heritage structure is structurally unsound.
3. Minimum working distances are in 5m increments only to account for the intrinsic uncertainty of this screening method.
4. Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring.
5. Daytime is 7 am to 10 pm; Night-time is 10 pm to 7am.
6. Examples include offices, schools, educational institutions, and place of worship.
7. Applicable when in use.

7.2 Vibration assessment

Detailed predicted vibration impacts for all receivers in each NCA are presented in APPENDIX E for each SWM4 work area, as:

- Vibration impact risk maps, identifying the minimum working distances for vibration over aerial photographs that also show the and the land uses;
- Tables identifying the number of buildings within minimum working distances for vibration source.

Table 7.3 present a summary of the vibration impacts in APPENDIX E, summarising the likelihood of vibration impacts for each work area based on the most vibration intensive plant. The risk assessment follows the process shown in Figure 7.1.

Table 7.3: Summary of vibration impacts

Work area	Worksite	Vibration significant plant[1]	Risk assessment	
			Structural damage to buildings	Disturbance to building occupants
Ancillary facilities	Laydown areas	Smooth drum roller (low vibration mode) Smooth drum roller (high vibration mode)	Moderate risk (refer to Section 9.6.2)	Moderate risk
Station overbridges	Punchbowl Station	Bored piling rig Excavator 35t (with hammer attachment) Smooth drum roller (low vibration mode) Smooth drum roller (high vibration mode)	Moderate risk (refer to Section 9.6.2)	Moderate risk
	Wiley Park Station	Bored piling rig Excavator 35t (with hammer attachment) Smooth drum roller (low vibration mode) Smooth drum roller (high vibration mode)	Moderate risk (refer to Section 9.6.2)	Moderate risk
	Belmore Station	Bored piling rig Excavator 35t (with hammer attachment) Smooth drum roller (low vibration mode) Smooth drum roller (high vibration mode)	Moderate risk (refer to Section 9.6.2)	Moderate risk
	Lakemba Station	Bored piling rig Excavator 35t (with hammer attachment) Smooth drum roller (low vibration mode) Smooth drum roller (high vibration mode)	Minimal risk	Moderate risk
	Canterbury Station	Bored piling rig Excavator 35t (with hammer attachment) Smooth drum roller (low vibration mode) Smooth drum roller (high vibration mode)	Moderate risk (refer to Section 9.6.2)	Moderate risk
	Hurlstone Park Station	Bored piling rig Excavator 35t (with hammer attachment) Smooth drum roller (low vibration mode) Smooth drum roller (high vibration mode)	Moderate risk (refer to Section 9.6.2)	Moderate risk

Work area	Worksite	Vibration significant plant[1]	Risk assessment	
			Structural damage to buildings	Disturbance to building occupants
	Dulwich Hill Station	Bored piling rig Excavator 35t (with hammer attachment) Smooth drum roller (low vibration mode) Smooth drum roller (high vibration mode)	Moderate risk (refer to Section 9.6.2)	Moderate risk
	Marrickville Station	Bored piling rig Excavator 35t (with hammer attachment) Smooth drum roller (low vibration mode) Smooth drum roller (high vibration mode)	Moderate risk (refer to Section 9.6.2)	Moderate risk
Non station overbridges	Stacey Street	Bored piling rig Excavator 35t (with hammer attachment) Smooth drum roller (low vibration mode) Smooth drum roller (high vibration mode)	Moderate risk (refer to Section 9.6.2)	Moderate risk
	Moreton Street	Bored piling rig Excavator 35t (with hammer attachment) Smooth drum roller (low vibration mode) Smooth drum roller (high vibration mode)	Minimal risk	Moderate risk
	Loch Street	Bored piling rig Excavator 35t (with hammer attachment) Smooth drum roller (low vibration mode) Smooth drum roller (high vibration mode)	Minimal risk	Moderate risk
	Melford Street	Bored piling rig Excavator 35t (with hammer attachment) Smooth drum roller (low vibration mode) Smooth drum roller (high vibration mode)	Minimal risk	Moderate risk
	Garnet Street	Bored piling rig Excavator 35t (with hammer attachment) Smooth drum roller (low vibration mode) Smooth drum roller (high vibration mode)	Moderate risk (refer to Section 9.6.2)	Moderate risk
	Albemarle Street	Bored piling rig Excavator 35t (with hammer attachment) Smooth drum roller (low vibration mode) Smooth drum roller (high vibration mode)	Minimal risk	Moderate risk
	Livingstone Road	Bored piling rig Excavator 35t (with hammer attachment) Smooth drum roller (low vibration mode) Smooth drum roller (high vibration mode)	Moderate risk (refer to Section 9.6.2)	Moderate risk
Corridor works	Corridor works	Nil	Minimal risk	Minimal risk

Notes: 1. Assessment based on worst case vibration intensive plant (plant in black text)

7.2.1 Building damage

The vibration assessment found there was minimal risk of vibration impact predicted for the corridor works as no vibration intensive plant and equipment were identified to be used for the works.

A moderate risk of vibration impact is predicted for the vibration intensive works within the ancillary facilities, station overbridges (except for Lakemba Station with minimal risk) and on Stacey Street, Garnet Street and Livingstone Road non-station overbridges. The potentially affected buildings/ structures are identified in APPENDIX E. Where plant is required to operate within minimum working distances, works

will be paused and the construction methodology will be revised to ensure the vibration intensive plant only operates outside the minimum working distance.

Where plant is required to operate within minimum working distances, vibration monitoring is recommended to determine site specific minimum working distances and/or verify that vibration levels achieve compliance with the structural damage objectives, as outlined in Section 4.

If the monitoring above identifies that vibration is likely to exceed the structural damage objectives, a different construction method with lower source vibration levels should be considered, or where this is not feasible a detailed vibration monitoring plan would be prepared. Mitigation and management measures to reduce vibration impacts are summarised in Section 9.

7.2.2 Heritage structures

The following heritage structures are identified within the recommended minimum working distance for the conservative screening limit for cosmetic damage for 'structurally unsound' structures:

- Punchbowl train station (Heritage item, Commercial building) located within 5m of bored piling, excavator with hammer and vibratory roller operation.
- Wiley Park train station (Heritage item, Commercial building) located within 5m of bored piling, excavator with hammer and vibratory roller operation.
- Belmore train station (Heritage item, Commercial building) located within 5m of bored piling, excavator with hammer and vibratory roller operation.
- Canterbury train station (Heritage item, Commercial building) located within 5m of bored piling, excavator with hammer and vibratory roller operation.
- Hurlstone Park train station (Heritage item, Commercial building) located within 5m of bored piling, excavator with hammer and vibratory roller operation.
- Dulwich Hill train station (Heritage item, Commercial building) located within 5m of bored piling, excavator with hammer and vibratory roller operation.
- Marrickville train station (Heritage item, Commercial building) located within 5m of bored piling, excavator with hammer and vibratory roller operation.
- 346 Burwood Road, Belmore (Heritage item, Residential building) located within 5m of bored piling, excavator with hammer and vibratory roller operation.
- 24 Kays Avenue, Marrickville (Heritage item, Residential building) located within 5m of vibratory roller operation.
- 26 Kays Avenue, Marrickville (Heritage item, Residential building) located within 15m of vibratory roller operation.
- 37 Kays Avenue, Marrickville (Heritage item, Residential building) located within 5m of vibratory roller operation.
- 242 Wardell Road, Dulwich Hill (Heritage item, Residential building) located within 10m of excavator with hammer and vibratory roller operation.

7.2.3 Disturbance to building occupants

The AVTG [8] notes that inside dwellings, adverse comments often arise when occupants can perceive (feel) vibration and they assume that the vibration has the potential to damage their building or contents. This is particularly so when the vibration arises from a source located outside their home (or outside their control).

However, it is noted that vibration levels required to cause minor cosmetic damage are typically 10 times higher than levels that will cause disturbance to building occupants. Many building occupants assume that building damage is occurring when they feel vibration or observe rattling of loose objects, however the level of vibration at which people perceive vibration or at which loose objects may rattle is far lower than vibration levels that can cause damage to structures.

At properties near the worksite, it is possible that the nearest receivers will be able to feel vibration levels when vibration-generating equipment is being utilised. Worksites where vibration levels may be above the vibration disturbance goals in Table 4.1 and there is a probability of adverse comment are identified as 'moderate risk' in Table 7.3. Potentially impacted receivers are identified in in APPENDIX E. It is important to note that human comfort vibration levels are much lower than vibration levels likely to result in property damage and people therefore may be disturbed by vibration with no potential to result in property damage. More detailed results are presented in APPENDIX E.

As listed in Table 7.3, there is a moderate risk that vibration sensitive receivers near the ancillary facilities/laydown areas, all the non-station and station overbridges may be exposed to vibration above the screening limit for disturbance to building occupants. The above assessment is based on vibration-generating equipment operating constantly at the closest location to nearby receivers. When vibration-generating equipment operates further from the closest point, the predicted vibration levels will reduce along with the probability of adverse comment.

Mitigation and management measures to reduce vibration impacts are summarised in Section 9.

7.2.4 Sensitive scientific and medical equipment (SME)

No receivers with potentially sensitive scientific and medical equipment (SME) have been identified near the SWM4 worksites.

8 Construction traffic noise assessment

Low levels of heavy vehicle movements are likely to be associated with SWM4 works, and the majority of the these will be at the start and end of the works period. As such, the increase in road traffic noise levels is likely be less than 2 dB(A) and so construction traffic will have minimal impact on the main roads used to access the site.

Notwithstanding this, the Heavy Vehicle Code of Conduct includes several measures, including limiting of compression braking, minimisation of vehicle idling, which will ensure that noise impacts of heavy vehicle traffic on surrounding streets are minimised.

9 Mitigation and management measures

9.1 Highly noise intensive works

Potential impact from high noise impact activities is unavoidable even after all reasonable and feasible mitigation measures have been implemented.

During standard construction hours, in accordance with CSSI-8256 Condition E24, respite from highly noise intensive activities that result in exceedance of the applicable NML (i.e. above 75dB(A) at closest residential receivers) will be provided by managing highly noise intensive activities to:

- Between the hours of 8:00am to 6:00pm Monday to Friday
- Between the hours of 8:00am to 1:00pm Saturday, 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.

For the purposes of this requirement 'continuous' includes any period during which there is less than one-hour respite between ceasing and recommencing any of the work that is subject to this requirement.

For construction activities which are required to take place outside standard construction hours under an ROL, the mitigation measures outlined in Table 9.1 will be applied to minimise the impact of high noise impact works. Where reasonable and feasible, high noise impact activities should be undertaken prior to 12am.

9.2 Consultation with affected receivers

CSSI-8256 Condition E28 requires consultation with affected community, religious or educational institutions where construction noise is found to exceed the NMLs to assist in managing works outside sensitive periods. Martinus Rail will continue consultation with potentially affected landholders in accordance with the CEMP and CNVMP (taking into consideration consultation outcomes undertaken by Sydney Metro to date) regarding specific mitigation measures applicable to the works:

- Ongoing direct contact with residents and businesses on streets surrounding the site via doorknocks, phone and email.
- Bi-annual newsletters distributed to businesses and residents in the surrounding area.
- Monthly notification distributed to businesses and residents nearby to the sites and include updates on recent works and works coming up.
- Community information session on site with environment, engineers, community on an as-needed basis.

- Specific consultation with businesses impacted by the works (adjacent to work areas).
- Invitation to all property owners within the surrounding area to register for weekly email updates included in the bi-annual newsletter.

9.3 Noise and vibration control and management measures

Noise and vibration control and management measures to reduce potential noise impacts will be implemented during the construction works, where reasonable and feasible. In accordance with the ICNG and consistent with the CNVS, feasible noise mitigation measures are those work practices or measures to reduce noise 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. Reasonable noise mitigation measures are those feasible noise mitigation measures 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 implementing the measure. To make such a judgement, consideration is to be given to noise level impacts, duration of impacts, noise mitigation benefits, cost effectiveness of noise mitigation and community views.

Table 9.1 outlines the noise and vibration control measures that will be implemented on site during the construction works, where feasible and reasonable.

Table 9.1 Site noise and vibration control measures

Control measure	Description of the control measure	Feasible mitigation test	Deemed feasible?	Reasonable mitigation test	Deemed reasonable?	Adopted?	Justification and commentary
At source control measures							
Worksite planning and layout	Locate noise-generating activities away from sensitive receivers, where practicable. Plan traffic flow, parking, loading/unloading, and other vehicle movements to keep vehicles away from sensitive receivers where possible and to minimise reversing movements.	This measure could be feasibly implemented, subject to site constraints.	Yes	- Potential benefit of 5-10 dB(A). - Deemed to be cost effective. - Outweighs the identified social, economic and environmental effects.	Yes	Yes	Fixed noise sources are located away from sensitive receivers. Where feasible with space restrictions loading/unloading to be conducted away from sensitive receivers and truck reversing movements to be minimised.
Noise control kits	Plant that is brought to site for works should meet the sound power limits identified in Table C1 of this assessment. Where plant are above limits then the plant may require installation of 'noise control kits' to comply with the noise limits in this assessment. Such 'noise control kits' comprise: • high performance 'residential-grade' exhaust mufflers, • additional engine cowling / enclosure lined inside with sound absorbent industrial-grade foam, and • air intake and discharge silencers / louvres.	This measure could be feasibly implemented. Subject to availability for each equipment item.	Yes	- Potential benefit of 5-10 dB(A). - Deemed to be cost effective. - Outweighs the identified social, economic and environmental effects.	Yes	Yes, subject to noise testing on site	The need to fit 'noise control kits' onto the identified plant, will be confirmed once each plant item is tested prior to its regular use on site, or alternative the plant will be swapped for lower noise plant. (see Table C2)
Limit equipment in use	Only the equipment necessary during each stage of the works will be used.	This measure could be feasibly implemented.	Yes	- Routine measure for project team. - Sufficient noise reduction could be achieved at enough receivers. - Cost effective.	Yes	Yes	Excess equipment will be avoided where it is not needed for the works and where it is reasonable to do without it. (see Table C1 for specific limitations)
Timing of equipment in use	Where practicable, activities and plant will be scheduled/limited as outlined in Table C1 (APPENDIX C) of this assessment. For example, for OOHW - During works under ROL or rail possession, limit all high noise activities (jackhammer, power tools etc) to standard hours, where practicable or to before midnight where the works cannot be undertaken during standard hours.	This measure is not feasible for all works as there is limited time for works to be completed under ROL or rail possession (or similar).	Not for all works	- Sufficient noise reduction could be achieved at enough receivers and cost effective etc, - Note that some of the OOHW are unavoidable due to the high risk to construction personnel or public safety triggering ROL/ rail possession.	Not for all works	Not for all works	Where practicable, the timing of works will be managed to reduce noise levels during more sensitive periods (i.e. after 10pm and after 12am; and not before 7am). Noisy plant that supports OOHW but does not require OOH operation (e.g. jackhammer) will be limited to standard hours use only within the worksite or off site, where practicable), providing a 5-15 dB reduction in noise levels.
Limit activity duration	Any equipment not in use for extended periods shall be switched off. For example, heavy vehicles will switch engines off when not in use, mobile crane will be switched off when not in use.	This measure could be feasibly implemented.	Yes	- Routine measure for project team. - Sufficient noise reduction could be achieved at enough receivers. - Deemed to be cost effective. - Outweighs the identified social, economic, and environmental effects.	Yes	Yes	Equipment that is not directly needed for works at a given time will be switched off.

Control measure	Description of the control measure	Feasible mitigation test	Deemed feasible?	Reasonable mitigation test	Deemed reasonable?	Adopted?	Justification and commentary
Equipment selection	Use quieter and less noise/vibration emitting construction methods where feasible and reasonable, for example use vibratory rollers can, where practicable, be operated with the vibratory mode switched off to reduce vibration impact.).	This measure could be feasibly implemented. To be determined on a case-by-case basis.	Yes	- Sufficient noise or vibration reduction could be achieved at enough receivers. - Deemed to be cost effective. - Outweighs the identified social, economic, and environmental effects.	Yes	Yes	Project team shall review plant and equipment on a case-by-case basis and find opportunities to use items with lower noise/vibration impacts.
Alternative construction methods to reduce vibration	Alternative, less vibration generating construction methods will be reviewed where vibration significant works found to be within the site-specific minimum working distance of a structure, as determined by site vibration monitoring. For example, the use of rocksaw cutting instead of rockbreaking to excavate.	This measure could be feasibly implemented. To be determined on a case-by-case basis.	Yes	- Sufficient vibration reduction could be achieved at identified structure to reduce the risk of structural damage from vibration significant works.	Yes	Yes	The use of alternative methods to reduce vibration transmission will be considered where site specific vibration assessments indicate that minimum working distances for cosmetic damage cannot be met.
Truck movements	Where practicable, avoid the use of park air brakes at night. Set up relevant traffic management measures to minimise the use of air brakes when leaving site. Air brake silencers are to be correctly installed and fully operational for any heavy vehicles (as per CNVMP). Minimise unnecessary acceleration on site and avoid vigorous slamming of truck doors.	This measure could be feasibly implemented, subject to trial of long-life shotcrete mix on site.	Yes	- Sufficient noise reduction could be achieved at enough receivers. - Deemed to be cost effective. - Outweighs the identified social, economic, and environmental effects.	Yes	Yes	Drivers will be reminded to drive responsibly on-site, especially when accessing and departing the site. Limits on truck numbers, namely for OOHW period, are identified in Table C1. See also truck management system below.
Non-tonal reversing alarms and other audible alarms	Alternative reverse or other audible alarms, such as 'quackers' will be installed on all vehicles, mobile plant and fixed plant regularly used on site and on all vehicles & plant required for OOHW. For example, avoid tonal alarms on plant items such as gantry cranes, EWPs etc. Consider limiting the volume of other audible alarms on plant/ equipment, while maintaining safe working.	This measure could be feasibly implemented.	Yes	- Sufficient noise reduction could be achieved at enough receivers. - Deemed to be cost effective. - Outweighs the identified social, economic, and environmental effects.	Yes	Yes	Project team will mandate use of non-tonal reversing alarms on equipment.
Building condition surveys	Undertake building dilapidation surveys on all buildings located within the minimum working distances established for cosmetic damage prior to commencement of activities with the potential to cause property damage (see Section 7.2.1 and APPENDIX **E**).	This measure could be feasibly implemented.	Yes	Deemed to be cost effective. Outweighs the identified social, economic and environmental effects.	Yes	Yes	Buildings identified within the MWD for cosmetic damage will undergo building condition survey, to reduce the risk of cosmetic damage.
Path mitigation measures							
Temporary noise screens	Placement of temporary noise screens, barriers or blankets around noise-generating items to shield sensitive receivers from noisy activities.	This measure is generally feasible, provided there is sufficient space to complete the works.	Yes, where there is sufficient space	- Potential benefit of 5-10 dB(A). - Sufficient noise reduction could be achieved at enough receivers. - Deemed to be cost effective.	Yes	Yes	Temporary noise screens installed around high noise generating plant and equipment will be adopted on a case by case basis where there is sufficient space is available and where significant noise reduction can be achieved.

Control measure	Description of the control measure	Feasible mitigation test	Deemed feasible?	Reasonable mitigation test	Deemed reasonable?	Adopted?	Justification and commentary
Hoardings	Erection of hoarding around the perimeter of the site or around noise generating sources. Hoarding would have sufficient height to shield sensitive receivers from noisy activities.	This measure is generally feasible, provided there is sufficient space to complete the works.	Yes, where there is sufficient space	- Potential benefit of 5 dB(A). - Insufficient noise reduction could be achieved at enough receivers. - Not cost effective. - Minor to moderate visual and amenity impacts - Does not outweigh the identified social, economic, and environmental effects.	No	No	Typical height site hoardings would not provide sufficient noise reduction to enough receivers to justify the additional noise impacts and costs of installation. Erecting taller hoardings will require footings for reinforcement and will take longer than the duration of the works. Therefore, it will not be adopted to reduce noise impacts. Hoardings may be implemented for other reasons apart from noise mitigation.
Acoustic shed	An acoustic shed with sound insulation/absorption specifications designed by Renzo Tonin & Associates.	This measure is generally not feasible	No	- Potential benefit of at least 20 dB(A). - Appreciable noise reduction could be achieved at enough receivers. - Substantial conflicts with rail corridor and local roads - Not cost effective. - Substantial visual and amenity impacts - Does not outweigh the identified social, economic, and environmental effects.	No	No	An acoustic shed cannot be constructed without substantial compromises to the safe and efficient usage of the railway and local roads. The noise reduction that could be achieved is insufficient to justify the cost and additional impacts from shed construction. Therefore, this measure will not be adopted.
Enclosures	Temporary enclosures containing key stationary noise-generating activities and/or items such as generators. The enclosure may be incorporated into the plant design (e.g. generator housing) or built on site, such as an 'acoustic tent', i.e. a structure hung with temporary noise screens (e.g. Echo-barrier, FlexShield or similar).	This measure could be feasibly implemented provided there is sufficient space to complete the works.	Yes	- Potential benefit of 10-20 dB(A). - Sufficient noise reduction could be achieved at enough receivers. - Could be cost effective for specific types of fixed plant and equipment	Yes	Yes	Enclosures would be considered on a case by case basis and would depend on the nature and duration of the activity. Short term and moving plant/equipment would not be placed in an enclosure due to the excessive cost for a large enclosure and the increased noise impacts from enclosure construction and removal.

Control measure	Description of the control measure	Feasible mitigation test	Deemed feasible?	Reasonable mitigation test	Deemed reasonable?	Adopted?	Justification and commentary
At-receiver							
At-property treatments	Design and installation of architectural treatments to sensitive receiver buildings to reduce internal noise levels to key rooms.	This measure could be feasibly implemented.	Yes	- Potential benefit of 5-20 dB(A). - Not cost effective. - Installation of at-property treatments will take longer to install than duration of construction works.	No	No	At-property treatment could provide moderate to significant noise reduction at the nearest sensitive receivers. However, the design and installation of the at-property treatments would not be completed in a reasonable timeframe for this scope of works. The additional costs incurred to this project for treating short-term impacts would be unreasonable.
Noise management measures							
Site inductions & Toolbox Talks	All employees, contractors and subcontractors will receive a Project induction. The environmental component may be covered in toolboxes and should include (but is not limited to): • location of nearest sensitive receivers • relevant project specific and standard noise and vibration mitigation measures; • permitted hours of work; • OOHW Procedure and Form • construction employee parking areas.	This measure could be feasibly implemented.	Yes	Routine task for project team.	Yes	Yes	Inductions and toolbox talks will continue to be conducted for the project.
Community consultation - disseminating information	Provide information to community of construction activity and potential impacts (see Section 9.2).	This measure could be feasibly implemented.	Yes	Routine task for project team.	Yes	Yes	Updates will be distributed regularly for the duration of the project.
Community consultation - active communication with nearby sensitive receivers	Seek feedback from community to identify more sensitive times of the day, or particularly sensitive days (see Section 9.2). An example is identifying when student exams (such as Higher School Certificate exams, end of semester exams) will take place.	This measure could be feasibly implemented.	Yes	Routine task for project team.	Yes	Yes	Project team shall proactively contact nearby sensitive receivers, particularly those which may have special requirements (e.g. recording studios).
Behavioural practices	No swearing or unnecessary shouting or loud stereos/radios on site. No dropping of materials from height, throwing of metal items and slamming of doors.	This measure could be feasibly implemented.	Yes	Routine task for project team.	Yes	Yes	Project team shall monitor site behaviour and advise supervisors if issues arise or additional behavioural practices are needed.
Noise monitoring	Noise monitoring to be conducted at key locations to quantify noise impacts at sensitive receivers.	This measure could be feasibly implemented.	Yes	Deemed to be cost effective. Outweighs the identified social, economic and environmental effects.	Yes	Yes	Noise monitoring shall be carried out as detailed in this assessment.

Control measure	Description of the control measure	Feasible mitigation test	Deemed feasible?	Reasonable mitigation test	Deemed reasonable?	Adopted?	Justification and commentary
Gatewave assessments to manage works	Regular Gatewave assessments for works, including OOHW to account for changes in noise and vibration management strategies.	This measure could be feasibly implemented.	Yes	Can be reasonably undertaken by project team where required.	Yes	Yes	Gatewave will be used regularly to plan, assess and manage works progressively.
Respite coordination	Consult with proponents of other construction works in the vicinity of the worksite and take reasonable steps to coordinate works to minimise cumulative impacts of noise and vibration and maximise respite for affected sensitive receivers (e.g. aligning respite evenings).	This measure could be feasibly implemented, if required.	Yes	Sufficient noise reduction could be achieved at enough receivers. Deemed to be cost effective. Outweighs the identified social, economic and environmental effects.	Yes	Yes	Respite coordination shall be conducted with neighbouring projects.
Implement additional management measures	Identify and implement additional management measures outlined in this assessment.	This measure could be feasibly implemented.	Yes	Consistency with CNVS	Yes	Yes	Additional management measures to be identified on a case-by-case basis and with consideration of the standard mitigation and management measures outlined in this report.
Encourage good heavy vehicle driver behaviour	Ensure heavy vehicle operators undertake good heavy vehicle operating behaviour such as limiting use of compression braking, which will ensure that noise impacts of heavy vehicle traffic on surrounding streets are minimised.	This measure could be feasibly implemented.	Yes	Routine task for project team.	Yes	Yes	Good heavy vehicle operating behaviour will be implemented through toolbox talks and as part of the truck management system.

9.4 Additional management measures

Section 5 of the CNVS directs that in instances where, after the application of all reasonable and feasible mitigation and management measures (refer to Section 9.3), the $L_{Aeq(15minute)}$ airborne construction noise and/ or $L_{Aeq(15minute)}$ ground-borne noise levels are still predicted to exceed the relevant NMLs, or if vibration monitoring at representative locations still exceeds relevant vibration objectives for human annoyance, additional management measures can be applied to further limit the risk of annoyance from construction noise and vibration. The CNVS suggests the Project should consider implementing additional management measures such as:

- **Alternative accommodation** (**AA**) options may be provided for residents living close to construction works that are likely to incur unreasonably high impacts over an extended period of time (more than 2 consecutive days). Alternative accommodation will be determined on a case-by-case basis.
- **Monitoring** (**M**) 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.
- **Individual briefings** (**IB**) are used to inform stakeholders about the impacts of high noise activities and mitigation and management measures that will be implemented. Communications representatives from the contractor 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.
- **Letter box drops** (**LB**) in the form of a newsletter produced and distributed to the local community via letterbox drop or email via the project mailing list. The newsletter will 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. Advanced warning of potential disruptions (e.g. traffic changes or noisy works) can assist in reducing the impact on the community.
- **Project specific respite offers** (**RO**) provide residents subjected to lengthy periods of noise or vibration respite from an ongoing impact.
- **Phone calls and emails** (**PC**) detailing relevant information about construction works would be made to identified noise or vibration affected stakeholders within 7 days of proposed work to provide tailored advice and the opportunity for stakeholders to provide comments on the proposed work and specific needs etc.
- **Specific notifications** (**SN**) would be letterbox dropped or hand distributed to identified stakeholders no later than 7 days ahead of construction activities that are likely to exceed the

noise objectives. This form of communication is used to support periodic notifications, or to advertise unscheduled works.

In addition, all potentially impacted receivers will be kept informed of the nature of works to be carried out, the expected noise levels and duration, as well as be given appropriate enquiries and complaints contact details.

9.4.1 Additional airborne noise management measures

The steps to be carried out to determine the additional airborne noise management measures to be implemented are identified in Table 9.2.

Table 9.2: Additional airborne noise management measures

Time Period		Mitigation Measures			
		Predicted $L_{Aeq(15minute)}$ Noise Level Above Background (RBL)			
		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 - 1.00 pm)				
	Sun/Pub Hol (Nil)				
OOHW	Mon-Fri (6.00 pm - 10.00 pm)	-	LB	M, LB	M, IB, LB, PC, RO,SN
	Sat (1.00 pm - 10.00 pm)				
	Sun/Pub Hol (8.00 am - 6.00 pm)				
OOHW	Mon-Fri (10.00 pm - 7.00 am)	-	M, LB,	M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN
	Sat (10.00 pm - 8.00 am)				
	Sun/Pub Hol (6.00 pm - 7.00 am)				

Table 9.2 presents a summary of the additional management measures applicable for construction activities where, after application of all reasonable and feasible mitigation options, construction noise levels are still above the NMLs.

Prior to the commencement of works, receivers identified in APPENDIX D.3 will be notified to advise that noise from the works may at times be audible. Additional airborne noise management measures will be implemented as per Table D.3.

9.4.2 Additional vibration management measures

If vibration monitoring at representative locations still exceeds relevant vibration objectives for human annoyance, the appropriate additional management measures [1], presented in Table 9.3, should be provided.

Table 9.3: Additional vibration management measures

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

9.5 Managing site specific activities and cumulative noise impacts

This CNVIS has established the overall impacts associated with the proposed works. A 3D construction noise and vibration management tool (Gatewave, www.gatewave.com.au) has been developed for the SWM4 Works to allow specific work areas and activities to be assessed as construction works progress. It also allows cumulative noise impact from other aspects of the Project or, where relevant noise from other construction projects, to be assessed and managed in accordance with relevant conditions of approval.

Gatewave will be used regularly to plan, assess and manage works progressively.

Gatewave incorporates ground elevation contours, building heights, the built environment and atmospheric conditions to predict construction noise in accordance with the International Standard ISO 9613-2:1996 implementing quality standard ISO 17534-1:2015. All sensitive receivers identified by the land use survey are integrated into the Gatewave tool.

9.6 Noise and vibration monitoring

9.6.1 Airborne noise

Attended noise monitoring is to be undertaken to verify that noise levels resulting from construction works are in accordance with the levels predicted in this report, subject to obtaining the property owner/occupier's consent to access the property (where required). Noise monitoring will be completed in publicly accessible areas on or near the nominated receivers, typically at ground floor level. Where, following community consultation, specific sensitive receivers are identified for additional monitoring, access to the property will be sought through the Stakeholder and Community Relations team.

Table 9.4 summarises nominated monitoring locations.

Table 9.4: Nominated verification monitoring locations

Work area	Worksite	Type of monitoring	NCA/ Receiver type	Nominated receiver address *
Ancillary facilities	Ancillary facilities/laydown areas	Attended	NCA01	17 Warburton Street, Marrickville
		Attended	NCA02	221 Livingstone Road, Marrickville
		Attended	NCA03	46 Floss Street, Hurlstone Park
		Attended	NCA04	15 Charles Street, Canterbury
		Attended	NCA06	18 Loftus Street, Campsie
		Attended	NCA07	68 Bridge Road, Belmore
		Attended	NCA08	34 Moreton Street, Lakemba
		Attended	NCA09	90 The Boulevarde, Wiley Park
		Attended	NCA10	15 South Terrace, Punchbowl
		Attended	NCA11	198 South Terrace, Bankstown
Station overbridges	Punchbowl Station	Attended	NCA10	15 South Terrace, Punchbowl
	Wiley Park Station	Attended	NCA09	108 The Boulevarde, Wiley Park
		Attended	NCA09	76 King Georges Road, Wiley Park
	Lakemba Station	Attended	NCA08	42 Railway Parade, Lakemba
		Attended	NCA08	49 The Boulevarde, Lakemba
	Belmore Station	Attended	NCA07	30 Redman Parade, Belmore
		Attended	NCA07	1 Acacia Street, Belmore
	Canterbury Station	Attended	NCA04	2 Charles Street, Canterbury
		Attended	NCA04	193 Canterbury Road, Canterbury
	Hurlstone Park Station	Attended	NCA03	34 Floss Street, Hurlstone Park
		Attended	NCA03	96 Duntroon Street, Hurlstone Park
	Dulwich Hill Station	Attended	NCA02	14 Dudley Street, Marrickville
		Attended	NCA02	242 Wardell Road, Dulwich Hill
	Marrickville Station	Attended	NCA01	20-22 Station Street, Marrickville
		Attended	NCA01	359 Illawarra Road, Marrickville
Non-station overbridges	Stacey Street	Attended	NCA11	55 Carnation Avenue, Bankstown
		Attended	NCA11	239 Wattle Street, Bankstown
	Moreton Street	Attended	NCA08	4 The Boulevarde, Lakemba
		Attended	NCA08	33 Moreton Street, Lakemba
	Loch Street	Attended	NCA06	83 Angle Road, Campsie
		Attended	NCA06	21 Loch Street, Campsie
	Melford Street	Attended	NCA04	124 Melford Street, Hurlstone Park
		Attended	NCA03	27 Hurlstone Avenue, Hurlstone Park
	Garnet Street	Attended	NCA03	64 Garnet Street, Hurlstone Park
		Attended	NCA02	101 Ewart Street, Dulwich Hill
	Albemarle Street	Attended	NCA02	37 Kays Avenue, Marrickville
		Attended	NCA02	34 Challis Avenue, Dulwich Hill
	Livingstone Road	Attended	NCA01	254 Livingstone Road, Marrickville

Work area	Worksite	Type of monitoring	NCA/ Receiver type	Nominated receiver address *
Corridor works	Corridor works	Attended	NCA01	252 Livingstone Road, Marrickville
		Attended	NCA01	21 Riverdale Avenue, Marrickville
		Attended	NCA02	71 Ewart Street, Dulwich Hill
		Attended	NCA03	2 Keir Avenue, Hurlstone Park
		Attended	NCA04	2-4 Sugar House Road, Canterbury
		Attended	NCA05	31 South Parade, Campsie
		Attended	NCA06	25-29 Loftus Street, Campsie
		Attended	NCA07	3 Belmore Avenue, Belmore
		Attended	NCA08	5 The Boulevarde, Lakemba
		Attended	NCA09	1-3 Shadforth Street, Wiley Park
		Attended	NCA10	105 Stansfield Avenue, Bankstown
		Attended	NCA11	232 South Terrace, Bankstown

Note: * To be confirmed subject to suitability of location and agreement from property owner.

APPENDIX D.3 identifies the activities where monitoring should be carried out for each NCA and additional locations, should any of the above monitoring locations be unsuitable.

9.6.2 Vibration monitoring

Attended vibration monitoring is to be undertaken to determine and verify site specific minimum working distances for cosmetic damage and human annoyance. Attended vibration monitoring will be undertaken during works at the locations identified in Table 9.5 whenever vibration significant plant items are operating within the recommended minimum working distances in Table 7.2.

Vibration monitoring is proposed for the nominated locations in Table 9.5 and will commence prior to the works.

Table 9.5: Attended and/or unattended vibration monitoring - nominated representative locations

Work area	Worksite	Vibration significant plant	Receiver to be monitored	Vibration monitoring for:	
				Building damage[1]	Disturbance to occupants[2]
Ancillary facilities	Ancillary facilities/lay down areas	- Smooth drum roller	15 South Terrace, Punchbowl	√	√
			739-753 Punchbowl Road, Punchbowl	√	√
			61-67 Haldon Street, Lakemba	√	√
			348 Burwood Road, Belmore	√	√
			346 Burwood Road, Belmore	√	√
			Belmore train station	√	-
			18 Loftus Street, Campsie	√	√

Work area	Worksite	Vibration significant plant	Receiver to be monitored	Vibration monitoring for:	
				Building damage[1]	Disturbance to occupants[2]
			46 Floss Street, Hurlstone Park	√	√
			Dulwich Hill train station facility	√	-
			24 Kays Avenue, Marrickville	√	√
			26 Kays Avenue, Marrickville	√	√
			37 Kays Avenue, Marrickville	√	√
			7 Randall Street, Marrickville	√	√
			5 Randall Street, Marrickville	√	√
			221 Livingstone Road, Marrickville	√	√
Station overbridges	Punchbowl Station	- Bored piling rig - Excavator 35t (with hammer attachment) - Smooth drum roller	Punchbowl train station	√	-
			709 Punchbowl Road, Punchbowl	√	√
			269-271 The Boulevarde, Punchbowl	√	√
	Wiley Park Station	- Bored piling rig - Excavator 35t (with hammer attachment) - Smooth drum roller	Wiley Park train station	√	-
			89 King Georges Road, Wiley Park	√	√
	Lakemba Station	- Bored piling rig - Excavator 35t (with hammer attachment) - Smooth drum roller	40 Haldon Street	-	√
	Belmore Station	- Bored piling rig - Excavator 35t (with hammer attachment) - Smooth drum roller	Belmore train station	√	-
			346 Burwood Road, Belmore	√	√
	Canterbury Station	- Bored piling rig - Excavator 35t (with hammer attachment) - Smooth drum roller	Canterbury train station	√	-
			214-218 Canterbury Road, Canterbury	√	√
			220 Canterbury Road, Canterbury	√	√
	Hurlstone Park Station	- Bored piling rig - Excavator 35t (with hammer attachment) - Smooth drum roller	Hurlstone Park train station	√	-
	Dulwich Hill Station	- Bored piling rig - Excavator 35t (with hammer attachment) - Smooth drum roller	Dulwich Hill train station	√	-
			242 Wardell Road, Dulwich Hill	√	√
			Marrickville train station	√	-

Work area	Worksite	Vibration significant plant	Receiver to be monitored	Vibration monitoring for:	
				Building damage[1]	Disturbance to occupants[2]
	Marrickville Station	- Bored piling rig - Excavator 35t (with hammer attachment) - Smooth drum roller	1 Warburton Street, Marrickville	√	√
Non station overbridges	Stacey Street	- Bored piling rig - Excavator 35t (with hammer attachment) - Smooth drum roller	2 Rickard Road, Bankstown	√	√
	Moreton Street	- Bored piling rig - Excavator 35t (with hammer attachment) - Smooth drum roller	32 Moreton Road, Lakemba	-	√
	Loch Street	- Bored piling rig - Excavator 35t (with hammer attachment) - Smooth drum roller	83 Anglo Road, Campsie	-	√
	Melford Street	- Bored piling rig - Excavator 35t (with hammer attachment) - Smooth drum roller	63 Melford Street, Hurlstone Park	-	√
	Garnet Street	- Bored piling rig - Excavator 35t (with hammer attachment) - Smooth drum roller	101 Ewart Street, Dulwich Hill	√	√
	Albermarle Street	- Bored piling rig - Excavator 35t (with hammer attachment) - Smooth drum roller	34 Challis Avenue, Dulwich Hill	-	√
	Livingstone Road	- Bored piling rig - Excavator 35t (with hammer attachment) - Smooth drum roller	221 Livingstone Road, Marrickville	√	√
			254 Livingstone Road, Marrickville	√	√
			256 Livingstone Road, Marrickville	√	√

Note: * Subject to suitability of location and agreement from property owner.

1. Properties identified as potentially within recommended MWD for cosmetic damage, based on Table 7.2. Vibration monitoring is recommended to determine site specific minimum working distances and/or verify that vibration levels achieve compliance with the structural damage objectives, as outlined in Section 9.6.2

2. Monitoring is required in the event of complaint in relation to vibration

9.6.3 Complaints handling

Noise and/or vibration complaints received and responded to will be managed in accordance with the SWM4 Community Communication Strategy prepared under Condition B1. Each complaint shall be investigated and where noise and/or vibration levels are established as exceeding the set limits, appropriate amelioration measures shall be put in place to mitigate future occurrences. Management measures may include modification of construction methods such as using smaller equipment and establishment of minimum working distances as mentioned above and/or use of additional temporary screening.

Sydney Metro operate a 24-hour construction complaints line. Enquiries/ complaints may also be received through the project email mailbox (sydneymetro@transport.nsw.gov.au) or through the complaints hotline (1800 171 386).

10 Conclusion

Construction works associated with the South West Metro Package 4 Works have been described in this CNVIS to identify potential environmental risks associated with construction noise and vibration. Construction noise and vibration objectives have been established consistent with the conditions of approval for the Project and the EIS.

Construction airborne noise

During SWM4 errant and hostile vehicle mitigation treatment works the predicted noise levels indicate the nearest sensitive receivers will be construction noise affected during and outside standard construction hours. The nearest receivers are likely to be highly noise affected receivers during all stages of the works. The nearest residential receivers have predicted noise levels above the awakening criteria during the night period.

Noise mitigation and management measures, including noise monitoring requirements, have been presented in Section 9 to aid in providing additional noise reduction benefits where noise levels are above the NMLs.

Construction vibration

Several worksites have been predicted to have moderate risk of vibration impact depending on the vibration intensive plant in use. Site specific minimum working distances will be determined and (if required) alternative construction methodology implemented, where reasonable and feasible, to reduce the risk of cosmetic damage occurring.

A conservative screening test found that vibration impacts from construction activities, namely bridge works, are likely to be perceptible and may cause human annoyance.

Vibration mitigation and management measures, including vibration monitoring requirements, have been presented in Section 9 to reduce the risk of damage to buildings near the worksites and to manage annoyance from construction vibration.

Construction traffic

The likelihood of noise impact from construction road traffic is assessed as low risk.

References

[1] Sydney Metro City & Southwest Construction Noise Strategy (ref: 610.14213-R3) 16 August 2023

[2] Sydney Metro City & Southwest Out-of-hours Work Strategy / Protocol (ref: SM ES-PW-317, version 5.3) October 2022

[3] SLR Consulting Australia Pty Ltd 2017 Sydney Metro Sydenham to Bankstown - Technical Paper 2: Noise and Vibration Report Number 610.15897-R02 – 28 August 2017

[4] SLR Consulting Australia Pty Ltd 2016 Sydney Metro Chatswood to Sydenham - Technical Paper 2: Noise and Vibration Report Number 610.14718R1 – 28 April 2016

[5] Department of Environment and Climate Change 2009 NSW Interim Construction Noise Guideline (ICNG)

[6] Environment Protection Authority 2017 NSW Noise Policy for Industry (NPfI)

[7] Department of Environment, Climate Change and Water 2011 NSW Road Noise Policy (RNP)

[8] Department of Environment Conservation NSW 2006 Assessing Vibration; a technical guideline

[9] Environment Protection Authority 2000 NSW Industrial Noise Policy (INP)

[10] British Standard BS 6472-2008, Evaluation of human exposure to vibration in buildings (1-80Hz)

[11] Australian Standard AS 2187.2-2006 Explosives - Storage and Use - Use of Explosives

[12] British Standard BS 7385 Part2-1993, Evaluation and measurements for vibration in buildings Part 2

[13] German Standard DIN 4150-3: 2016-12, Structural vibration - Effects of vibration on structures, December 2016

[14] ASHRAE Applications Handbook (SI) 2003, Chapter 47 Sound and Vibration Control, pp47.39-47.40

[15] Australian Standard 2834-1995 Computer Accommodation, Chapter 2.9 Vibration, p16

[16] Australian Standard AS/NZS 2107:2000 *Acoustics - Recommended design sound levels and reverberation times for building interiors*

APPENDIX A Glossary of terminology

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

ABN	Airborne Noise
Adverse weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Assessment period	The period in a day over which assessments are made.
Assessment point	A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.
Attenuation	The reduction in the level of sound or vibration.
AVTG	Assessing Vibration – a technical guideline (DEC 2006)
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below).
CEMP	Construction Environmental Management Plan
CNVIS	Construction Noise and Vibration Impact Statement
CNVG	Construction Noise and Vibration Guideline (Transport for NSW Roads and Maritime Services 2016)
CoA	Condition of Approval (SSI 663 – Mod 6)
Condition	Condition of Approval (SSI 663 – Mod 6)
Decibel [dB]	The units that sound is measured in. The following are examples of the decibel readings of every day sounds: 0dB The faintest sound we can hear 30dB A quiet library or in a quiet location in the country 45dB Typical office space. Ambience in the city at night 60dB CBD mall at lunch time 70dB The sound of a car passing on the street 80dB Loud music played at home 90dB The sound of a truck passing on the street 100dB The sound of a rock band 115dB Limit of sound permitted in industry 120dB Deafening
dB(A)	A-weighted decibels. The A- weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
dB(C)	C-weighted decibels. The C-weighting noise filter simulates the response of the human ear at relatively high levels, where the human ear is nearly equally effective at hearing from mid-low frequency (63Hz) to mid-high frequency (4kHz), but is less effective outside these frequencies.

DEC	Department of Environment and Conservation (now EPA)
DECC	Department of Environment and Climate Change (now EPA)
DECCW	Department of Environment, Climate Change and Water (now EPA)
DP&E	NSW Department of Planning and Environment
ECRTN	Environmental Criteria for Road Traffic Noise (EPA 1999)
EIS	Environmental Impacts Statement
EPA	NSW Environment Protection Authority
Feasible and reasonable	Consideration of best practice taking into account the benefit of proposed measures and their technological and associated operational application in the NSW and Australian context. Feasible relates to engineering considerations and what is practical to build. Reasonable relates to the application of judgement in arriving at a decision, taking into account mitigation benefits and cost of mitigation versus benefits provided, community views and nature and extent of potential improvements.
Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
GBN	Ground-borne noise
GIS	Geographic Information System
ICNG	Interim Construction Noise Guideline (DECC, 2009)
INP	NSW Industrial Noise Policy (EPA, 2000)
L_{Max}	The maximum sound pressure level measured over a given period.
L_{Min}	The minimum sound pressure level measured over a given period.
L_1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L_{10}	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L_{90}	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
L_{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
MWD	Minimum Working Distance
NCA	Noise Catchment Area
NML	Noise management level
NPfI	Noise Policy for Industry
NSR	Noise Sensitive Receiver
OEH	Office of Environment and Heritage
OOHW	Out-of-Hours Works – work completed outside of standard construction hours
OSR	Other Sensitive Receiver
PPV	Peak Particle Velocity
RBL	The Rating Background Level for each period is the medium value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period (day, evening and night)
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
EMM	Environmental Mitigation Measure
RNP	NSW Road Noise Policy (DECCW 2011)

ROL	Road Occupancy Licence
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain Leq sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound pressure level (SPL)	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound power level (SWL)	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
SSI	State Significant Infrastructure
Standard construction hours	Hours during which construction work is permitted by the conditions of approval and the EPL.

APPENDIX B Worksites, land use and NMLs

B.1 Noise Management Levels

Table B1: Noise Sensitive Receivers and Construction Noise Management Levels (airborne noise) **SOUTH WEST METRO PACKAGE 4**

NCA	Receiver Type	RBL Monitoring ID	Existing RBLs, dB(A) Morning Shoulder	Day	Evening	Evening Shoulder	Night	Airborne NMLs based on ICNG (external) NMLMS	NMLD(S)	NMLD(O)	NMLE	NMLES	NMLN	Sleep Dist. L_{Amax} Screening	Max	Comments
Residential receivers																
NCA 01	Predominantly Residential	B.02	0	38	38	0	33	5	48	43	43	40.5	38	48	65	
NCA 02	Predominantly Residential	B.03	0	38	38	0	33	5	48	43	43	40.5	38	48	65	
NCA 03	Predominantly Residential	EIS B.06	0	38	38	0	34	5	48	43	43	41	39	49	65	
NCA 04	Commercial and Residential	EIS B.07	0	40	40	0	35	5	50	45	45	42.5	40	50	65	
NCA 05	Predominantly Residential	EIS B.09	0	36	36	0	32	5	46	41	41	39	37	47	65	
NCA 06	Commercial and Residential	EIS B.10	0	45	42	0	35	5	55	50	47	43.5	40	50	65	
NCA 07	Commercial and Residential	EIS B.13	0	41	41	0	35	5	51	46	46	43	40	50	65	
NCA 08	Commercial and Residential	EIS B.14	0	47	47	0	41	5	57	52	52	49	46	56	65	
NCA 09	Predominantly Residential	EIS B.16	0	44	44	0	36	5	54	49	49	45	41	51	65	
NCA 10	Commercial and Residential	EIS B.19	0	47	47	0	41	5	57	52	52	49	46	56	65	
NCA 11	Predominantly Residential	EIS B.20	0	47	47	0	39	5	57	52	52	48	44	54	65	
NCA 12	Commercial and Residential	EIS B.22	0	47	51	0	42	5	57	52	52	51.5	47	57	65	
NCA 13	Predominantly Residential	EIS B.23	0	54	42	0	39	5	64	59	47	45.5	44	54	65	
ICNG 'Other sensitive' receivers (NML applicable when in use)																
Classrooms at schools and other educational institutions								65	65	65	65	65	65	-	-	Source: ICNG, assuming a conservative façade loss of 20 dB(A) in CBD
Hospital wards and operating theatres								65	65	65	65	65	65	-	-	Source: ICNG, assuming a conservative façade loss of 20 dB(A)
Places of worship								55	55	55	55	55	55	-	-	Source: ICNG, assuming a conservative façade loss of 10 dB(A)
Passive recreation areas (e.g. area used for reading, meditation)								60	60	60	60	60	60	-	-	Source: ICNG
Active recreation areas (e.g. sports fields)								65	65	65	65	65	65	-	-	Source: ICNG
Commercial premises (including offices and retail outlets)								70	70	70	70	70	70	-	-	Source: ICNG
Industrial premises								75	75	75	75	75	75	-	-	Source: ICNG
Non-ICNG 'Other sensitive' receivers (GBNML applicable when in use)																
Hotel - daytime and evening								70	70	70	70	70	70	-	-	Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 20 dB(A) facade loss
Hotel - night-time								60 70	60 70	60 70	60 70	60 70	60 70	-	-	Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 20 dB(A) facade loss for standard hotels; 30 dB(A) facade loss for luxury hotels (e.g. Radisson)
Café/ Bar/ Restaurant								60	60	60	60	60	60	-	-	Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 10 dB(A) facade loss
Childcare centre (indoor sleeping areas)								55	55	55	55	55	55	-	-	Source: CNVS Section 2.2.1, assuming a conservative façade loss of 10 dB(A)
Childcare centre (play areas)								65	65	65	65	65	65	-	-	Source: CNVS Section 2.2.1
Public Building								60	60	60	60	60	60	-	-	Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 10 dB(A) facade loss
Studio building (music recording studio)								45	45	45	45	45	45	-	-	Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 20 dB(A) facade loss
Studio building (film or television studio)								50	50	50	50	50	50	-	-	Source: AS2107 'maximum', assuming 20 dB(A) facade loss
Theatre/ Auditorium								50	50	50	50	50	50	-	-	Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 20 dB(A) facade loss

Notes:
D(S): standard construction hours from 7 am to 6 pm Monday to Friday and from 8 am to 6 pm Saturday
D(O): out-of-hours day period from 8 am to 6 pm Sunday and Public holidays - OOHW P1
E: evening period from 6 pm to 10 pm Monday to Sunday - OOHW P1
N: night-time pe N: night-time period from 10 pm to 7 am Monday to Friday, from 10 pm am to 8 am Saturday, Sunday and Public holidays - OOHW P2
MS: morning sh MS: morning shoulder period from 5 am to 7 am Monday to Friday, from 6 am to 8 am Saturday, Sunday and Public holidays - OOHW P1

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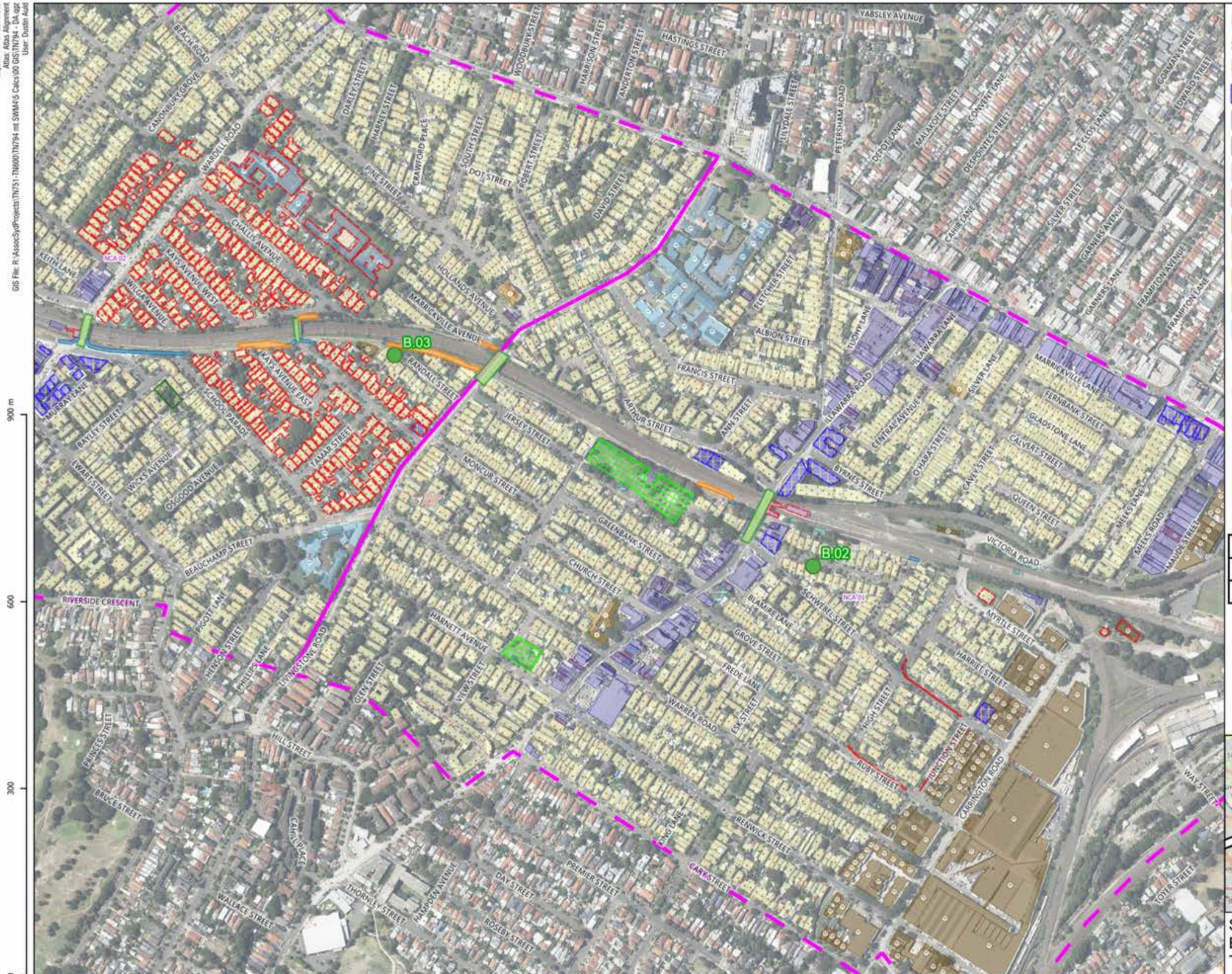


LEGEND

Sensitive Receivers

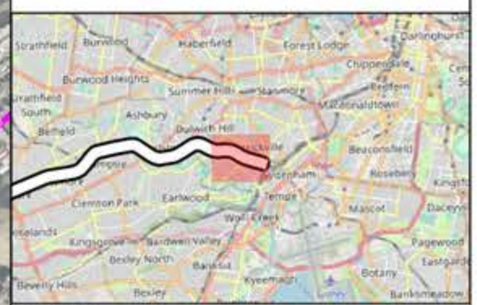
- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- Baseline monitoring locations
- NCAs

Construction Work Areas

- Ancillary facilities and laydown areas
- Station/Non-station overbridge work areas
- Corridor work areas

NCA	NMLD(S)	NMLD(O)	NMLE	NMLN
NCA 01	48	43	43	38
NCA 02	48	43	43	38



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r0	DA	17/04/2024	Prepare figures	AMo

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Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

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ORIGINAL SCALE FOR A3 SIZE PAPER

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Atlas: Atlas Alignment
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LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- Baseline monitoring locations
- NCAs

Construction Work Areas

- Ancillary facilities and laydown areas
- Station/Non-station overbridge work areas
- Corridor work areas

NCA	NMLD(S)	NMLD(O)	NMLE	NMLN
NCA 02	48	43	43	38
NCA 03	48	43	43	39
NCA 04	50	45	45	40

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r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

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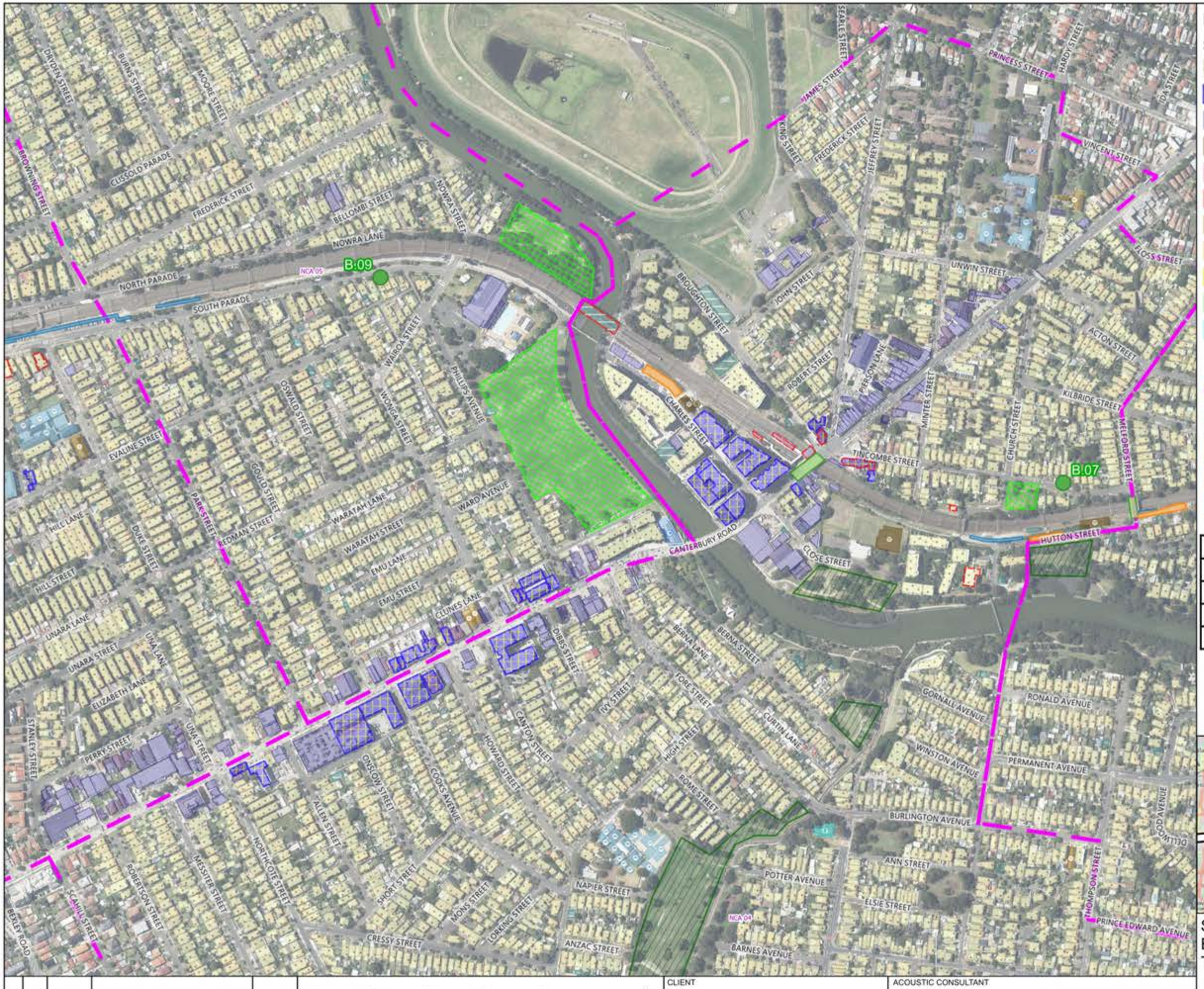

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- Baseline monitoring locations
- NCAs

Construction Work Areas

- Ancillary facilities and laydown areas
- Station/Non-station overbridge work areas
- Corridor work areas

NCA	NMLD(S)	NMLD(O)	NMLE	NMLN
NCA 06	55	50	47	40
NCA 03	48	43	43	39
NCA 05	46	41	41	37
NCA 04	50	45	45	40

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Errant and Hostile Vehicle Mitigation Treatments CNVIS

Land use, NCAs and work areas

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r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

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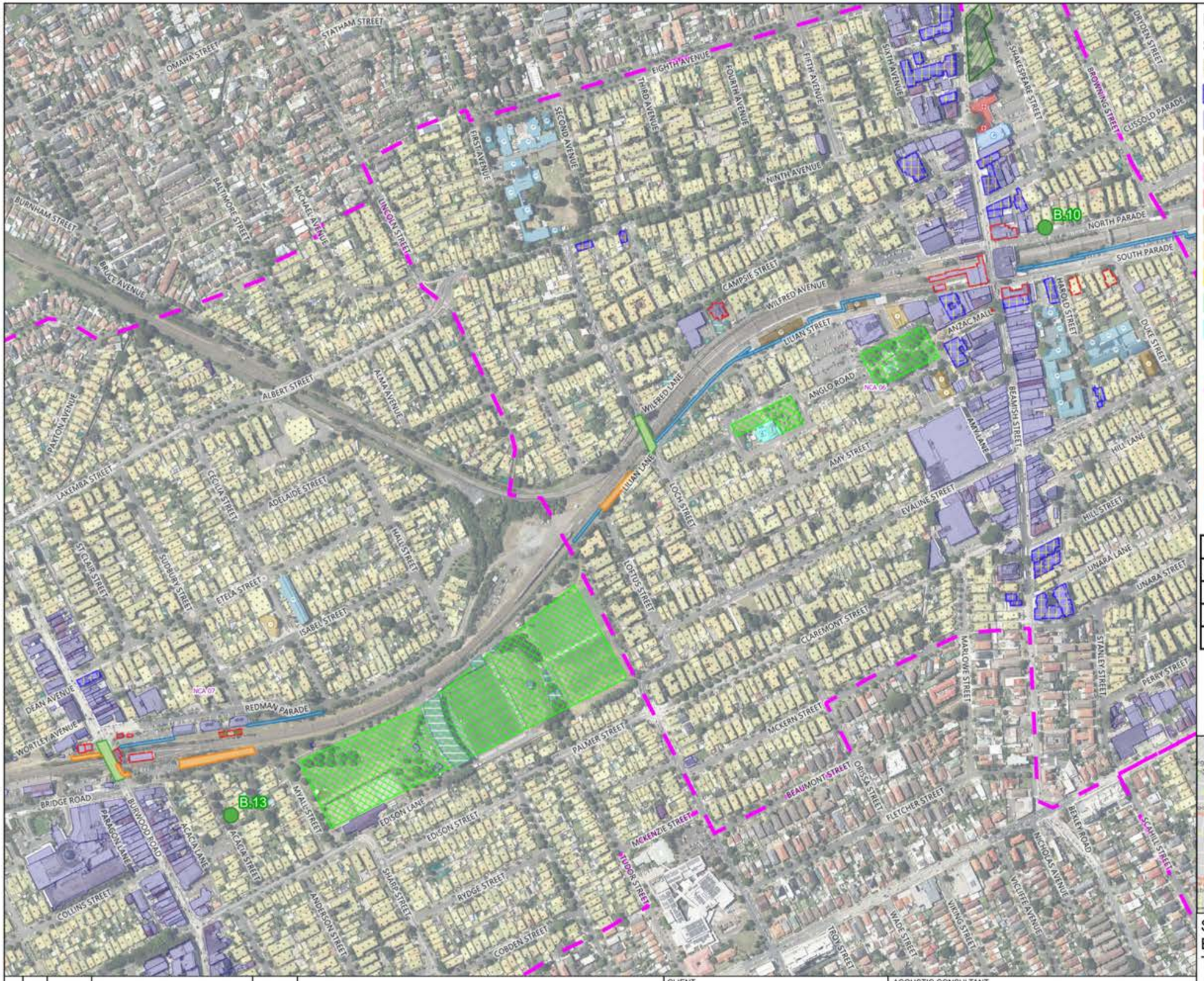

900 m
600
300
0

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- Baseline monitoring locations
- NCAs

Construction Work Areas

- Ancillary facilities and laydown areas
- Station/Non-station overbridge work areas
- Corridor work areas

NCA	NMLD(S)	NMLD(O)	NMLE	NMLN
NCA 06	55	50	47	40
NCA 05	46	41	41	37
NCA 07	51	46	46	40
NCA 04	50	45	45	40

REV	BY	DATE	DESCRIPTION	APPROVED
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r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

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Atlas: Atlas Alignment
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LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- Baseline monitoring locations
- NCAs

Construction Work Areas

- Ancillary facilities and laydown areas
- Station/Non-station overbridge work areas
- Corridor work areas

NCA	NMLD(S)	NMLD(O)	NMLE	NMLN
NCA 09	54	49	49	41
NCA 07	51	46	46	40
NCA 08	57	52	52	46

REV	BY	DATE	DESCRIPTION	APPROVED
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r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

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Land use, NCAs and work areas

Plot Date: 31/05/24 - 10:44
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User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- Baseline monitoring locations
- NCAs

Construction Work Areas

- Ancillary facilities and laydown areas
- Station/Non-station overbridge work areas
- Corridor work areas

NCA	NMLD(S)	NMLD(O)	NMLE	NMLN
NCA 09	54	49	49	41
NCA 08	57	52	52	46
NCA 11	57	52	52	44
NCA 10	57	52	52	46

REV	BY	DATE	DESCRIPTION	APPROVED
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r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

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SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Land use, NCAs and work areas

Plot Date: 31/05/24 - 10:45
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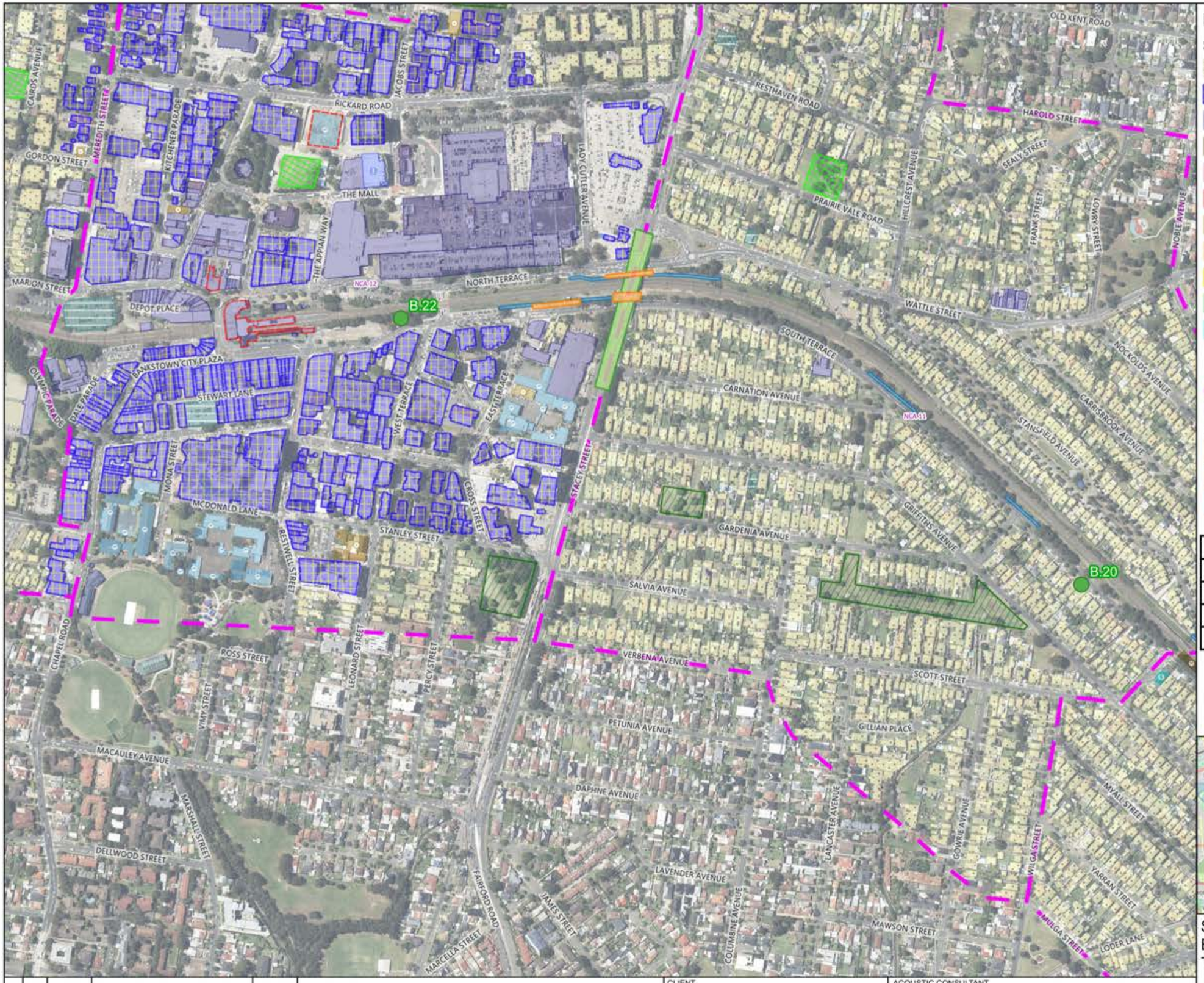

600 m
400
200
0

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- Baseline monitoring locations
- NCAs

Construction Work Areas

- Ancillary facilities and laydown areas
- Station/Non-station overbridge work areas
- Corridor work areas

NCA	NMLD(S)	NMLD(O)	NMLE	NMLN
NCA 11	57	52	52	44
NCA 10	57	52	52	46
NCA 13	52	47	47	44
NCA 12	64	59	56	47

REV	BY	DATE	DESCRIPTION	APPROVED
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r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 90 180 270 360 m

1:6,000

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SWM4
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Land use, NCAs and work areas

B.2 Ancillary facilities

Plot Date: 31/05/24 - 11:10
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Atlas: Atlas Ancillary Facilities (zoomed in 1 2500)
GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Construction Work Areas

Ancillary facilities and laydown areas

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Ancillary Facilities and Laydown Areas

REV	BY	DATE	DESCRIPTION	APPROVER
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

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1:2,500

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Plot Date: 31/05/24 - 11:11
Layout: TN794 Land Use
Atlas: Atlas Ancillary Facilities (zoomed in 1 2500)
GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Construction Work Areas

Ancillary facilities and laydown areas

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Ancillary Facilities and Laydown Areas

REV	BY	DATE	DESCRIPTION	APPROVER
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 40 80 120 160 m

1:2,500

ORIGINAL SCALE FOR A3 SIZE PAPER

NOTES: Do not scale from this drawing

N

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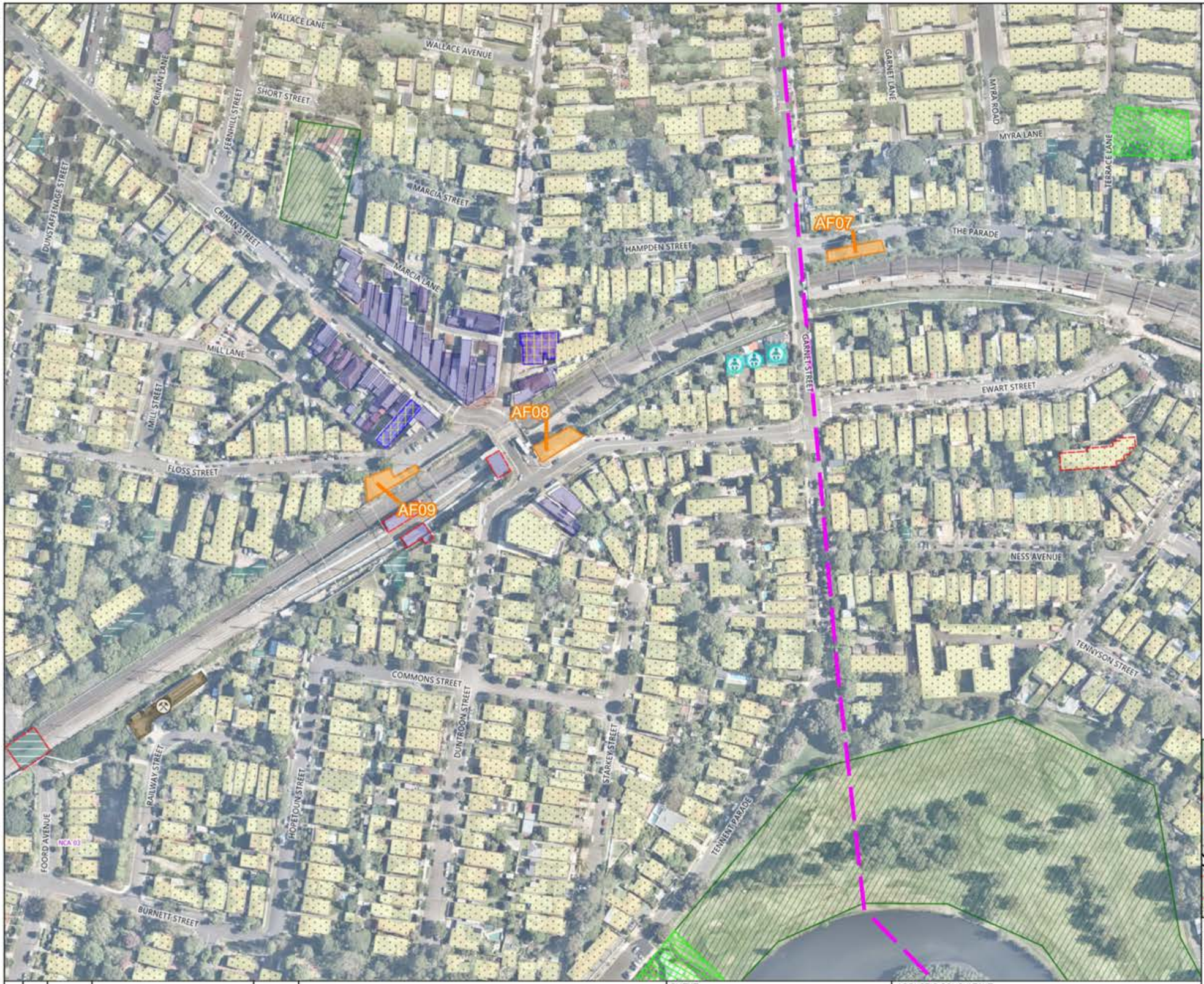
Plot Date: 31/05/24 - 11:12
Layout: TN794 Land Use
Atlas: Atlas Ancillary Facilities (zoomed in 1 2500)
GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld



300 m
200
100
0

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Construction Work Areas

Ancillary facilities and laydown areas

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 40 80 120 160 m

1:2,500

ORIGINAL SCALE FOR A3 SIZE PAPER

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SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Ancillary Facilities and Laydown Areas

Plot Date: 31/05/24 - 11:13
Layout: TN794 Land Use
Atlas: Atlas Ancillary Facilities (zoomed in 1 2500)
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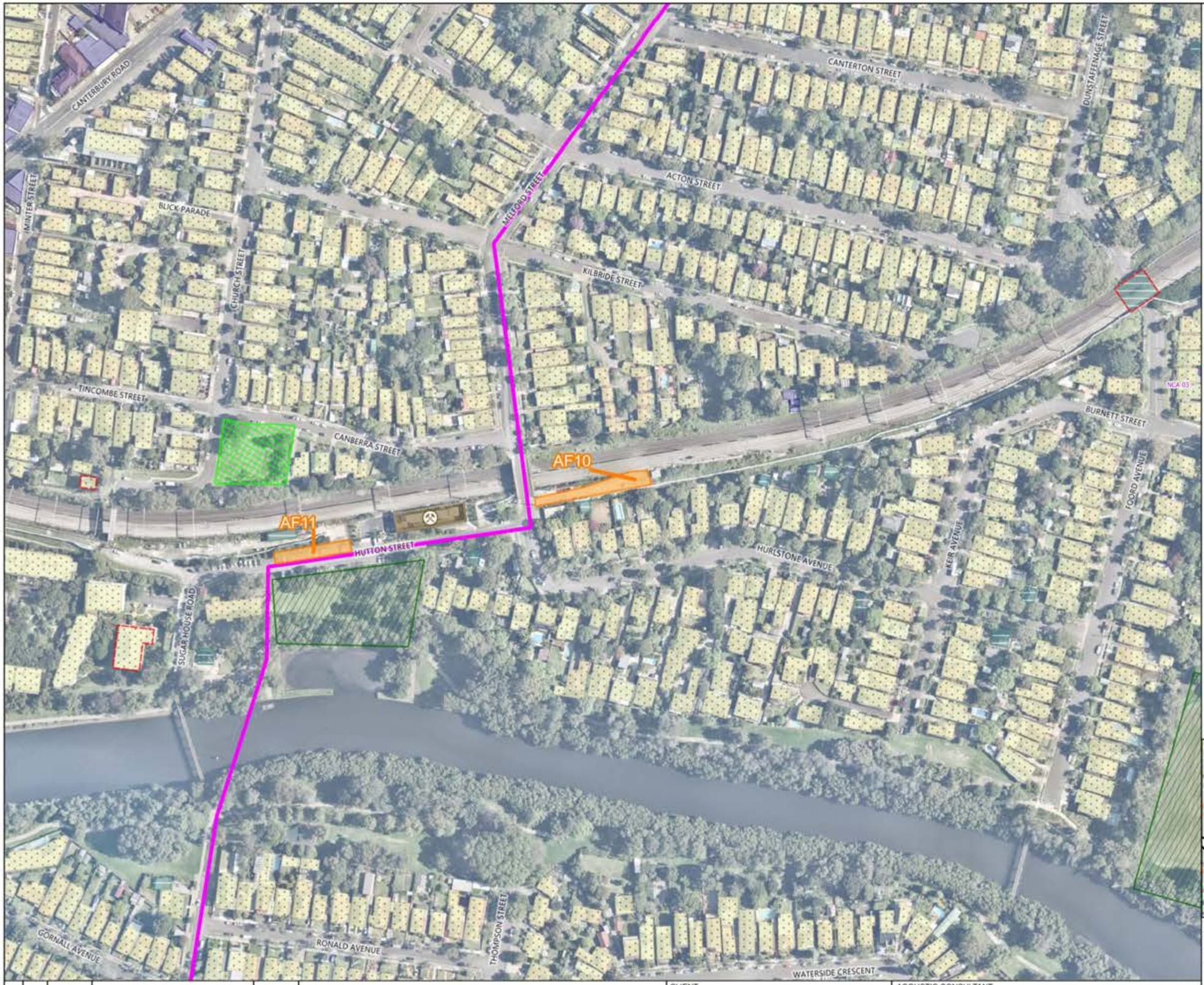
User: Dustin Auld



LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Construction Work Areas

Ancillary facilities and laydown areas

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Ancillary Facilities and Laydown Areas

REV	BY	DATE	DESCRIPTION	APPROVER
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 40 80 120 160 m

1:2,500

ORIGINAL SCALE FOR A3 SIZE PAPER

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Plot Date: 31/05/24 - 11:13
Layout: TN794 Land Use
Atlas: Atlas Ancillary Facilities (zoomed in 1 2500)
GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Construction Work Areas

- Ancillary facilities and laydown areas

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Ancillary Facilities and Laydown Areas

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 40 80 120 160 m

1:2,500

ORIGINAL SCALE FOR A3 SIZE PAPER

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Plot Date: 31/05/24 - 11:13
Layout: TN794 Land Use
Atlas: Atlas Ancillary Facilities (zoomed in 1 2500)
GIS File: R:\AssocSyd\Projects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
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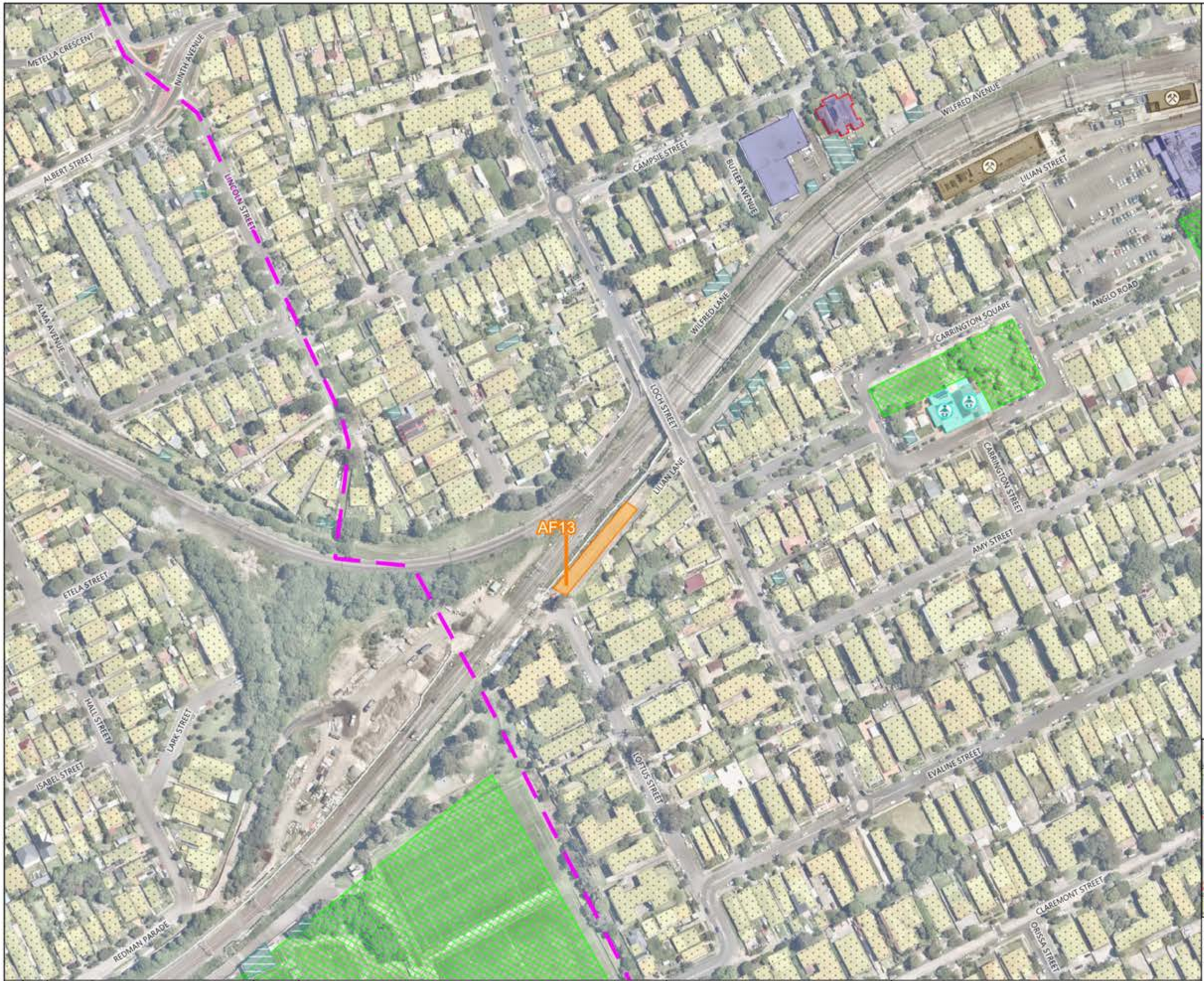

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Construction Work Areas

- Ancillary facilities and laydown areas

REV	BY	DATE	DESCRIPTION	APPROVER
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 40 80 120 160 m

1:2,500

ORIGINAL SCALE FOR A3 SIZE PAPER

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Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Ancillary Facilities and Laydown Areas

Plot Date: 31/05/24 - 11:14
Layout: TN794 Land Use
Atlas: Atlas Ancillary Facilities (zoomed in 1 2500)
GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Construction Work Areas

Ancillary facilities and laydown areas

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Ancillary Facilities and Laydown Areas

REV	BY	DATE	DESCRIPTION	APPROVER
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 40 80 120 160 m

1:2,500

ORIGINAL SCALE FOR A3 SIZE PAPER

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Plot Date: 31/05/24 - 11:15
Layout: TN794 Land Use
Atlas: Atlas Ancillary Facilities (zoomed in 1 2500)
GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Construction Work Areas

Ancillary facilities and laydown areas

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 40 80 120 160 m

1:2,500

ORIGINAL SCALE FOR A3 SIZE PAPER

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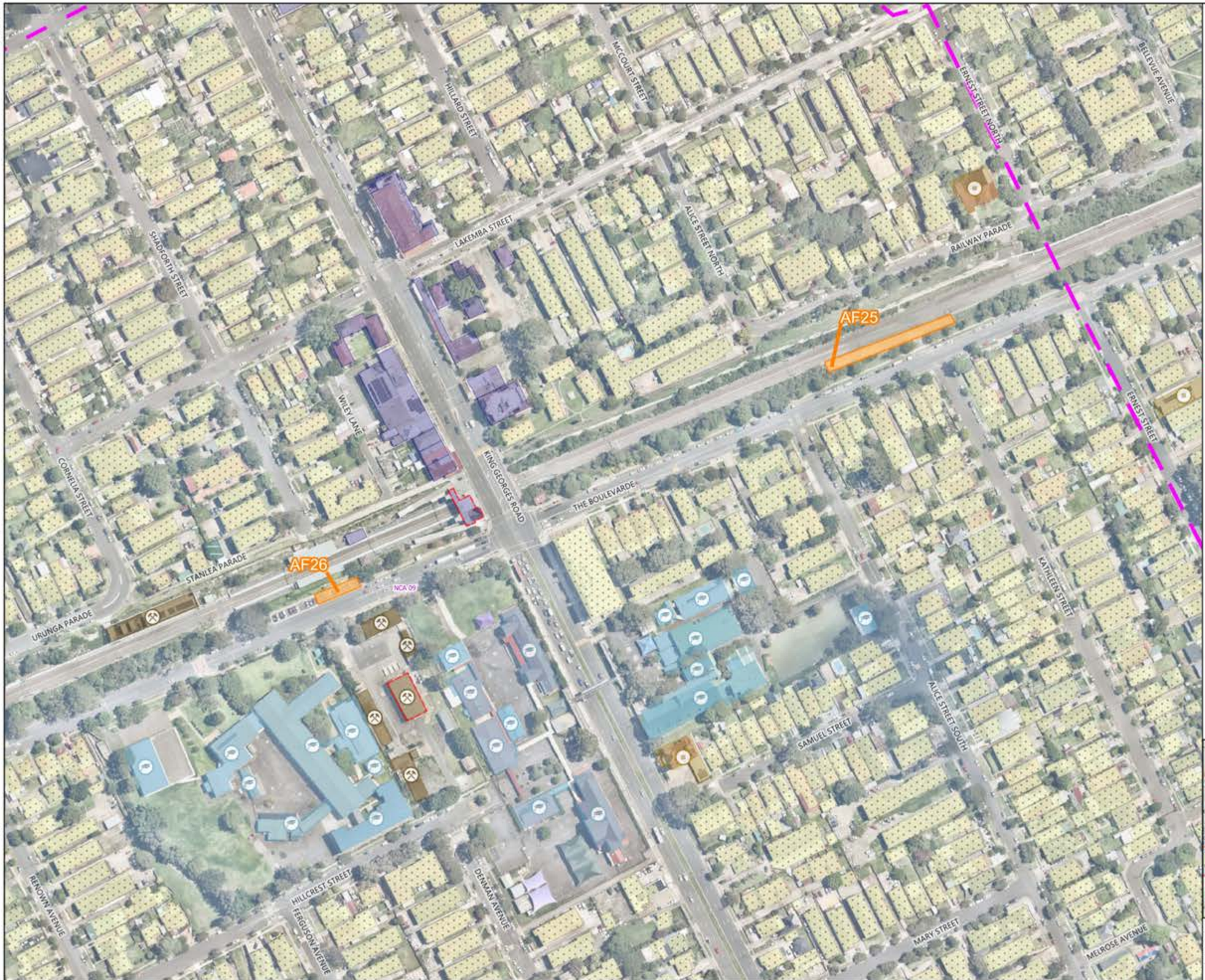
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Ancillary Facilities and Laydown Areas

Plot Date: 31/05/24 - 11:15
Layout: TN794 Land Use
Atlas: Atlas Ancillary Facilities (zoomed in 1 2500)
GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld



LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
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- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Construction Work Areas

Ancillary facilities and laydown areas

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Ancillary Facilities and Laydown Areas

300 m
200
100
0

REV	BY	DATE	DESCRIPTION	APPROVER
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 40 80 120 160 m

1:2,500

ORIGINAL SCALE FOR A3 SIZE PAPER

NOTES: Do not scale from this drawing

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Plot Date: 31/05/24 - 11:16
Layout: TN794 Land Use
Atlas: Atlas Ancillary Facilities (zoomed in 1 2500)
GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Construction Work Areas

Ancillary facilities and laydown areas

REV	BY	DATE	DESCRIPTION	APPROVER
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 40 80 120 160 m

1:2,500

ORIGINAL SCALE FOR A3 SIZE PAPER

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SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Ancillary Facilities and Laydown Areas

Plot Date: 31/05/24 - 11:17
Layout: TN794 Land Use
Atlas: Atlas Ancillary Facilities (zoomed in 1 2500)
GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

RICKARD ROAD
LADY CUTLER AVENUE
RESTHAVEN ROAD
PRAIRIE VALE ROAD
WATTLE STREET
HILLCREST AVENUE
NORTH TERRACE
AF31
AF30
AF32
SOUTH TERRACE
STACEY STREET
STANSFIELD AVENUE
WEST TERRACE
EAST TERRACE
CARNATION AVENUE
RAYMOND STREET
GRIFFITHS AVENUE

300 m
200
100
0

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Construction Work Areas

Ancillary facilities and laydown areas

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Ancillary Facilities and Laydown Areas

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original
Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 40 80 120 160 m
1:2,500
ORIGINAL SCALE FOR A3 SIZE PAPER
NOTES: Do not scale from this drawing

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Sheet 11 of 11

B.3 Station overbridge worksites and surrounding receivers

Plot Date: 31/05/24 - 11:01
Layout: TN794 Land Use
Atlas: Atlas Bridges
GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Project work areas

- Marrickville Station

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Marrickville Station

REV	BY	DATE	DESCRIPTION	APPROVER
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 16 32 48 64 m

1:1,000

ORIGINAL SCALE FOR A3 SIZE PAPER

NOTES: Do not scale from this drawing

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Plot Date: 31/05/24 - 11:01
Layout: TN794 Land Use
Atlas: Atlas Bridges
GIS File: R:\AssocSyd\Projects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
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- Hotel/Motel/Hostel
- Medical facility
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- Community centre
- Recording studio
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- Educational
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- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Project work areas

Dulwich Hill Station

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 16 32 48 64 m

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ORIGINAL SCALE FOR A3 SIZE PAPER

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SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Dulwich Hill Station

Plot Date: 31/05/24 - 11:01
Layout: TN794 Land Use
Atlas: Atlas Bridges
GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- NCAs

Project work areas

- Hurlstone Park Station

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Hurlstone Park Station

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 16 32 48 64 m

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ORIGINAL SCALE FOR A3 SIZE PAPER

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Plot Date: 31/05/24 - 11:02
Layout: TN794 Land Use
Atlas: Atlas Bridges
GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- NCAs

Project work areas

- Canterbury Station

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Canterbury Station

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 16 32 48 64 m

1:1,000

ORIGINAL SCALE FOR A3 SIZE PAPER

NOTES: Do not scale from this drawing

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Plot Date: 31/05/24 - 11:02
Layout: TN794 Land Use
Atlas: Atlas Bridges
GIS File: R:\Assoc\Syd\Projects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- NCAs

Project work areas

- Belmore Station

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Belmore Station

REV	BY	DATE	DESCRIPTION	APPROVER
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 16 32 48 64 m

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ORIGINAL SCALE FOR A3 SIZE PAPER

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Ph (02) 8218 0500 Fax (02) 8218 0501

Plot Date: 31/05/24 - 11:02
Layout: TN794 Land Use
Atlas: Atlas Bridges
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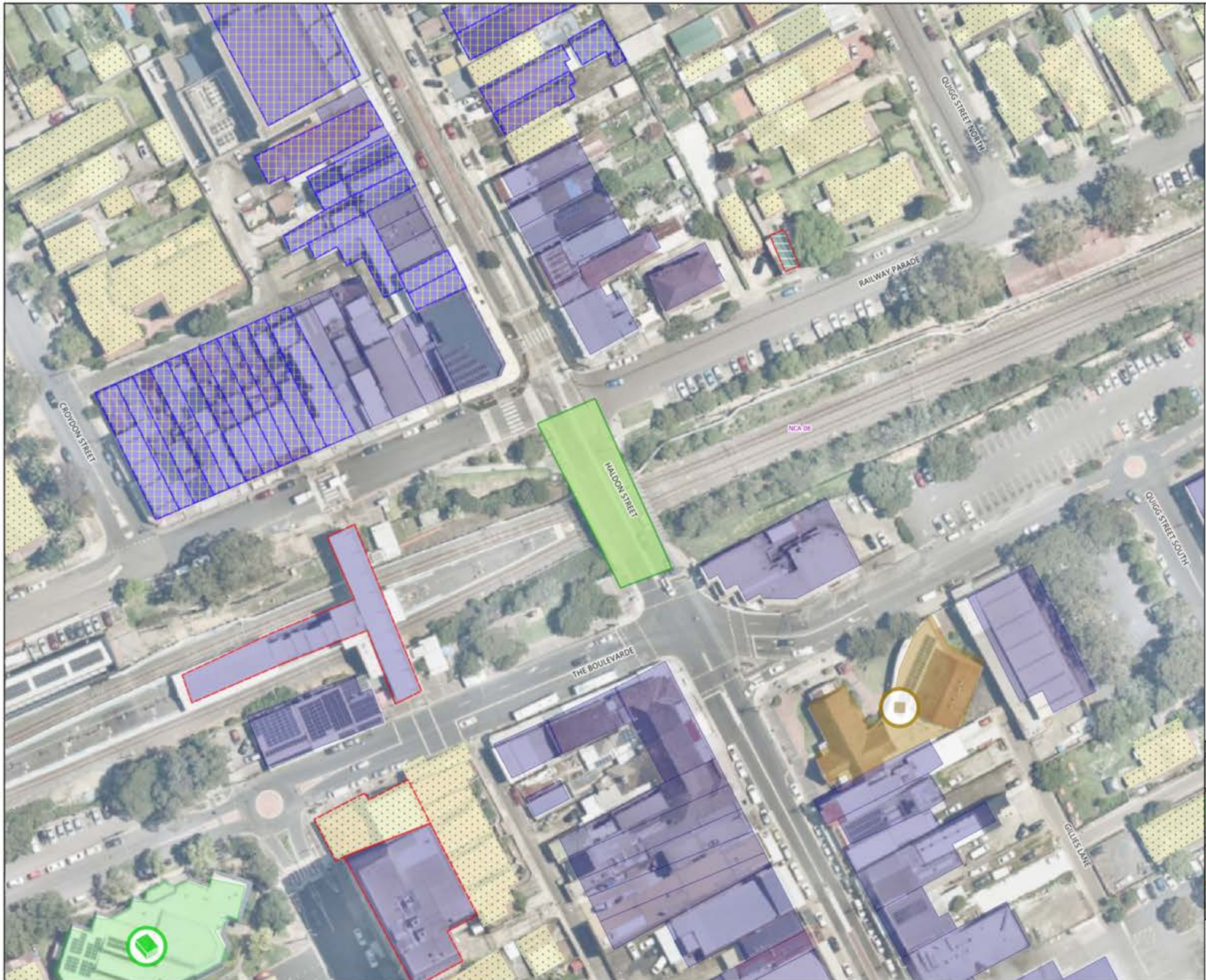

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- NCAs

Project work areas

- Lakemba Station

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Lakemba Station

REV	BY	DATE	DESCRIPTION	APPROVER
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 16 32 48 64 m

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Plot Date: 31/05/24 - 11:03
Layout: TN794 Land Use
Atlas: Atlas Bridges
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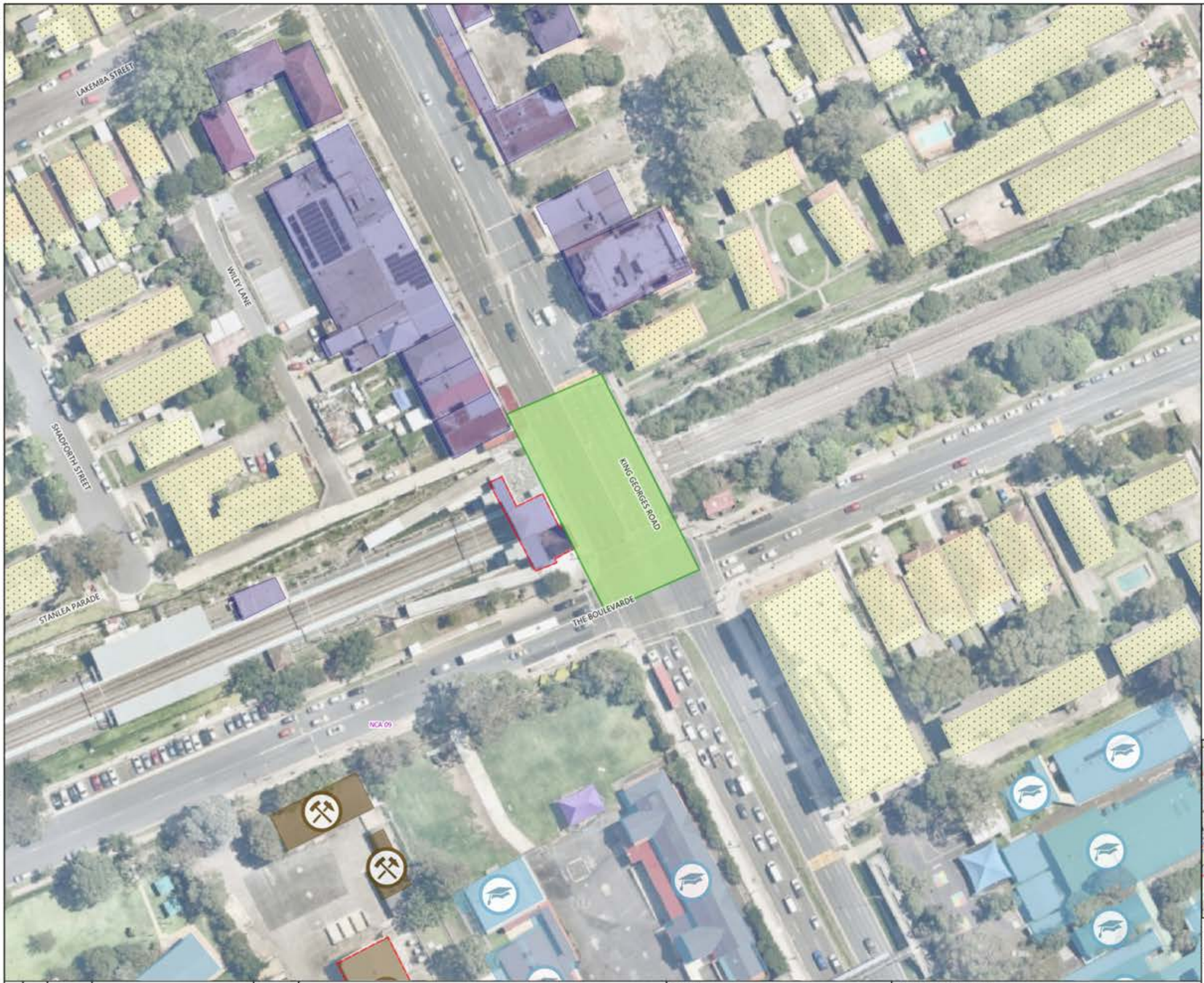

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Project work areas

Wiley Park Station

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Wiley Park Station

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 16 32 48 64 m

1:1,000

ORIGINAL SCALE FOR A3 SIZE PAPER

NOTES: Do not scale from this drawing

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Plot Date: 31/05/24 - 11:03
Layout: TN794 Land Use
Atlas: Atlas Bridges
GIS File: R:\AssocSyd\Projects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Project work areas

- Punchbowl Station

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Punchbowl Station

REV	BY	DATE	DESCRIPTION	APPROVER
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 16 32 48 64 m

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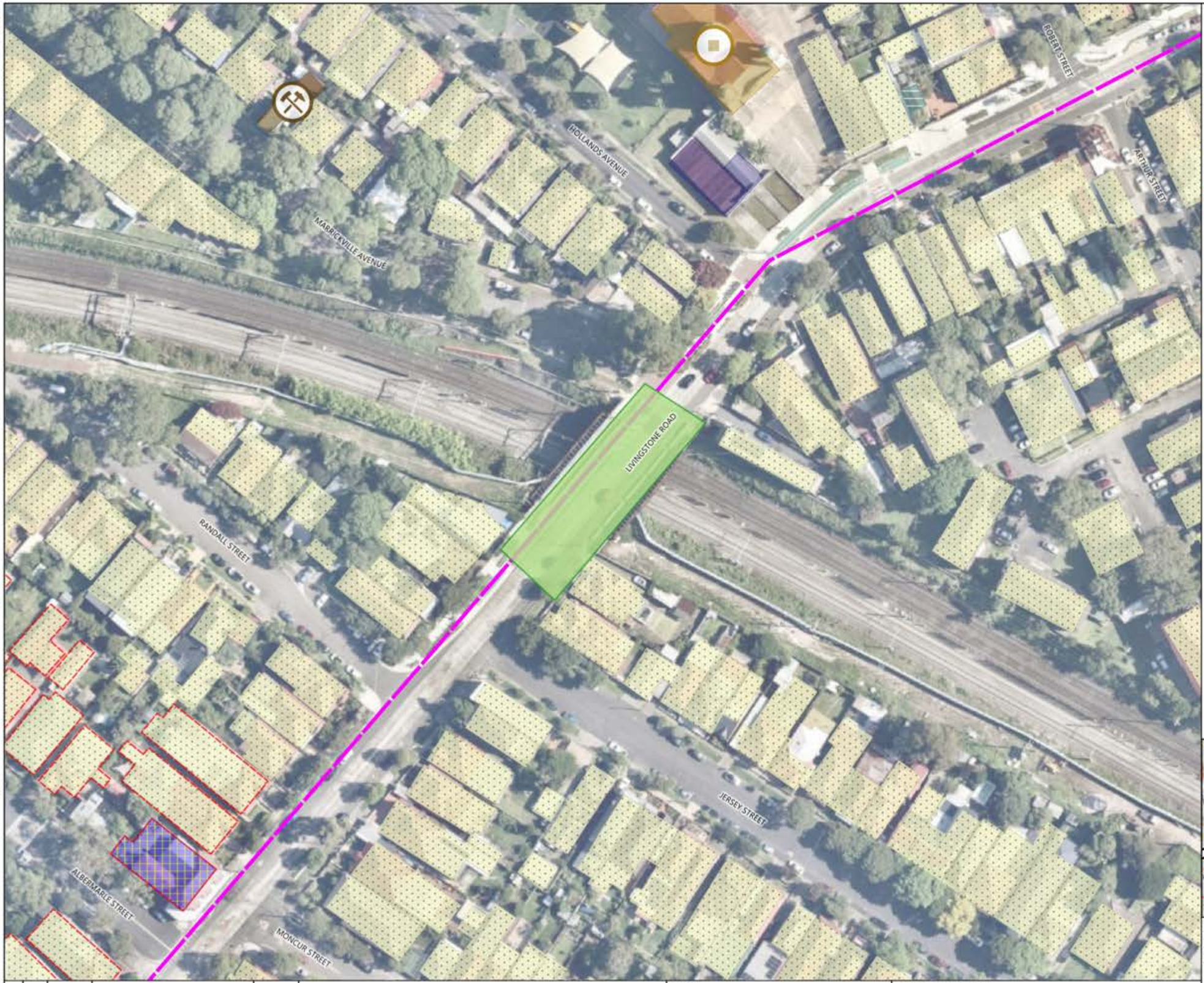
B.4 Non station overbridge worksites and surrounding receivers

Plot Date: 31/05/24 - 11:04
Layout: TN794 Land Use
Atlas: Atlas Bridges
GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld



150 m
100
50
0

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- NCAs

Project work areas

- Livingstone Road

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 16 32 48 64 m

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SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Livingstone Road

Plot Date: 31/05/24 - 11:04
Layout: TN794 Land Use
Atlas: Atlas Bridges
GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- NCAs

Project work areas

- Albermarle Street

REV	BY	DATE	DESCRIPTION	APPROVER
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 16 32 48 64 m

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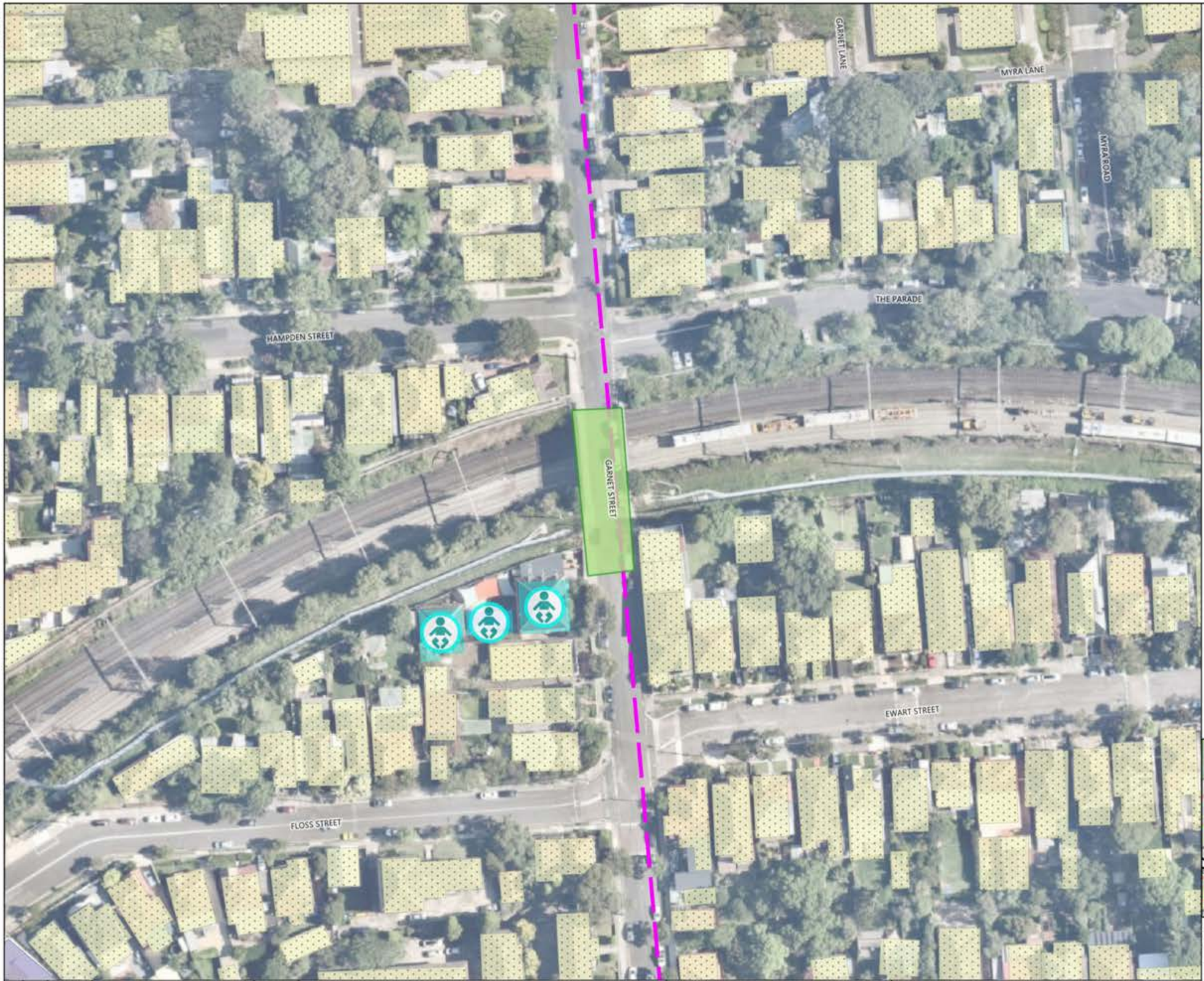
SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Albermarle Street

Plot Date: 31/05/24 - 11:04
Layout: TN794 Land Use
Atlas: Atlas Bridges
GIS File: R:\AssocSyd\Projects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld



LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- NCAs

Project work areas

- Garnet Street

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Garnet Street

REV	BY	DATE	DESCRIPTION	APPROVER
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 16 32 48 64 m

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ORIGINAL SCALE FOR A3 SIZE PAPER

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Plot Date: 31/05/24 - 11:05
Layout: TN794 Land Use
Atlas: Atlas Bridges
GIS File: R:\Assoc\Syd\Projects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Project work areas

- Melford Street

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Melford Street

REV	BY	DATE	DESCRIPTION	APPROVER
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 16 32 48 64 m

1:1,000

ORIGINAL SCALE FOR A3 SIZE PAPER

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Plot Date: 31/05/24 - 11:05
Layout: TN794 Land Use
Atlas: Atlas Bridges
GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- NCAs

Project work areas

- Loch Street

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Loch Street

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 16 32 48 64 m

1:1,000

ORIGINAL SCALE FOR A3 SIZE PAPER

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Plot Date: 31/05/24 - 11:05
Layout: TN794 Land Use
Atlas: Atlas Bridges
GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- NCAs

Project work areas

- Moreton Street

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Moreton Street

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 16 32 48 64 m

1:1,000

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Plot Date: 31/05/24 - 11:06
Layout: TN794 Land Use
Atlas: Atlas Bridges
GIS File: R:\AssocSyd\Projects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Project work areas

- Stacey Street

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Stacey Street

REV	BY	DATE	DESCRIPTION	APPROVER
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 16 32 48 64 m

1:1,000

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B.5 Corridor works worksites and surrounding receivers

Plot Date: 31/05/24 - 11:19
Layout: TN794 Land Use
Atlas: Atlas Corridor Works (zoomed in 1:2500)
GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Construction Work Areas

- Corridor work areas

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 40 80 120 160 m

1:2,500

ORIGINAL SCALE FOR A3 SIZE PAPER

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SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Ancillary Facilities and Laydown Areas

Plot Date: 31/05/24 - 11:20
Layout: TN794 Land Use
Atlas: Atlas Corridor Works (zoomed in 1 2500)
GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

300 m
200
100
0

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Construction Work Areas

- Corridor work areas

REV	BY	DATE	DESCRIPTION	APPROVER
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 40 80 120 160 m

1:2,500

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SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Ancillary Facilities and Laydown Areas

Plot Date: 31/05/24 - 11:21
Layout: TN794 Land Use
Atlas: Atlas Corridor Works (zoomed in 1 2500)
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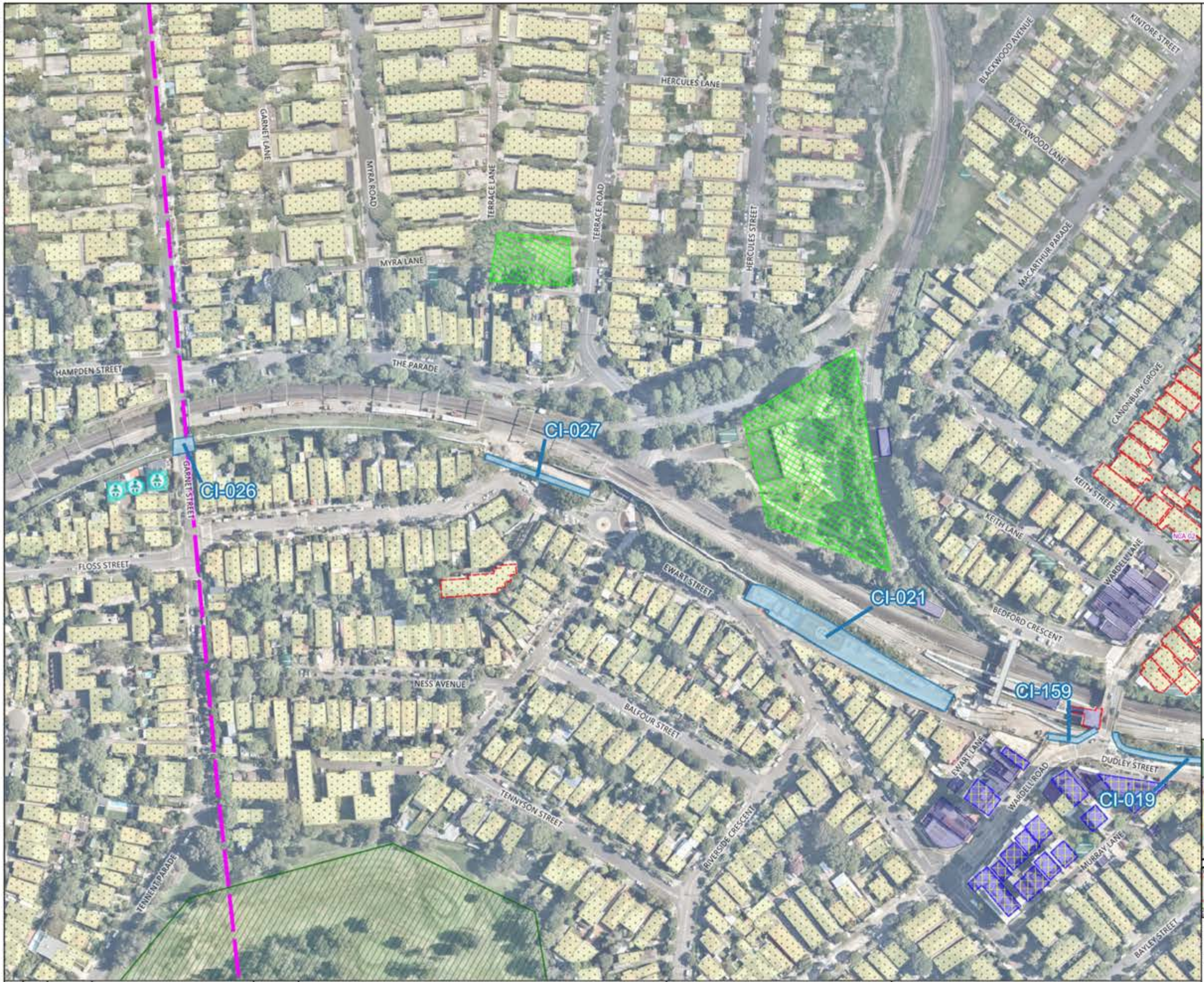
User: Dustin Auld



LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Construction Work Areas

Corridor work areas

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Ancillary Facilities and Laydown Areas

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 40 80 120 160 m

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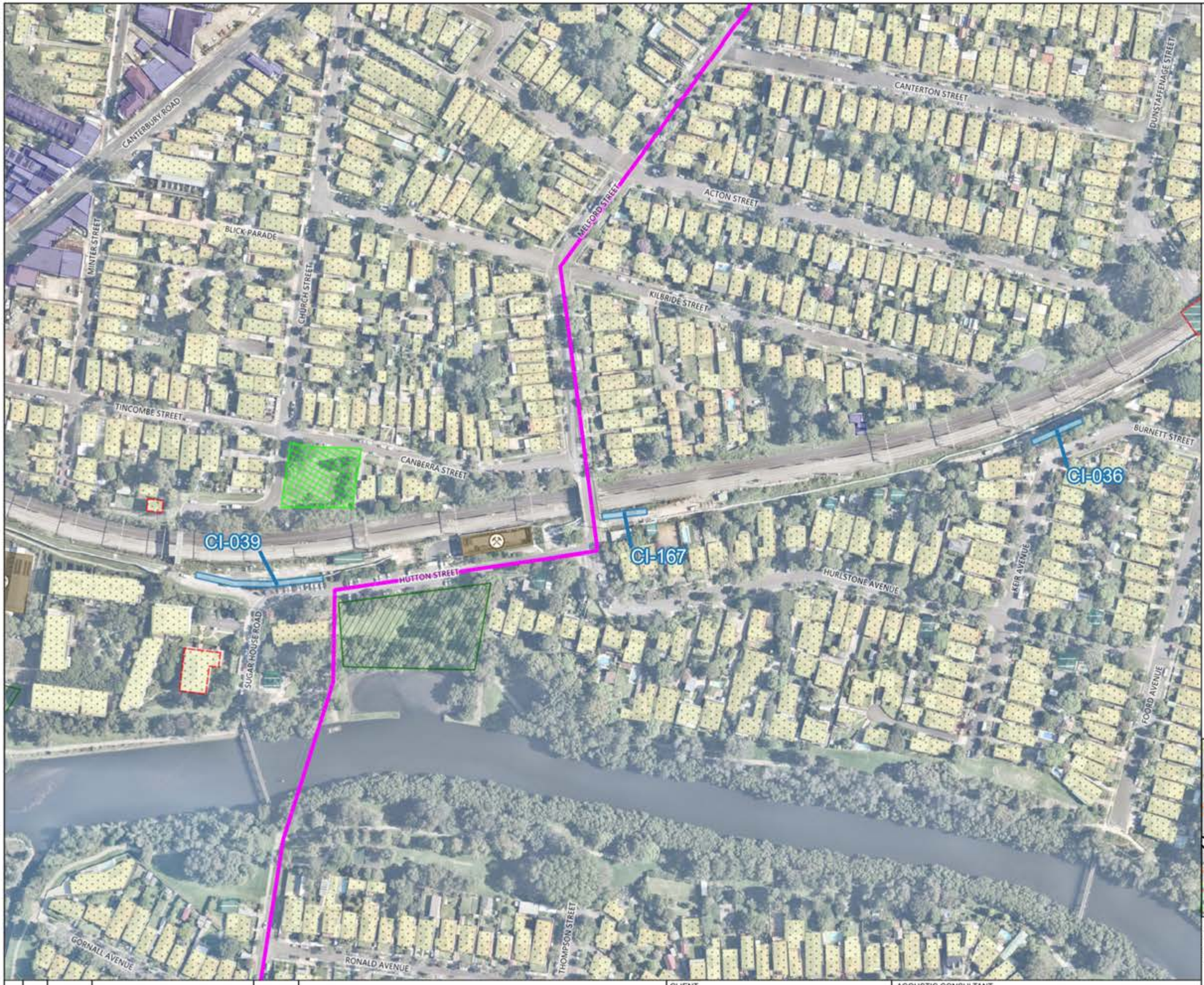
Plot Date: 31/05/24 - 11:21
Layout: TN794 Land Use
Atlas: Atlas Corridor Works (zoomed in 1 2500)
GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld



LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Construction Work Areas

Corridor work areas

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Ancillary Facilities and Laydown Areas

REV	BY	DATE	DESCRIPTION	APPROVER
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 40 80 120 160 m

1:2,500

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Plot Date: 31/05/24 - 11:22
Layout: TN794 Land Use
Atlas: Atlas Corridor Works (zoomed in 1 2500)
GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
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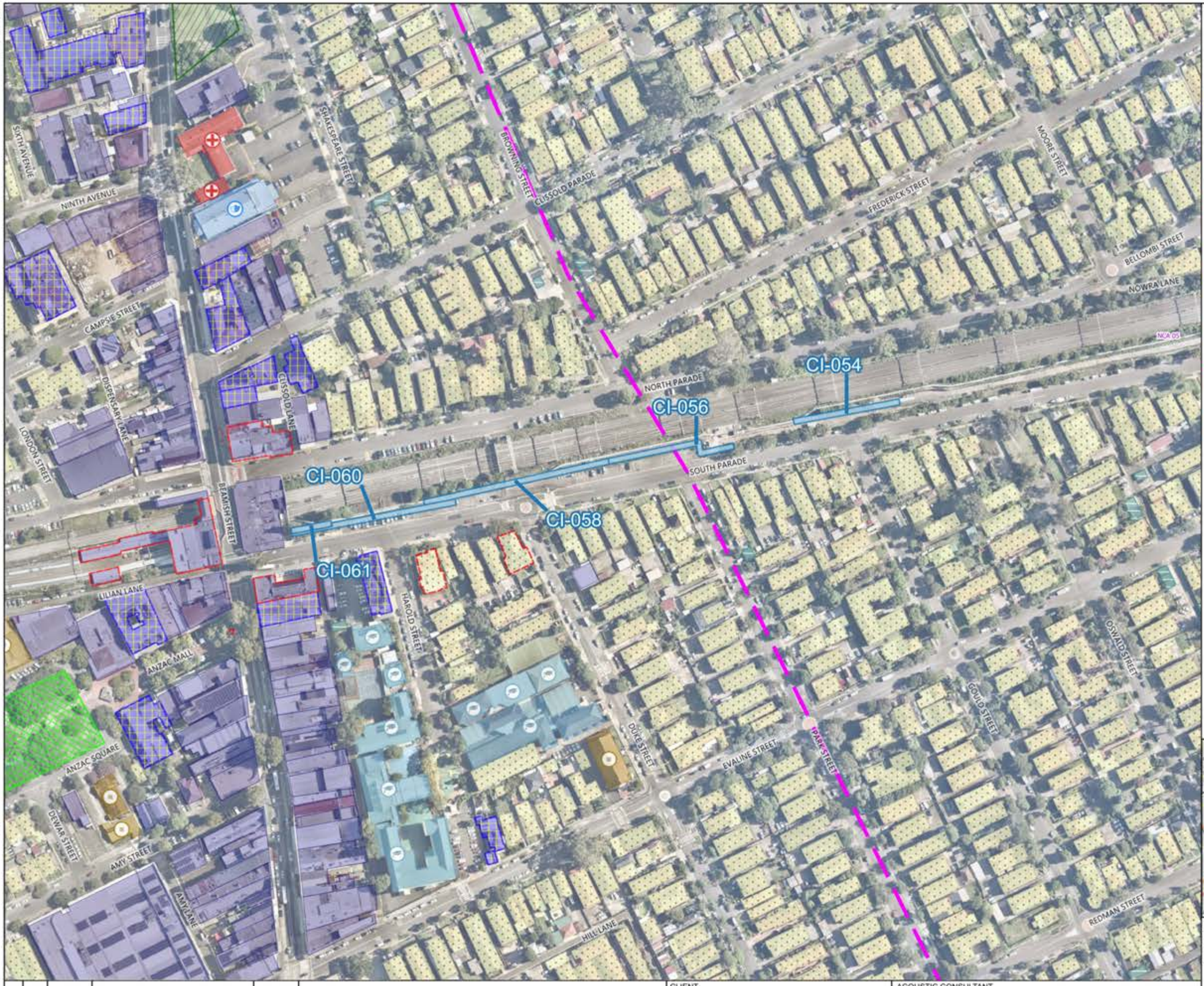

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Construction Work Areas

- Corridor work areas

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 40 80 120 160 m

1:2,500

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SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Ancillary Facilities and Laydown Areas

Plot Date: 31/05/24 - 11:22
Layout: TN794 Land Use
Atlas: Atlas Corridor Works (zoomed in 1 2500)
GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Construction Work Areas

- Corridor work areas

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Ancillary Facilities and Laydown Areas

REV	BY	DATE	DESCRIPTION	APPROVER
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 40 80 120 160 m

1:2,500

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Plot Date: 31/05/24 - 11:23
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User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
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- Flight simulator
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- Other
- Heritage

NCAs

Construction Work Areas

Corridor work areas

REV	BY	DATE	DESCRIPTION	APPROVER
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

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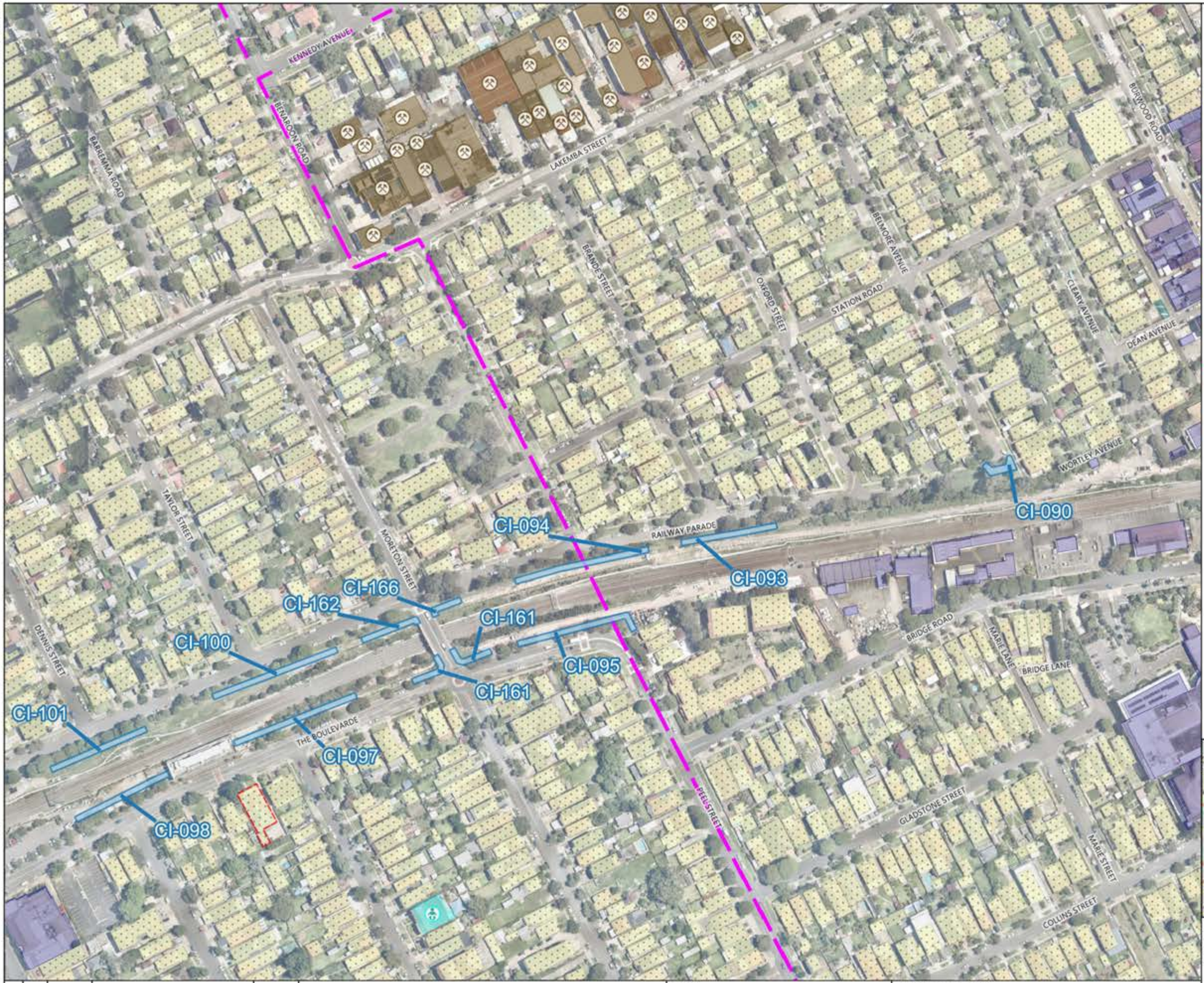
SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Ancillary Facilities and Laydown Areas

Plot Date: 31/05/24 - 11:24
Layout: TN794 Land Use
Atlas: Atlas Corridor Works (zoomed in 1 2500)
GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld



LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Construction Work Areas

- Corridor work areas

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Ancillary Facilities and Laydown Areas

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 40 80 120 160 m

1:2,500

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NOTES: Do not scale from this drawing

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Plot Date: 31/05/24 - 11:24
Layout: TN794 Land Use
Atlas: Atlas Corridor Works (zoomed in 1 2500)
GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Construction Work Areas

- Corridor work areas

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Ancillary Facilities and Laydown Areas

REV	BY	DATE	DESCRIPTION	APPROVER
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 40 80 120 160 m

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Layout: TN794 Land Use
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GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
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NCAs

Construction Work Areas

- Corridor work areas

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

Work Area: Ancillary Facilities and Laydown Areas

REV	BY	DATE	DESCRIPTION	APPROVED
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r0	DA	17/04/2024	Prepare figures	AMo

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NCAs

Construction Work Areas

- Corridor work areas

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r0	DA	17/04/2024	Prepare figures	AMo

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Work Area: Ancillary Facilities and Laydown Areas

Plot Date: 31/05/24 - 11:26
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User: Dustin Auld

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LEGEND

Sensitive Receivers

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NCAs

Construction Work Areas

- Corridor work areas

REV	BY	DATE	DESCRIPTION	APPROVER
r1	DA	31/05/24	Update legend	MT
r0	DA	17/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

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Work Area: Ancillary Facilities and Laydown Areas

Plot Date: 31/05/24 - 11:26
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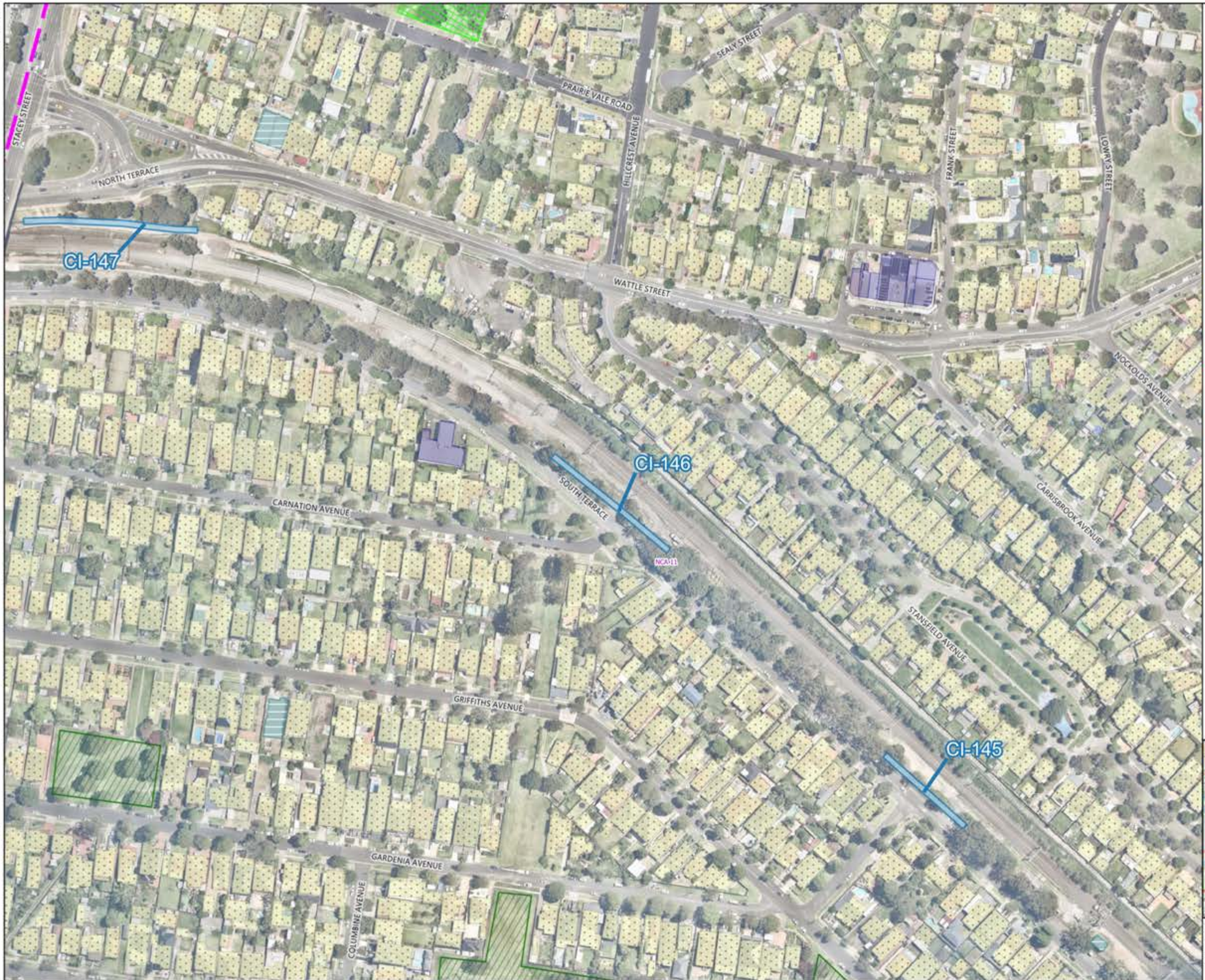

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r0	DA	17/04/2024	Prepare figures	AMo

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Work Area: Ancillary Facilities and Laydown Areas

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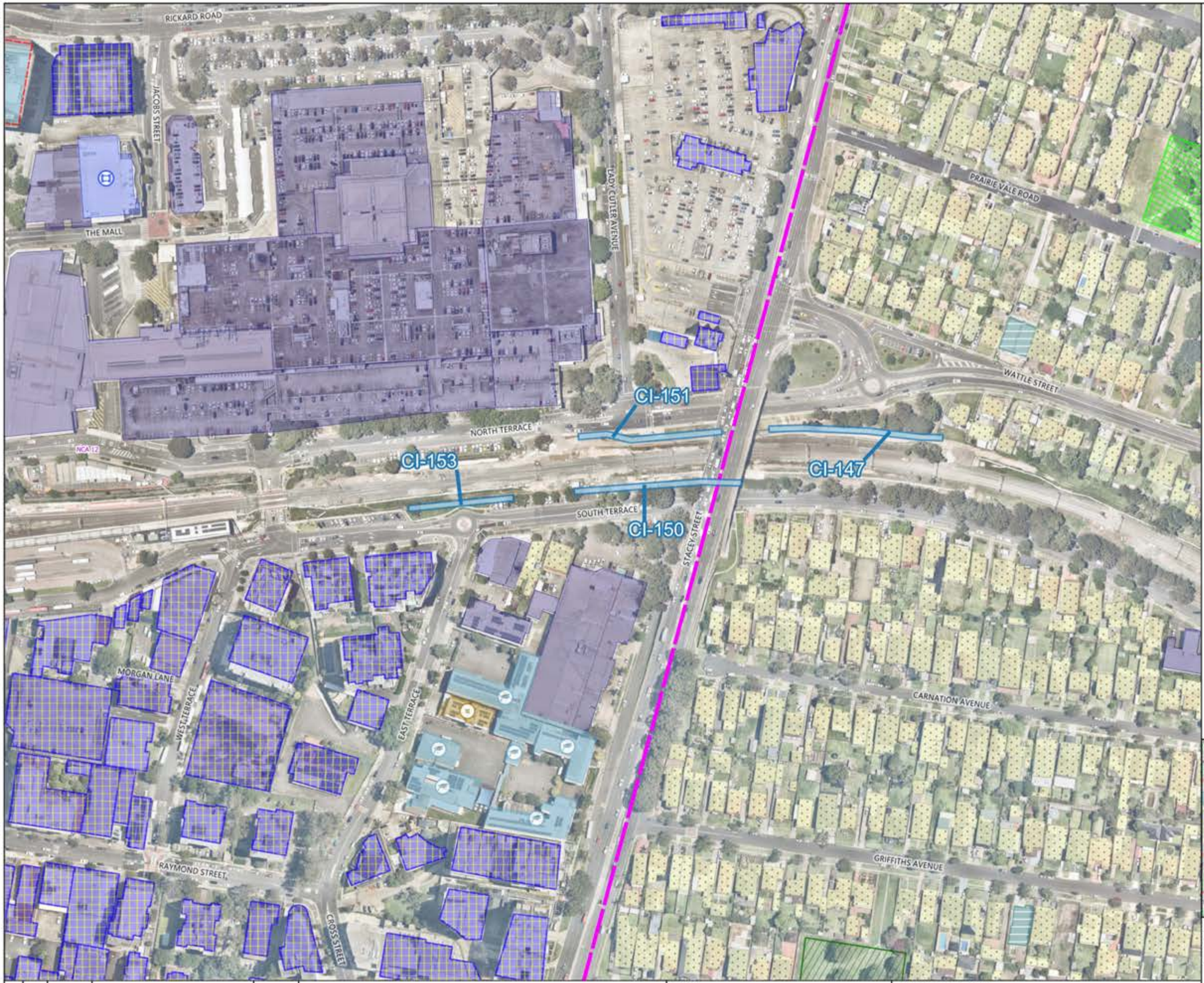

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Work Area: Ancillary Facilities and Laydown Areas

APPENDIX C Construction timetable/ activities/ management

C.1 Construction timetable/activities/equipment

Table B1: Noise Sensitive Receivers and Construction Noise Management Levels (airborne noise) **SOUTH WEST METRO PACKAGE 4**

NCA	Receiver Type	RBL Monitoring ID	Existing RBLs, dB(A) Morning Shoulder	Day	Evening	Evening Shoulder	Night	Airborne NMLs based on ICNG (external) NMLMS	NMLD(S)	NMLD(O)	NMLE	NMLES	NMLN	Sleep Dist. L_{Amax} Screening	Max	Comments
Residential receivers																
NCA 01	Predominantly Residential	B.02	0	38	38	0	33	5	48	43	43	40.5	38	48	65	
NCA 02	Predominantly Residential	B.03	0	38	38	0	33	5	48	43	43	40.5	38	48	65	
NCA 03	Predominantly Residential	EIS B.06	0	38	38	0	34	5	48	43	43	41	39	49	65	
NCA 04	Commercial and Residential	EIS B.07	0	40	40	0	35	5	50	45	45	42.5	40	50	65	
NCA 05	Predominantly Residential	EIS B.09	0	36	36	0	32	5	46	41	41	39	37	47	65	
NCA 06	Commercial and Residential	EIS B.10	0	45	42	0	35	5	55	50	47	43.5	40	50	65	
NCA 07	Commercial and Residential	EIS B.13	0	41	41	0	35	5	51	46	46	43	40	50	65	
NCA 08	Commercial and Residential	EIS B.14	0	47	47	0	41	5	57	52	52	49	46	56	65	
NCA 09	Predominantly Residential	EIS B.16	0	44	44	0	36	5	54	49	49	45	41	51	65	
NCA 10	Commercial and Residential	EIS B.19	0	47	47	0	41	5	57	52	52	49	46	56	65	
NCA 11	Predominantly Residential	EIS B.20	0	47	47	0	39	5	57	52	52	48	44	54	65	
NCA 12	Commercial and Residential	EIS B.22	0	47	51	0	42	5	57	52	52	51.5	47	57	65	
NCA 13	Predominantly Residential	EIS B.23	0	54	42	0	39	5	64	59	47	45.5	44	54	65	
ICNG 'Other sensitive' receivers (NML applicable when in use)																
Classrooms at schools and other educational institutions								65	65	65	65	65	65	-	-	Source: ICNG, assuming a conservative façade loss of 20 dB(A) in CBD
Hospital wards and operating theatres								65	65	65	65	65	65	-	-	Source: ICNG, assuming a conservative façade loss of 20 dB(A)
Places of worship								55	55	55	55	55	55	-	-	Source: ICNG, assuming a conservative façade loss of 10 dB(A)
Passive recreation areas (e.g. area used for reading, meditation)								60	60	60	60	60	60	-	-	Source: ICNG
Active recreation areas (e.g. sports fields)								65	65	65	65	65	65	-	-	Source: ICNG
Commercial premises (including offices and retail outlets)								70	70	70	70	70	70	-	-	Source: ICNG
Industrial premises								75	75	75	75	75	75	-	-	Source: ICNG
Non-ICNG 'Other sensitive' receivers (GBNML applicable when in use)																
Hotel - daytime and evening								70	70	70	70	70	70	-	-	Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 20 dB(A) facade loss
Hotel - night-time								60 70	60 70	60 70	60 70	60 70	60 70	-	-	Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 20 dB(A) facade loss for standard hotels; 30 dB(A) facade loss for luxury hotels (e.g. Radisson)
Café/ Bar/ Restaurant								60	60	60	60	60	60	-	-	Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 10 dB(A) facade loss
Childcare centre (indoor sleeping areas)								55	55	55	55	55	55	-	-	Source: CNVS Section 2.2.1, assuming a conservative façade loss of 10 dB(A)
Childcare centre (play areas)								65	65	65	65	65	65	-	-	Source: CNVS Section 2.2.1
Public Building								60	60	60	60	60	60	-	-	Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 10 dB(A) facade loss
Studio building (music recording studio)								45	45	45	45	45	45	-	-	Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 20 dB(A) facade loss
Studio building (film or television studio)								50	50	50	50	50	50	-	-	Source: AS2107 'maximum', assuming 20 dB(A) facade loss
Theatre/ Auditorium								50	50	50	50	50	50	-	-	Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 20 dB(A) facade loss

Notes:
D(S): standard construction hours from 7 am to 6 pm Monday to Friday and from 8 am to 6 pm Saturday
D(O): out-of-hours day period from 8 am to 6 pm Sunday and Public holidays - OOHW P1
E: evening period from 6 pm to 10 pm Monday to Sunday - OOHW P1
N: night-time pe N: night-time period from 10 pm to 7 am Monday to Friday, from 10 pm am to 8 am Saturday, Sunday and Public holidays - OOHW P2
MS: morning sh MS: morning shoulder period from 5 am to 7 am Monday to Friday, from 6 am to 8 am Saturday, Sunday and Public holidays - OOHW P1

Table C1: Construction timetable/ activities/ equipment — **SOUTH WEST METRO PACKAGE 4**

Construction activity	Aspect	Work location	Assessment reference	Sound Power Level, LAeq, 15min dB(A)	Plant/ Equipment (as provided by client)	Day	Evening	Night	Timing of Activity			Sound Power Level (Lw re: 1pW) in Noise Model, dB(A)			High noise plant	Vibration intensive plant	Notes
						7am - 6pm	6pm - 10pm	10pm - 7am	Start Date	End Date	Duration	$L_{Aeq,\ 15min}$	Penalty	L_{Amax}			
Ancillary Facilities	Site Establishment	Ancillary Facilities			Light Vehicles	6 ph	-	-				89	-	100	-	-	
					Excavator 21-25T w bucket	1	-	-				103	-	108	-	-	
		Typical impact	SE-T	108	Franna Crane	1	-	-				98	-	102	-	-	
		High impact	SE-H	125	Delivery trucks	2 ph	-	-				106	-	111	-	-	
					Mobile crane (20t-100t)	1	-	-				104	-	108	-	-	
					Smooth Drum Roller	1	-	-				107	5	111	HN	X	
					Water cart/ Street Sweeper	1	-	-				107	-	111	-	-	
					Concrete Agi	1 ph	-	-				108	-	111	-	-	
					Concrete pump	1	-	-				103	-	107	-	-	
					Handtool - powered	1	-	-				108	-	118	-	-	
					EWP	1	-	-				95	-	98	-	-	
					Generator	1	-	-				94	-	95	-	-	
					Lighting tower	1	-	-				99	-	102	-	-	
					Chainsaw (Petrol)	1	-	-				116	5	120	HN	-	
					Chipper	1	-	-				120	5	124	HN	-	
	Site Operation	Ancillary Facilities (concurrent with bridge works)	AF	108	Light Vehicles	6 ph	6 ph	6 ph				89	-	100	-	-	Ancillary Facilities required to facilitate night works during ROL and possessions
					Water cart/ Street Sweeper	1	1	1				107	-	111	-	-	
					Franna Crane	1	1	1				98	-	102	-	-	
					Delivery trucks	1 ph	1 ph	1 ph				106	-	111	-	-	Deliveries to be coordinated during daytime where possible
					Handtool - powered	1	1	1				108	-	118	-	-	
					Excavator 21-25T w bucket	1	1	1				103	-	108	-	-	
					Telehander / Franna crane (20t)	1	1	1				98	-	102	-	-	
Bridge works	Bridge barrier, anti-screens and anti-vehicle bollards installation	Bridges			Mobile crane 100 (to mobilise larger cran	1	1	1				104	-	108	-	-	
					Mobile crane 400-600t (to install off struc	1	1	1				104	-	108	-	-	Only duing off structure beam lifts
		Typical impact	BR-T	108	EWP	1	1	1				95	-	98	-	-	
		High impact	BR-H	123	Lighting tower	0	4	4				99	-	102	-	-	
					Vacuum Truck	1	1	1				107	-	111	-	-	
					Asphalt miller	1	1	1				105	-	112	-	-	
					Asphalt Paver	1	1	1				105	-	112	-	-	
					Kerb machine	1	1	1				102	-	103	-	-	
					Road Saw	1	1	1				116	5	129	HN	-	
					Line removing truck	1	1	1				107	-	111	-	-	
					Concrete Agi	2 ph	2 ph	2 ph				108	-	111	-	-	
					Concrete pump	1	1	1				103	-	107	-	-	
					Franna Crane	1	1	1				98	-	102	-	-	
					Generator	1	1	1				94	-	95	-	-	
					Excavator 21-25T w bucket	2	2	2				103	-	108	-	-	
					Excavator 21-25T w rockhammer	1	1	1				118	5	126	HN	X	
					Smooth Drum Roller	1	1	1				107	5	111	HN	X	
					Backhoe	1	1	1				100	-	104	-	-	
					Delivery trucks	1 ph	1 ph	1 ph				106	-	111	-	-	
					Handtool - powered	1	1	1				108	-	118	-	-	
					EWP	1	1	1				95	-	98	-	-	
					Street Sweeper	1	1	1				107	-	111	-	-	
					Water cart	1	1	1				107	-	111	-	-	
					Roller	1	1	1				107	5	111	HN	X	
					Hydrema	1	1	1				106	-	111	-	-	
					Telehandler	1	1	1				98	-	102	-	-	
					Kibble	1	1	1				-	-	-	-	-	
					Drill Rig	1	1	1				106	-	116	-	X	
					Rock breaker	1	1	1				118	5	126	HN	X	
					Jinker trailer	1	1	1				106	-	111	-	-	Only during off structure beam lifts
					Line marking truck	1	1	1				107	-	111	-	-	
					Waterblaster	1	1	1				109	-	115	-	-	
					Truck and dog	1 ph	1 ph	1 ph				106	-	111	-	-	
					Stump grinder	1	1	1				120	5	124	HN	-	
					Scabling tools	1	1	1				109	5	124	HN	-	
					Road profiler	1	1	1				109	5	124	HN	-	
					Hydro-demolition equipment	1	1	1				125	5	130	HN	-	
					Core Drilling Units	1	1	1				113	-	116	-	-	
					Piling rig	1	1	1				107	-	116	-	X	
Corridor works	Safety improvements	Barrier work locations			Handtool - powered	1	1	1				108	-	118	-	-	
					Lighting tower	0	4	4				99	-	102	-	-	
		Typical impact	BA-T	108	Excavator 5T w bucket	1	1	1				101	-	114	-	-	
					Tipper truck	2	1	1				103	-	111	-	-	
					8T tipper	1	1	1				103	-	111	-	-	
					Concrete agi	2 ph	1 ph	1 ph				108	-	111	-	-	
					Concrete pump	1	1	1				103	-	107	-	-	
					Delivery truck	2 ph	-	-				106	-	111	-	-	

APPENDIX D Construction airborne noise impacts

D.1 Predicted noise levels

The detailed predicted levels have been provided to Martinus Rail in a spreadsheet table to mitigate and manage potential noise impacts more adequately.

D.2 Number of receivers above NMLs

The number of exceedances has been provided to Martinus Rail in a spreadsheet table.

D.3 Additional management measures

The additional management measures have been provided to Martinus Rail in a spreadsheet table to mitigate and manage potential noise impacts more adequately.

APPENDIX E Construction vibration impacts

E.1 Predicted vibration impacts – ancillary facilities/laydown areas

E.1.1 Number of receivers within MWD

Work area	Vibration significant plant	Number of buildings within minimum working distances							
		Structural damage to buildings			Disturbance to building occupants				
		Reinforced or frame structures	Unreinforced or light framed structures	Structurally unsound heritage structures	Critical areas	Residence – Day	Residence – Night	Offices	Workshops
Ancillary facilities/ laydown areas	Smooth drum roller (low vibration mode)	10	10	5	0	218	-	33	2
	Smooth drum roller (high vibration mode)	10	10	6	0	379	-	52	3

E.1.2 MWD maps

Plot Date: 31/05/24 - 11:37
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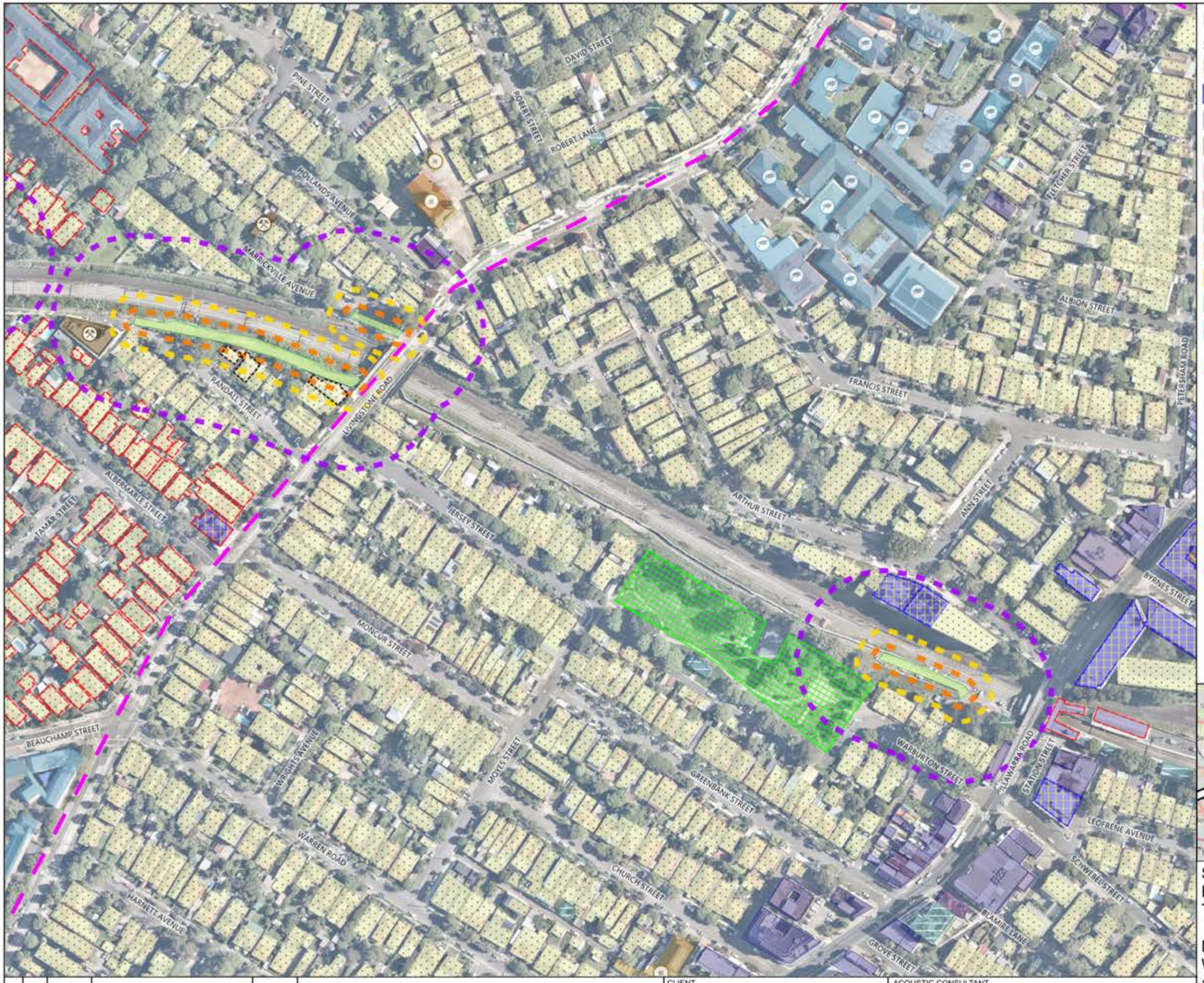

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- Cinema
- Laboratory
- Flight simulator
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- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Receivers within MWD for cosmetic damage

Project work area

Ancillary facilities/laydown areas

MWD for cosmetic damage and human annoyance for Smooth drum roller (high vibration mode)

- Unreinforced structures (7.5mm/s ppv)
- Heritage structures (2.5mm/s ppv)
- Human annoyance - Residential (day)

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

MWD
Work area: Ancillary facilities/laydown areas
Plant: Smooth drum roller (high vibration mode)

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Updated legend	MT
r0	DA	10/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 40 80 120 160 m

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Atlas: Atlas Ancillary Facilities MWD
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User: Dustin Auld

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- Other
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NCAs

Receivers within MWD for cosmetic damage

Project work area

Ancillary facilities/laydown areas

MWD for cosmetic damage and human annoyance for Smooth drum roller (high vibration mode)

- Unreinforced structures (7.5mm/s ppv)
- Heritage structures (2.5mm/s ppv)
- Human annoyance - Residential (day)

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

MWD
Work area: Ancillary facilities/laydown areas
Plant: Smooth drum roller (high vibration mode)

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r0	DA	10/04/2024	Prepare figures	AMo

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Plot Date: 31/05/24 - 11:38
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Atlas: Atlas Ancillary Facilities MWD
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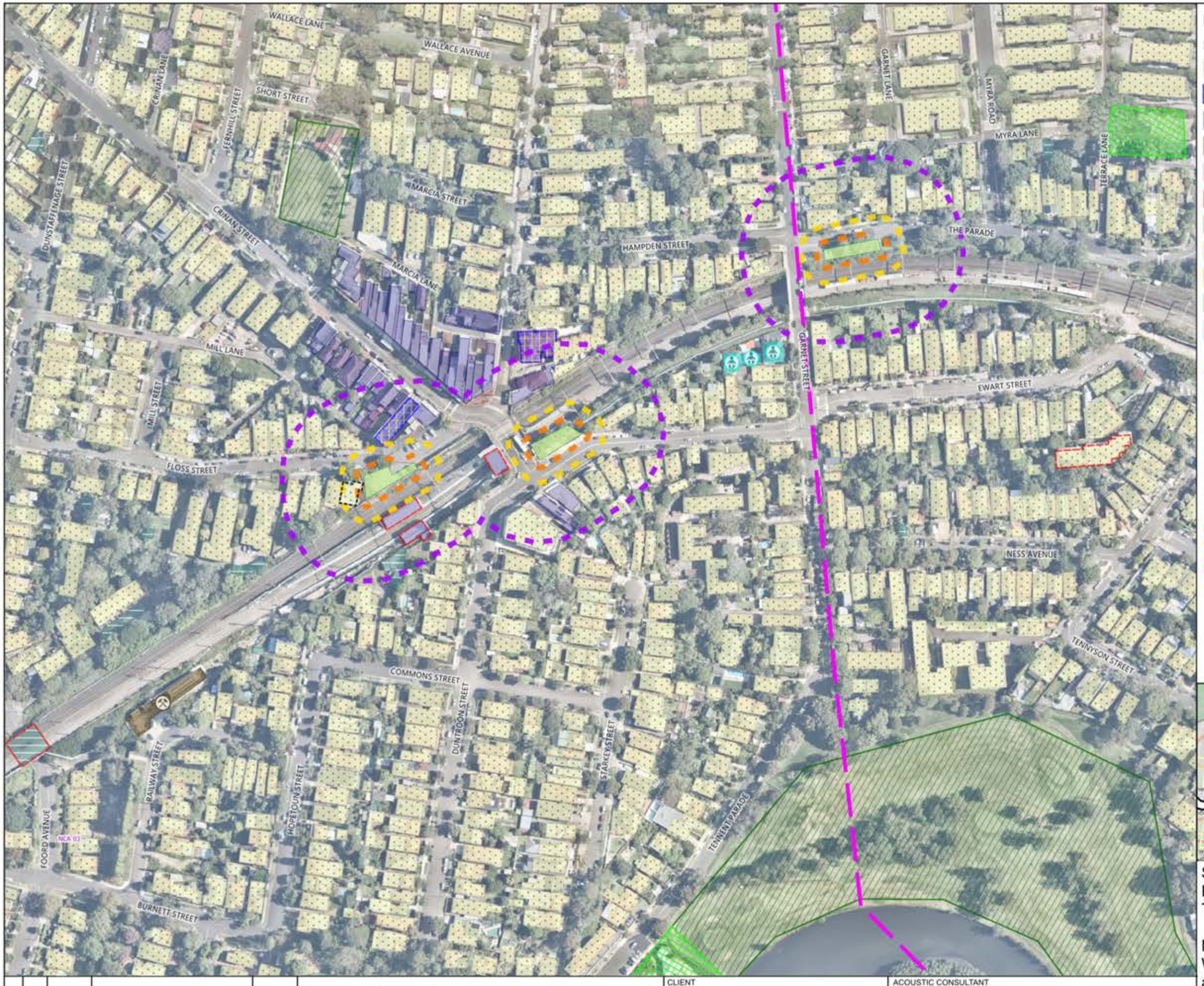

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- NCAs
- Receivers within MWD for cosmetic damage

Project work area

- Ancillary facilities/laydown areas

MWD for cosmetic damage and human annoyance for Smooth drum roller (high vibration mode)

- Unreinforced structures (7.5mm/s ppv)
- Heritage structures (2.5mm/s ppv)
- Human annoyance - Residential (day)

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

MWD
Work area: Ancillary facilities/laydown areas
Plant: Smooth drum roller (high vibration mode)

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Updated legend	MT
r0	DA	10/04/2024	Prepare figures	AMo

A3 Original | Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356) | NOTES: Do not scale from this drawing

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1:2,500
ORIGINAL SCALE FOR A3 SIZE PAPER

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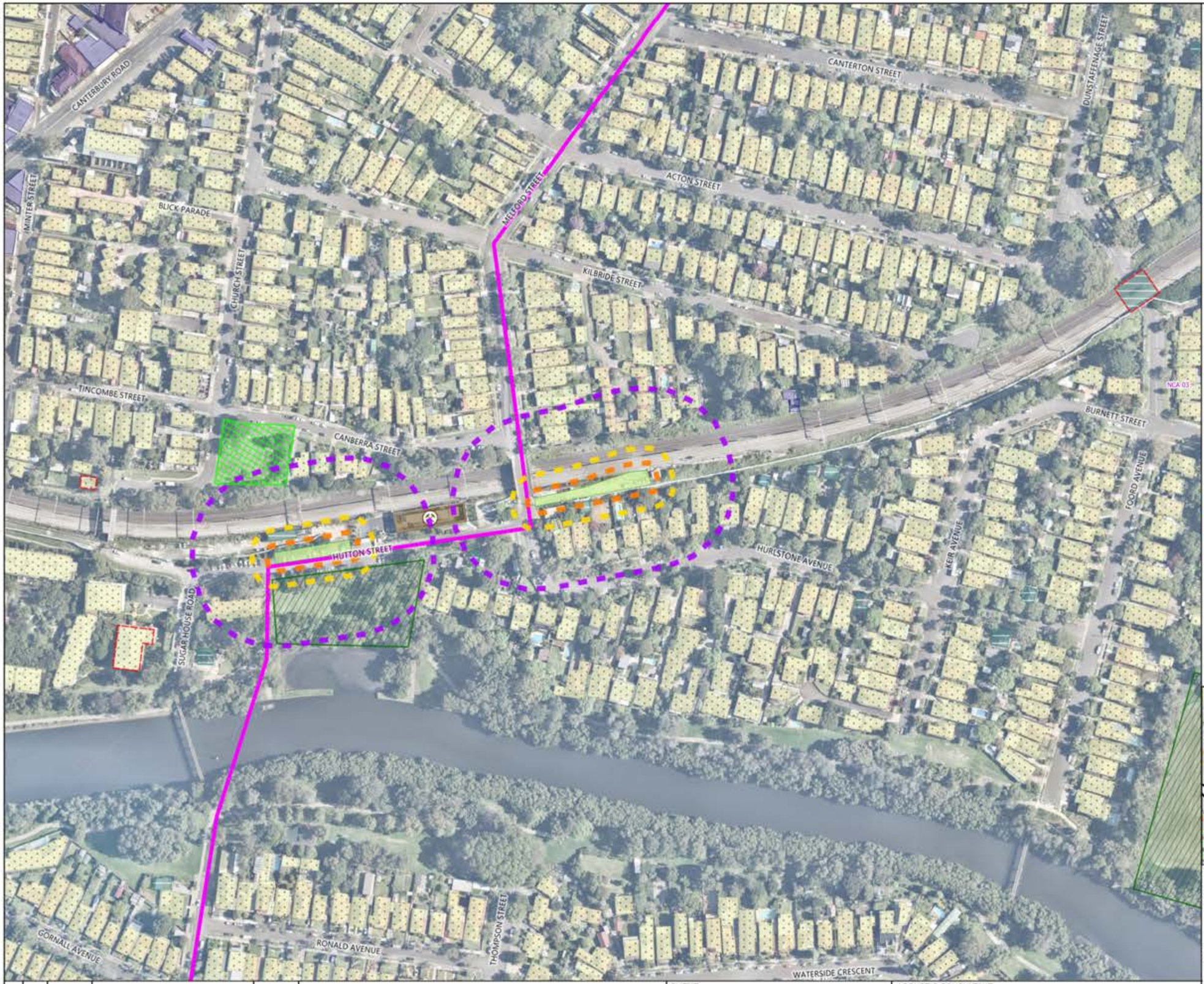
Layout: TN794 MWD
Atlas: Atlas Ancillary Facilities MWD
GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld



LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
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- Horse Stable
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- Recreational - Active
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NCAs

Project work area

Ancillary facilities/laydown areas

MWD for cosmetic damage and human annoyance for Smooth drum roller (high vibration mode)

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SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

MWD
Work area: Ancillary facilities/laydown areas
Plant: Smooth drum roller (high vibration mode)

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Updated legend	MT
r0	DA	10/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

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1:2,500

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Plot Date: 31/05/24 - 11:39
Layout: TN794 MWD
Atlas: Atlas Ancillary Facilities MWD
GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
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NCAs

Project work area

Ancillary facilities/laydown areas

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SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

MWD
Work area: Ancillary facilities/laydown areas
Plant: Smooth drum roller (high vibration mode)

REV	BY	DATE	DESCRIPTION	APPROVER
r1	DA	31/05/24	Updated legend	MT
r0	DA	10/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

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1:2,500

ORIGINAL SCALE FOR A3 SIZE PAPER

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Plot Date: 31/05/24 - 11:40
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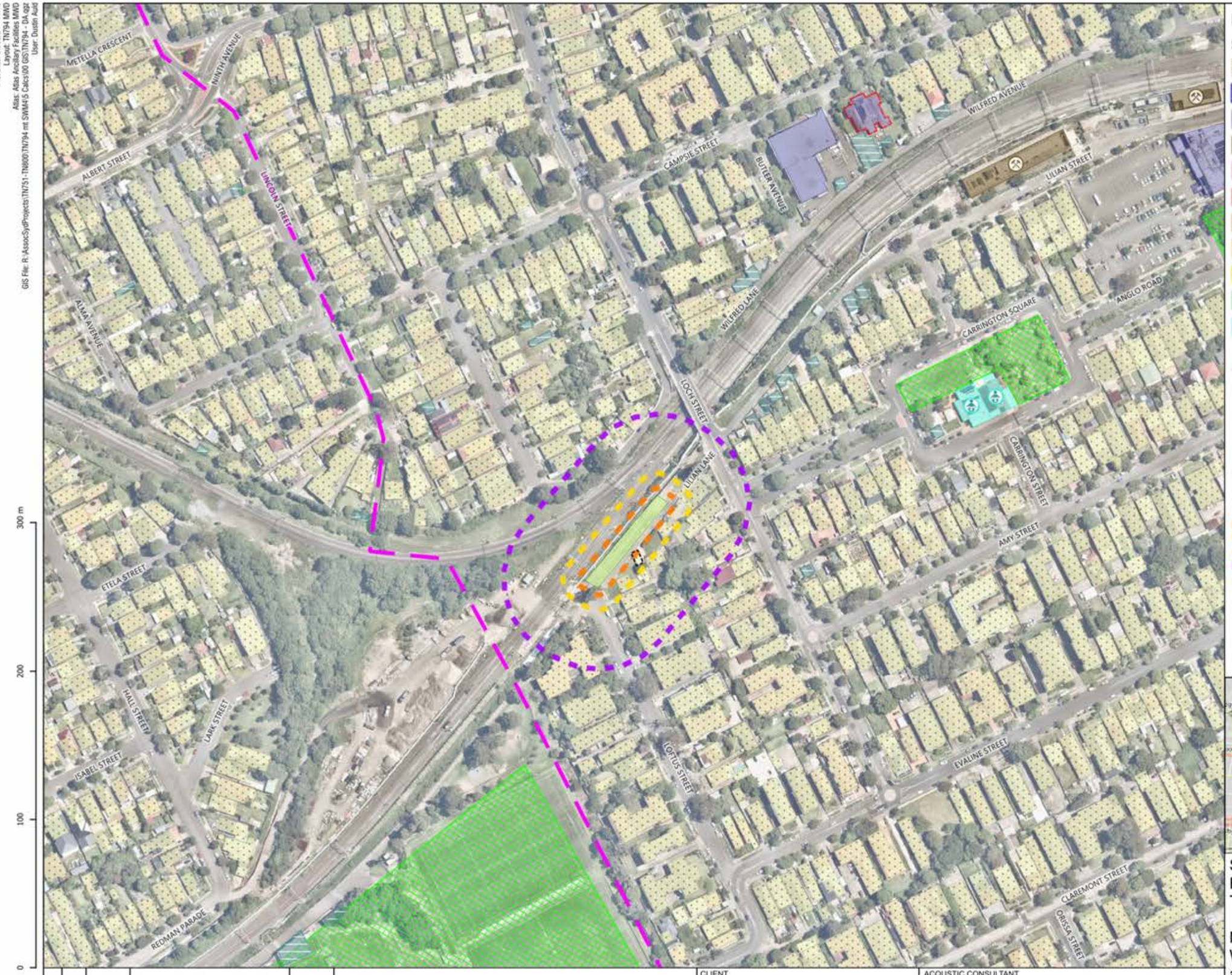

300 m
200
100
0

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
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Project work area

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SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

MWD
Work area: Ancillary facilities/laydown areas
Plant: Smooth drum roller (high vibration mode)

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Updated legend	MT
r0	DA	10/04/2024	Prepare figures	AMo

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1:2,500
ORIGINAL SCALE FOR A3 SIZE PAPER

A3 Original
Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)
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Plot Date: 31/05/24 - 11:40
Layout: TN794 MWD
Atlas: Atlas Ancillary Facilities MWD
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User: Dustin Auld

LEGEND

Sensitive Receivers

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- Mixed use
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SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

MWD
Work area: Ancillary facilities/laydown areas
Plant: Smooth drum roller (high vibration mode)

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Updated legend	MT
r0	DA	10/04/2024	Prepare figures	AMo

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1:2,500
ORIGINAL SCALE FOR A3 SIZE PAPER

A3 Original
Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)
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Atlas: Atlas Ancillary Facilities MWD
GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
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- Medical facility
- Place of Worship
- Community centre
- Recording studio
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Project work area

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SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

MWD
Work area: Ancillary facilities/laydown areas
Plant: Smooth drum roller (high vibration mode)

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Updated legend	MT
r0	DA	10/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

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1:2,500

ORIGINAL SCALE FOR A3 SIZE PAPER

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Atlas: Atlas Ancillary Facilities MWD
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User: Dustin Auld

LEGEND

Sensitive Receivers

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SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

MWD
Work area: Ancillary facilities/laydown areas
Plant: Smooth drum roller (high vibration mode)

300 m
200
100
0

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Updated legend	MT
r0	DA	10/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

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1:2,500

ORIGINAL SCALE FOR A3 SIZE PAPER

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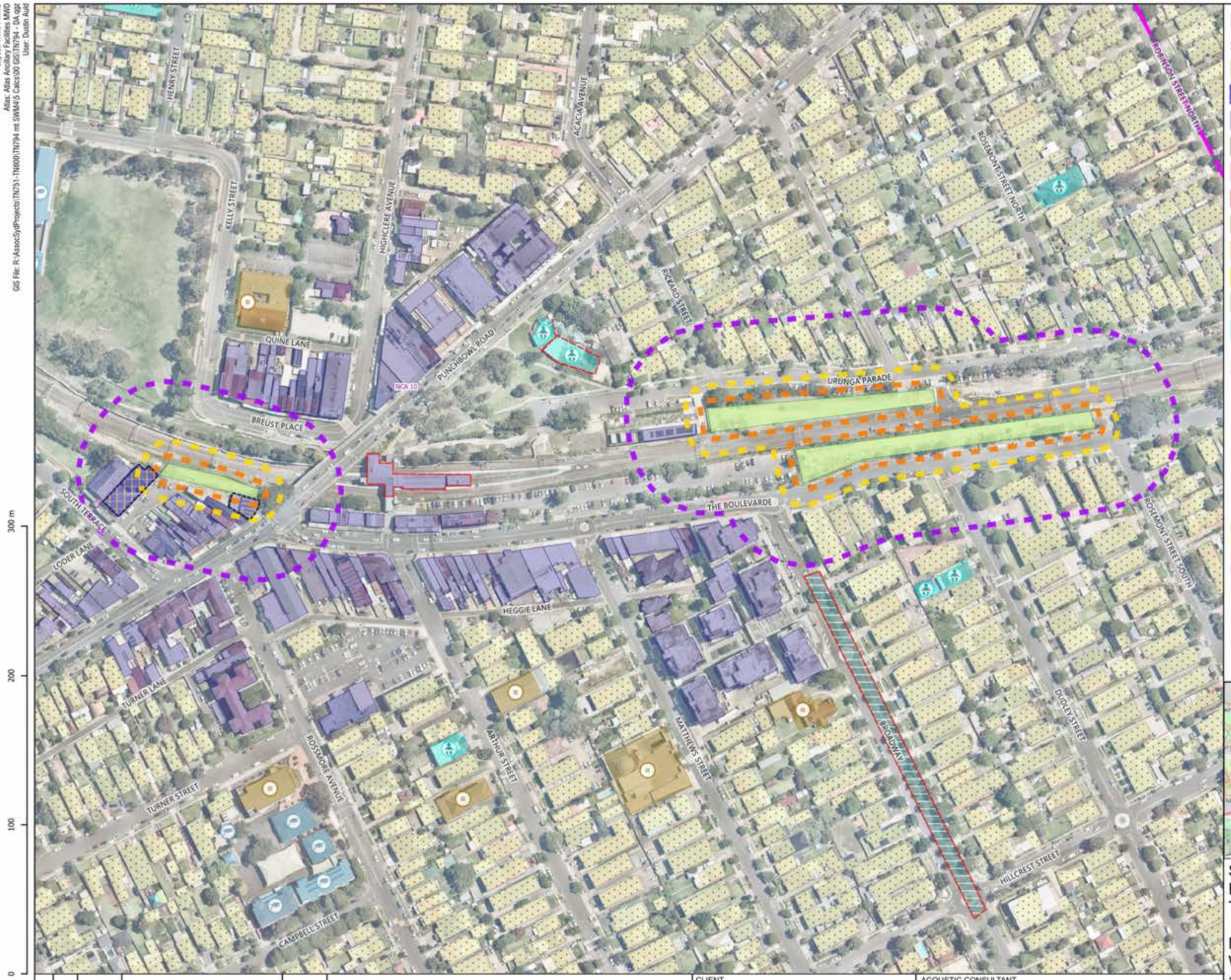

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
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- Place of Worship
- Community centre
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- Recreational - Active
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- Ancillary facilities/laydown areas

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SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

MWD
Work area: Ancillary facilities/laydown areas
Plant: Smooth drum roller (high vibration mode)

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Updated legend	MT
r0	DA	10/04/2024	Prepare figures	AMo

A3 Original
Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

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1:2,500
ORIGINAL SCALE FOR A3 SIZE PAPER
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Atlas: Atlas Ancillary Facilities MWD
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User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- NCAs

Project work area

- Ancillary facilities/laydown areas

MWD for cosmetic damage and human annoyance for Smooth drum roller (high vibration mode)

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- Heritage structures (2.5mm/s ppv)
- Human annoyance - Residential (day)

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

MWD
Work area: Ancillary facilities/laydown areas
Plant: Smooth drum roller (high vibration mode)

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Updated legend	MT
r0	DA	10/04/2024	Prepare figures	AMo

A3 Original | Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

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ORIGINAL SCALE FOR A3 SIZE PAPER
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E.2 Predicted vibration impacts – station overbridge works

E.2.1 Number of receivers within MWD

Work area	Vibration significant plant	Number of buildings within minimum working distances							
		Structural damage to buildings			Disturbance to building occupants				
		Reinforced or frame structures	Unreinforced or light framed structures	Structurally unsound heritage structures	Critical areas	Residence – Day	Residence – Night	Offices	Workshops
Marrickville Station	Bored piling rig	1	1	1	0	3	3	2	0
	Excavator 25t (hammer attachment)	1	1	1	0	6	6	6	0
	Smooth drum roller (low vibration mode)	1	1	1	0	10	15	6	0
	Smooth drum roller (high vibration mode)	1	1	1	0	15	29	10	0
Dulwich Hill Station	Bored piling rig	0	0	1	0	1	1	1	0
	Excavator 25t (hammer attachment)	0	0	2	0	4	4	4	0
	Smooth drum roller (low vibration mode)	0	0	2	0	8	14	4	0
	Smooth drum roller (high vibration mode)	0	0	2	0	14	31	7	0
Hurlstone Park Station	Bored piling rig	0	0	1	0	0	0	2	0
	Excavator 25t (hammer attachment)	0	0	1	0	2	4	4	0
	Smooth drum roller (low vibration mode)	0	0	1	0	7	16	4	0
	Smooth drum roller (high vibration mode)	0	0	1	0	16	31	8	0
Canterbury Station	Bored piling rig	2	2	1	0	2	2	5	0
	Excavator 25t (hammer attachment)	2	2	1	0	4	5	7	0
	Smooth drum roller (low vibration mode)	2	2	1	0	7	9	7	0

Work area	Vibration significant plant	Number of buildings within minimum working distances							
		Structural damage to buildings			Disturbance to building occupants				
		Reinforced or frame structures	Unreinforced or light framed structures	Structurally unsound heritage structures	Critical areas	Residence – Day	Residence – Night	Offices	Workshops
	Smooth drum roller (high vibration mode)	2	2	1	0	9	13	9	0
Belmore Station	Bored piling rig	0	0	1	0	0	0	3	0
	Excavator 25t (hammer attachment)	0	0	2	0	0	0	8	0
	Smooth drum roller (low vibration mode)	0	0	2	0	0	1	8	0
	Smooth drum roller (high vibration mode)	0	0	2	0	1	3	11	0
Lakemba Station	Bored piling rig	0	0	0	0	0	0	1	0
	Excavator 25t (hammer attachment)	0	0	0	0	0	0	3	0
	Smooth drum roller (low vibration mode)	0	0	0	0	0	4	3	0
	Smooth drum roller (high vibration mode)	0	0	0	0	4	18	8	0
Wiley Park Station	Bored piling rig	1	1	1	0	1	1	3	0
	Excavator 25t (hammer attachment)	1	1	1	0	2	2	5	0
	Smooth drum roller (low vibration mode)	1	1	1	0	2	5	5	0
	Smooth drum roller (high vibration mode)	1	1	1	0	5	9	6	0
Punchbowl Station	Bored piling rig	2	2	1	0	0	0	3	0
	Excavator 25t (hammer attachment)	2	2	1	0	0	0	7	0
	Smooth drum roller (low vibration mode)	2	2	1	0	0	0	7	0
	Smooth drum roller (high vibration mode)	2	2	1	0	0	0	16	0

E.2.2 MWD maps

Plot Date: 31/05/24 - 11:48
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Atlas: Project work area
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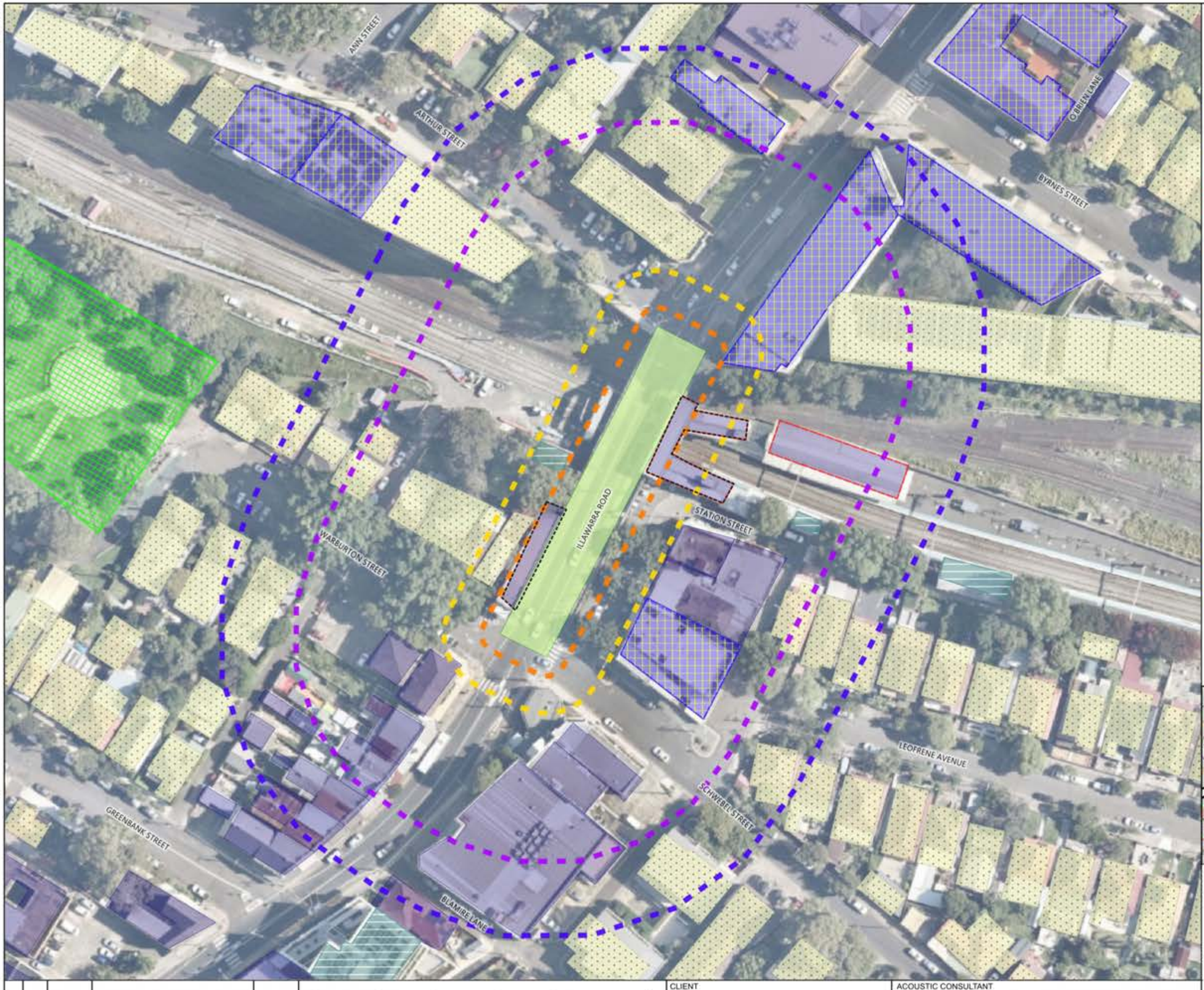
User: Dustin Auld



150 m
100
50
0

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- NCAs
- Receivers within MWD for cosmetic damage

Overbridge work areas

- Marrickville Station

MWD for cosmetic damage and human annoyance for Vibratory Roller (high vibration mode)

- Unreinforced structures (7.5mm/s ppv)
- Heritage structures (2.5mm/s ppv)
- Human annoyance - Residential (day)
- Human annoyance - Residential (night)

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

MWD
Work area: Marrickville Station
Plant: Vibratory Roller (high vibration mode)

REV	BY	DATE	DESCRIPTION	APPROVER
r1	DA	31/05/24	Updated legend	MT
r0	DA	10/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

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1:1,000

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Plot Date: 31/05/24 - 11:49
Layout: TN794 MWD
Atlas: Project work area
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User: Dustin Auld

150 m
100
50
0

LEGEND

Sensitive Receivers

- Residential
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- NCAs
- Receivers within MWD for cosmetic damage

Overbridge work areas

- Dulwich Hill Station

MWD for cosmetic damage and human annoyance for Vibratory Roller (high vibration mode)

- Unreinforced structures (7.5mm/s ppv)
- Heritage structures (2.5mm/s ppv)
- Human annoyance - Residential (day)
- Human annoyance - Residential (night)

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

MWD
Work area: Dulwich Hill Station
Plant: Vibratory Roller (high vibration mode)

REV	BY	DATE	DESCRIPTION	APPROVED
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r0	DA	10/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 16 32 48 64 m

1:1,000

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Plot Date: 31/05/24 - 11:50
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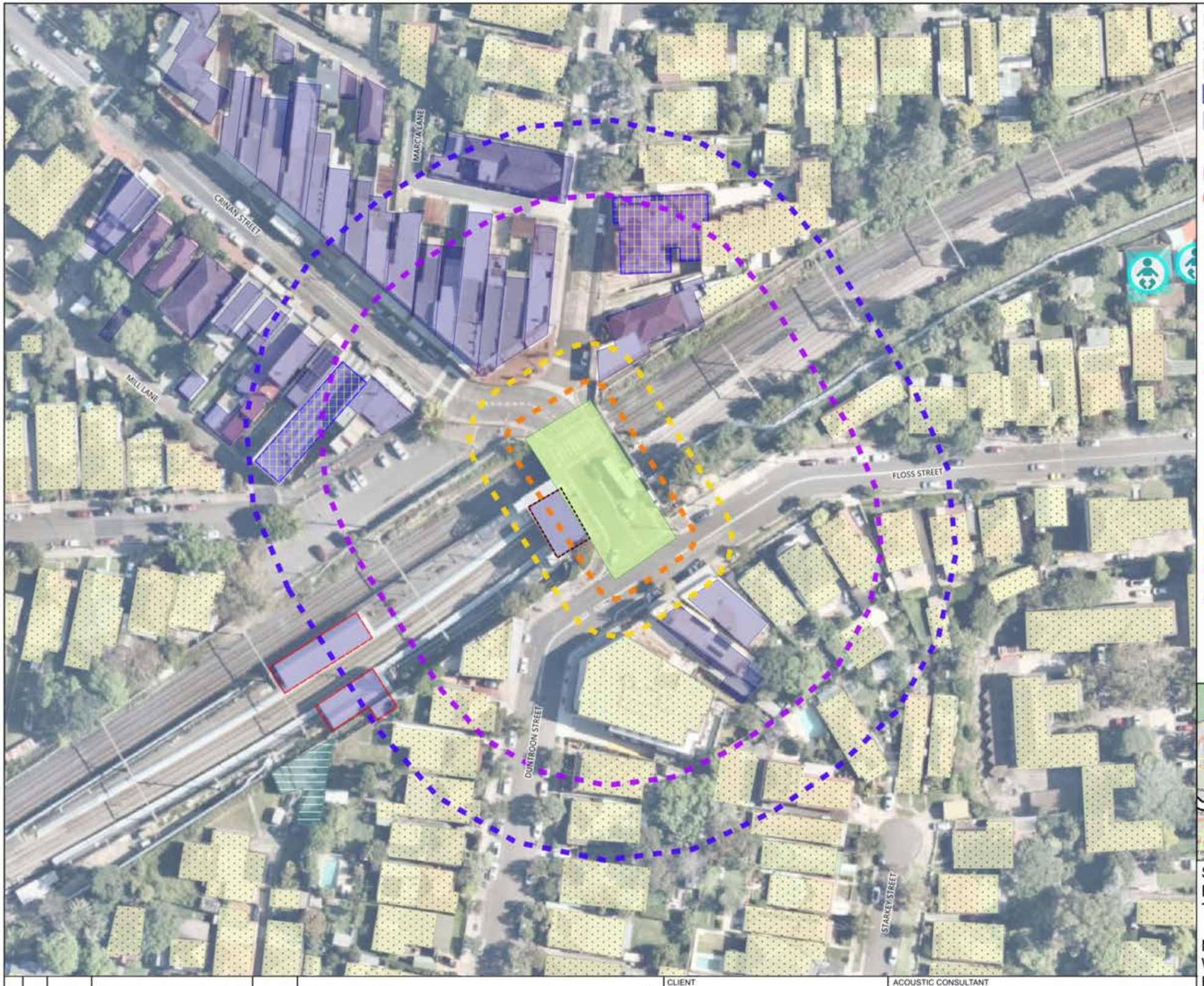

LEGEND

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Overbridge work areas

- Hurlstone Park Station

MWD for cosmetic damage and human annoyance for Vibratory Roller (high vibration mode)

- Unreinforced structures (7.5mm/s ppv)
- Heritage structures (2.5mm/s ppv)
- Human annoyance - Residential (day)
- Human annoyance - Residential (night)

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

MWD
Work area: Hurlstone Park Station
Plant: Vibratory Roller (high vibration mode)

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Updated legend	MT
r0	DA	10/04/2024	Prepare figures	AMo

A3 Original
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Layout: TN794 MWD
Atlas: Project work area
GIS File: R:\Assoc\Syd\Projects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- NCAs
- Receivers within MWD for cosmetic damage

Overbridge work areas

- Canterbury Station

MWD for cosmetic damage and human annoyance for Vibratory Roller (high vibration mode)

- Unreinforced structures (7.5mm/s ppv)
- Heritage structures (2.5mm/s ppv)
- Human annoyance - Residential (day)
- Human annoyance - Residential (night)

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

MWD
Work area: Canterbury Station
Plant: Vibratory Roller (high vibration mode)

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Updated legend	MT
r0	DA	10/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

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Atlas: Project work area
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LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- NCAs
- Receivers within MWD for cosmetic damage

Overbridge work areas

- Belmore Station

MWD for cosmetic damage and human annoyance for Vibratory Roller (high vibration mode)

- Unreinforced structures (7.5mm/s ppv)
- Heritage structures (2.5mm/s ppv)
- Human annoyance - Residential (day)
- Human annoyance - Residential (night)

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

MWD
Work area: Belmore Station
Plant: Vibratory Roller (high vibration mode)

REV	BY	DATE	DESCRIPTION	APPROVER
r1	DA	31/05/24	Updated legend	MT
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Atlas: Project work area
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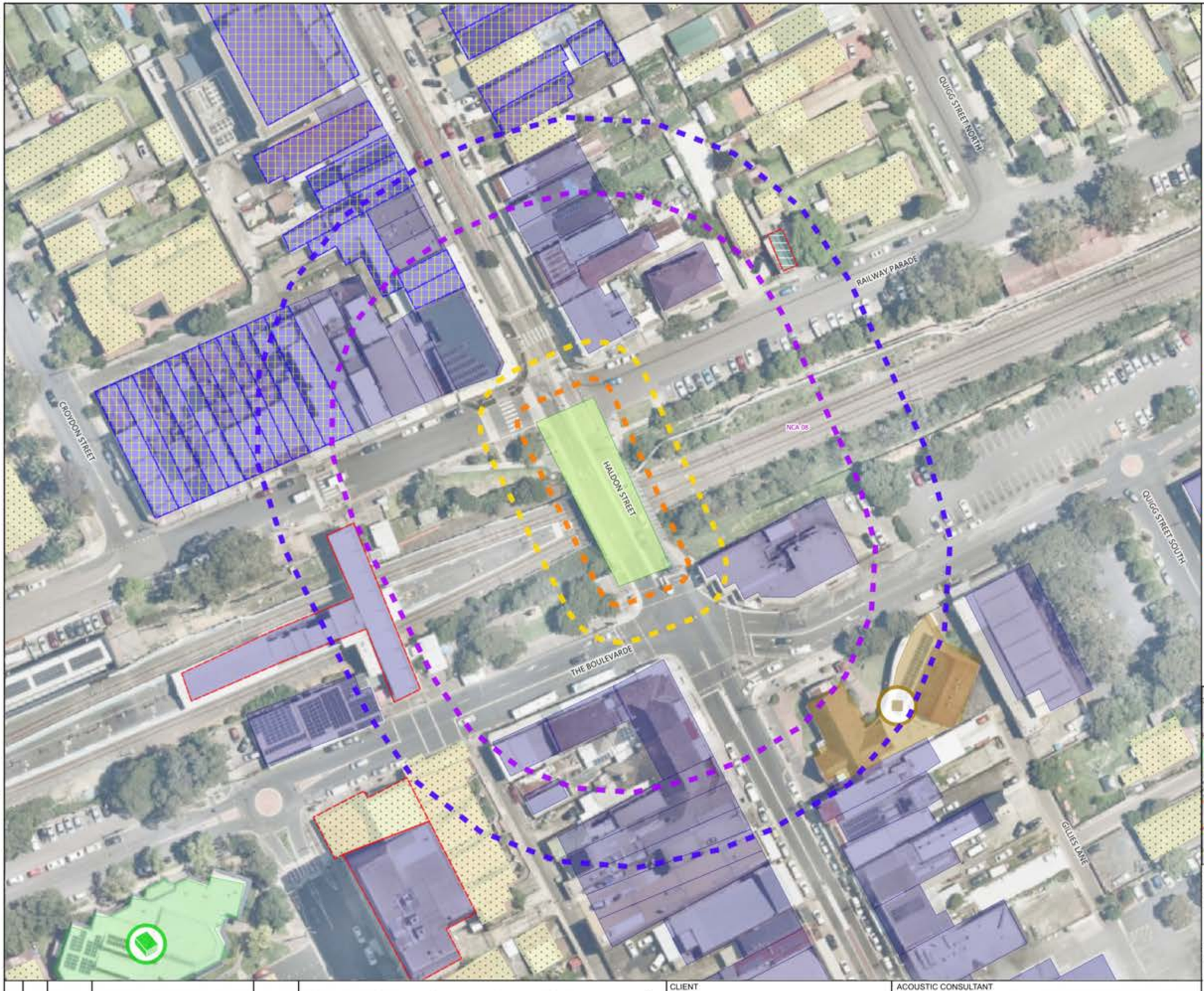

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LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Overbridge work areas

- Lakemba Station

MWD for cosmetic damage and human annoyance for Vibratory Roller (high vibration mode)

- Unreinforced structures (7.5mm/s ppv)
- Heritage structures (2.5mm/s ppv)
- Human annoyance - Residential (day)
- Human annoyance - Residential (night)

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

MWD
Work area: Lakemba Station
Plant: Vibratory Roller (high vibration mode)

REV	BY	DATE	DESCRIPTION	APPROVER
r1	DA	31/05/24	Updated legend	MT
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Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

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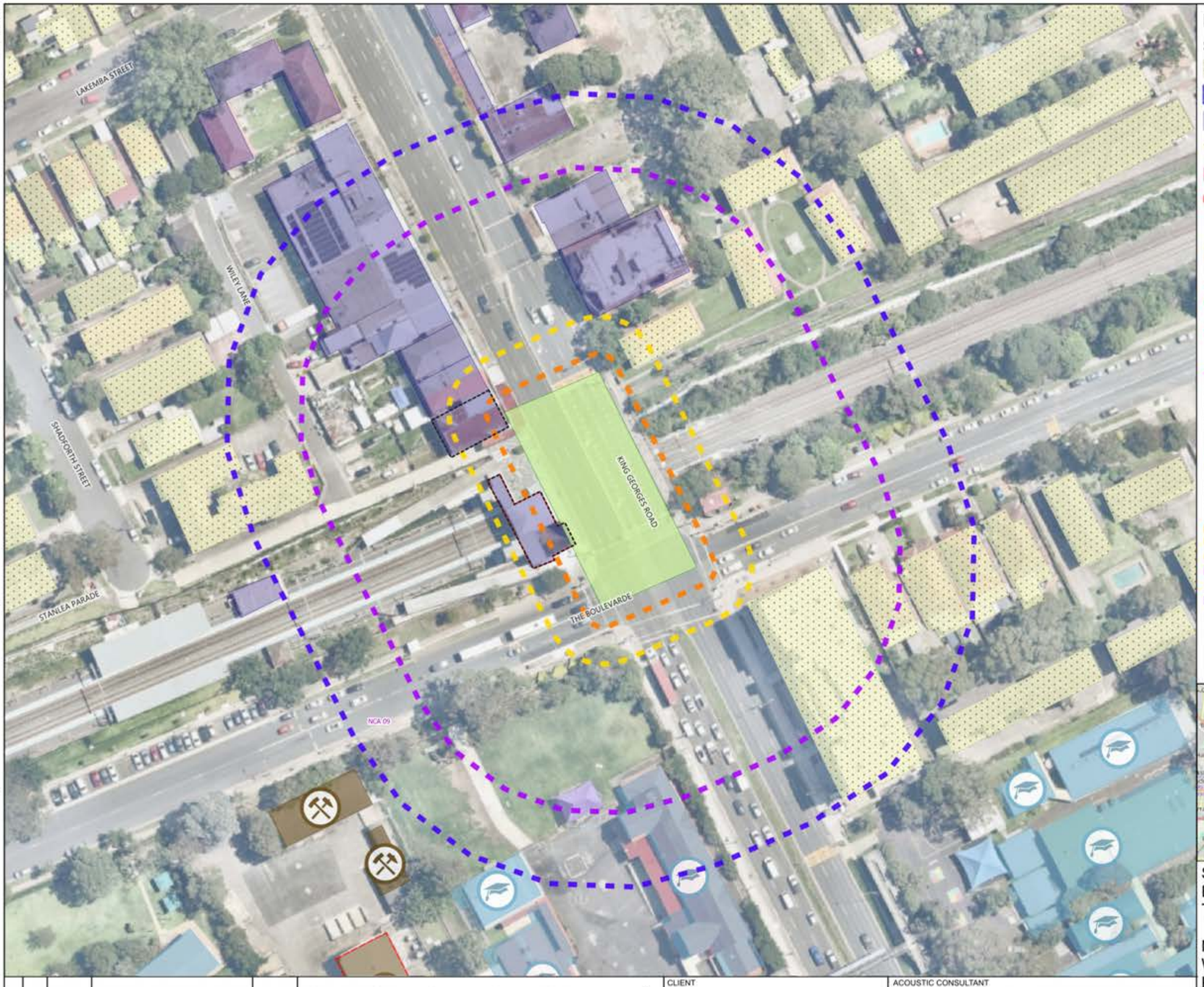

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- NCAs
- Receivers within MWD for cosmetic damage

Overbridge work areas

- Wiley Park Station

MWD for cosmetic damage and human annoyance for Vibratory Roller (high vibration mode)

- Unreinforced structures (7.5mm/s ppv)
- Heritage structures (2.5mm/s ppv)
- Human annoyance - Residential (day)
- Human annoyance - Residential (night)

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

MWD
Work area: Wiley Park Station
Plant: Vibratory Roller (high vibration mode)

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Updated legend	MT
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Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

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User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- NCAs
- Receivers within MWD for cosmetic damage

Overbridge work areas

- Punchbowl Station

MWD for cosmetic damage and human annoyance for Vibratory Roller (high vibration mode)

- Unreinforced structures (7.5mm/s ppv)
- Heritage structures (2.5mm/s ppv)
- Human annoyance - Residential (day)
- Human annoyance - Residential (night)

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

MWD
Work area: Punchbowl Station
Plant: Vibratory Roller (high vibration mode)

REV	BY	DATE	DESCRIPTION	APPROVED
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E.3 Predicted vibration impacts – non-station overbridge works

E.3.1 Number of receivers within MWD

Work area	Vibration significant plant	Number of buildings within minimum working distances							
		Structural damage to buildings			Disturbance to building occupants				
		Reinforced or frame structures	Unreinforced or light framed structures	Structurally unsound heritage structures	Critical areas	Residence – Day	Residence – Night	Offices	Workshops
Livingstone Road	Bored piling rig	3	3	0	0	5	5	0	0
	Excavator 25t (hammer attachment)	3	3	0	0	8	12	0	0
	Smooth drum roller (low vibration mode)	3	3	0	0	16	28	0	0
	Smooth drum roller (high vibration mode)	3	3	0	0	28	49	0	0
Albermarle Street	Bored piling rig	0	0	0	0	0	0	0	0
	Excavator 25t (hammer attachment)	0	0	0	0	4	10	0	0
	Smooth drum roller (low vibration mode)	0	0	0	0	14	22	0	0
	Smooth drum roller (high vibration mode)	0	0	0	0	22	43	0	0
Garnet Street	Bored piling rig	2	2	0	0	4	4	1	0
	Excavator 25t (hammer attachment)	2	2	0	0	7	11	1	0
	Smooth drum roller (low vibration mode)	2	2	0	0	14	24	1	0
	Smooth drum roller (high vibration mode)	2	2	0	0	24	43	2	0
Melford Street	Bored piling rig	0	0	0	0	0	0	0	0
	Excavator 25t (hammer attachment)	0	0	0	0	4	5	0	0
	Smooth drum roller (low vibration mode)	0	0	0	0	7	13	0	0

Work area	Vibration significant plant	Number of buildings within minimum working distances							
		Structural damage to buildings			Disturbance to building occupants				
		Reinforced or frame structures	Unreinforced or light framed structures	Structurally unsound heritage structures	Critical areas	Residence – Day	Residence – Night	Offices	Workshops
	Smooth drum roller (high vibration mode)	0	0	0	0	13	37	0	0
Loch Street	Bored piling rig	0	0	0	0	3	3	0	0
	Excavator 25t (hammer attachment)	0	0	0	0	8	13	0	0
	Smooth drum roller (low vibration mode)	0	0	0	0	13	25	0	0
	Smooth drum roller (high vibration mode)	0	0	0	0	25	40	0	0
Moreton Street	Bored piling rig	0	0	0	0	0	0	0	0
	Excavator 25t (hammer attachment)	0	0	0	0	2	5	0	0
	Smooth drum roller (low vibration mode)	0	0	0	0	9	17	0	0
	Smooth drum roller (high vibration mode)	0	0	0	0	17	32	0	0
Stacey Street	Bored piling rig	1	1	0	0	7	7	0	0
	Excavator 25t (hammer attachment)	1	1	0	0	9	12	1	0
	Smooth drum roller (low vibration mode)	1	1	0	0	20	28	1	0
	Smooth drum roller (high vibration mode)	1	1	0	0	28	42	1	0

E.3.2 MWD maps

Plot Date: 31/05/24 - 11:56
Layout: TN794 MWD
Atlas: Project work area
GIS File: R:\Assoc\Syd\Projects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- NCAs
- Receivers within MWD for cosmetic damage

Overbridge work areas

- Livingstone Road

MWD for cosmetic damage and human annoyance for Vibratory Roller (high vibration mode)

- Unreinforced structures (7.5mm/s ppv)
- Heritage structures (2.5mm/s ppv)
- Human annoyance - Residential (day)
- Human annoyance - Residential (night)

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

MWD
Work area: Livingstone Road
Plant: Vibratory Roller (high vibration mode)

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r1	DA	31/05/24	Updated legend	MT
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A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

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Atlas: Project work area
GIS File: R:\AssocSydProjects\TN751-TN800\TN794 mt SWM4\5 Calcs\00 GIS\TN794 - DA.qgz
User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- NCAs

Overbridge work areas

- Albermarle Street

MWD for cosmetic damage and human annoyance for Vibratory Roller (high vibration mode)

- Unreinforced structures (7.5mm/s ppv)
- Heritage structures (2.5mm/s ppv)
- Human annoyance - Residential (day)
- Human annoyance - Residential (night)

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

MWD
Work area: Albermarle Street
Plant: Vibratory Roller (high vibration mode)

REV	BY	DATE	DESCRIPTION	APPROVER
r1	DA	31/05/24	Updated legend	MT
r0	DA	10/04/2024	Prepare figures	AMo

A3 Original

Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

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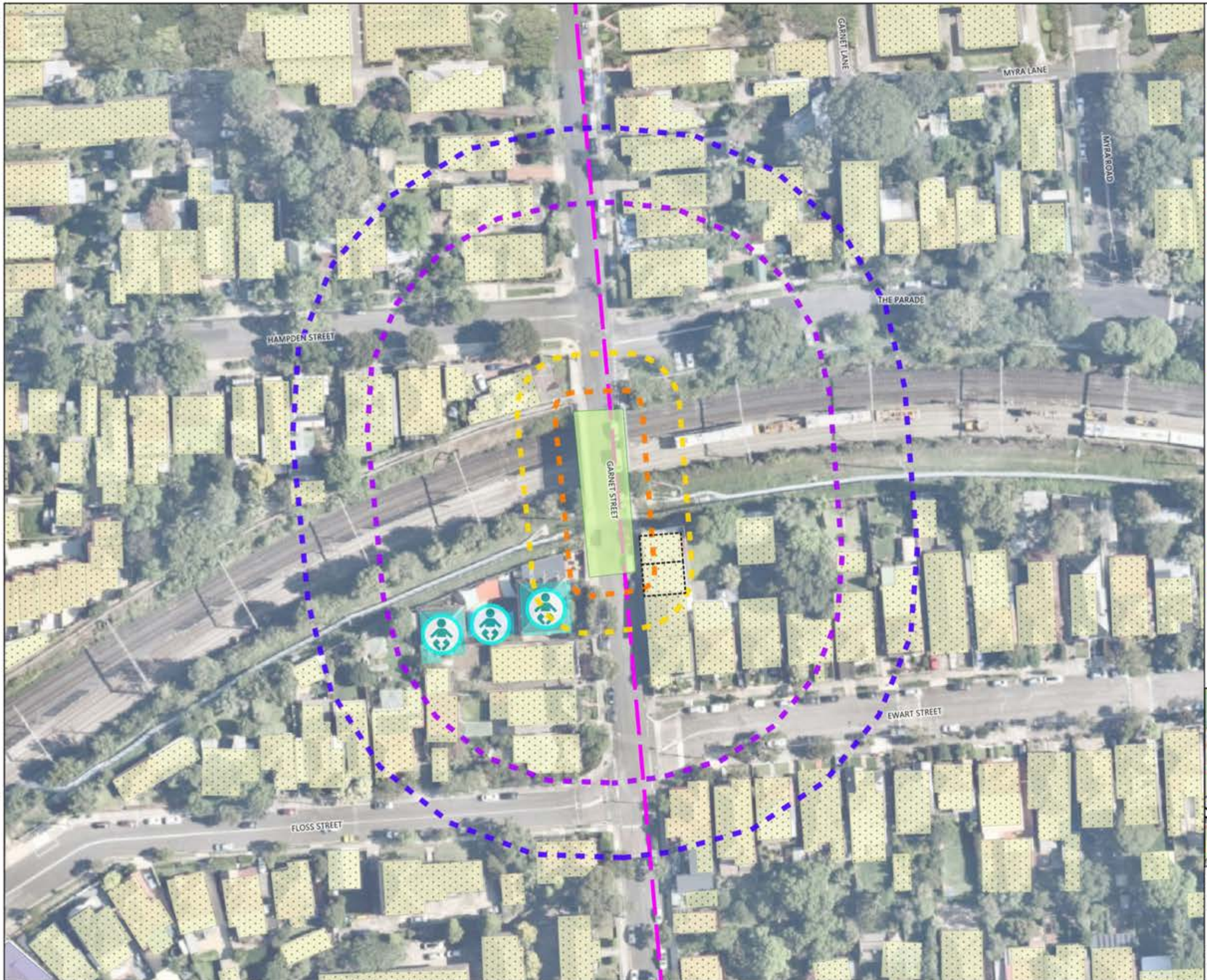

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- NCAs
- Receivers within MWD for cosmetic damage

Overbridge work areas

- Garnet Street

MWD for cosmetic damage and human annoyance for Vibratory Roller (high vibration mode)

- Unreinforced structures (7.5mm/s ppv)
- Heritage structures (2.5mm/s ppv)
- Human annoyance - Residential (day)
- Human annoyance - Residential (night)

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

MWD
Work area: Garnet Street
Plant: Vibratory Roller (high vibration mode)

REV	BY	DATE	DESCRIPTION	APPROVER
r1	DA	31/05/24	Updated legend	MT
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A3 Original | Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

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LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Overbridge work areas

- Melford Street

MWD for cosmetic damage and human annoyance for Vibratory Roller (high vibration mode)

- Unreinforced structures (7.5mm/s ppv)
- Heritage structures (2.5mm/s ppv)
- Human annoyance - Residential (day)
- Human annoyance - Residential (night)

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

MWD
Work area: Melford Street
Plant: Vibratory Roller (high vibration mode)

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Updated legend	MT
r0	DA	10/04/2024	Prepare figures	AMo

A3 Original

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LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Overbridge work areas

- Loch Street

MWD for cosmetic damage and human annoyance for Vibratory Roller (high vibration mode)

- Unreinforced structures (7.5mm/s ppv)
- Heritage structures (2.5mm/s ppv)
- Human annoyance - Residential (day)
- Human annoyance - Residential (night)

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

MWD
Work area: Loch Street
Plant: Vibratory Roller (high vibration mode)

REV	BY	DATE	DESCRIPTION	APPROVER
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r0	DA	10/04/2024	Prepare figures	AMo

0 16 32 48 64 m
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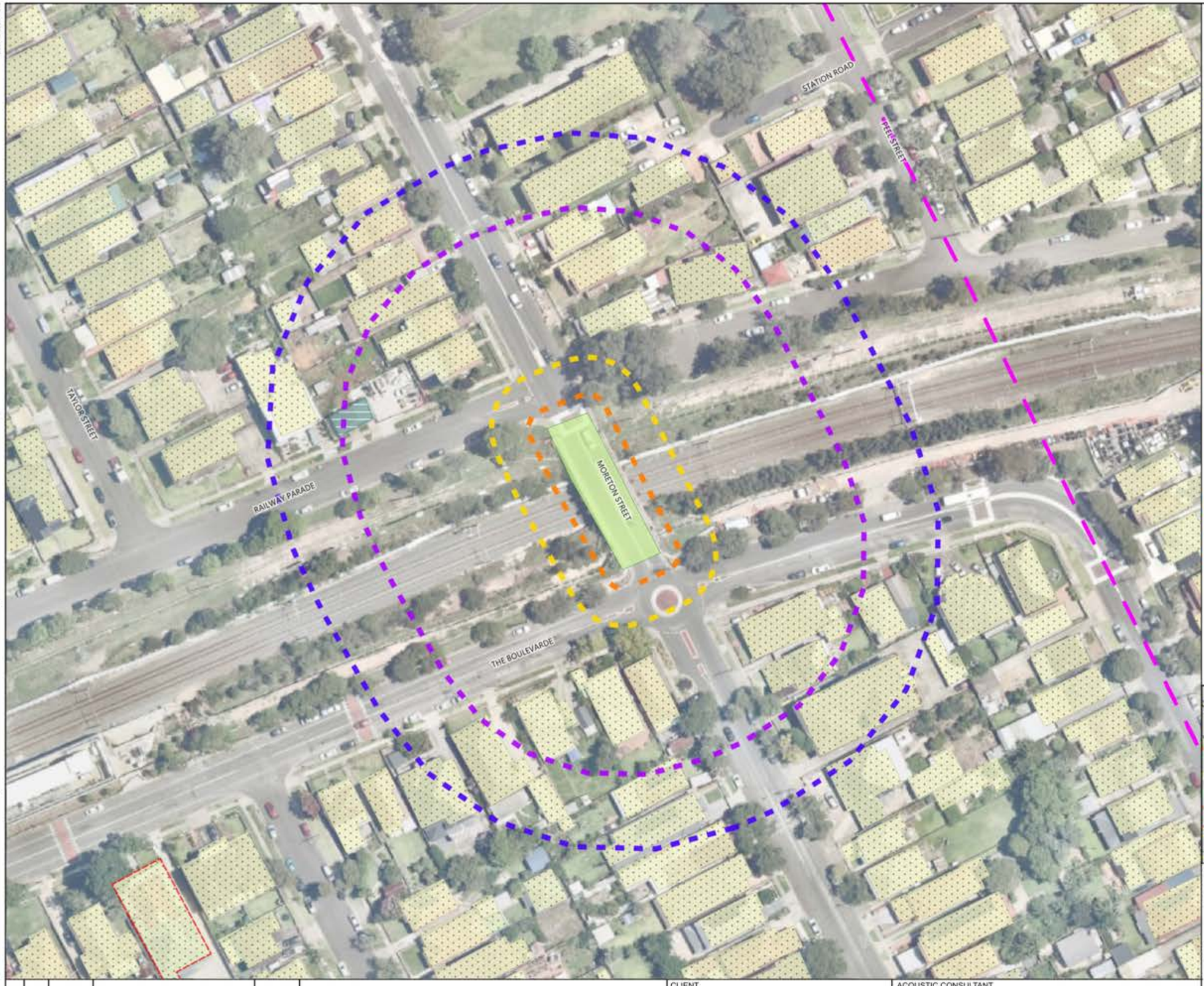

LEGEND

Sensitive Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NCAs

Overbridge work areas

Moreton Street

MWD for cosmetic damage and human annoyance for Vibratory Roller (high vibration mode)

- Unreinforced structures (7.5mm/s ppv)
- Heritage structures (2.5mm/s ppv)
- Human annoyance - Residential (day)
- Human annoyance - Residential (night)

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

MWD
Work area: Moreton Street
Plant: Vibratory Roller (high vibration mode)

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Updated legend	MT
r0	DA	10/04/2024	Prepare figures	AMo

A3 Original

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User: Dustin Auld

LEGEND

Sensitive Receivers

- Residential
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- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- NCAs
- Receivers within MWD for cosmetic damage

Overbridge work areas

- Stacey Street

MWD for cosmetic damage and human annoyance for Vibratory Roller (high vibration mode)

- Unreinforced structures (7.5mm/s ppv)
- Heritage structures (2.5mm/s ppv)
- Human annoyance - Residential (day)
- Human annoyance - Residential (night)

SWM4
Errant and Hostile Vehicle Mitigation Treatments CNVIS

MWD
Work area: Stacey Street
Plant: Vibratory Roller (high vibration mode)

REV	BY	DATE	DESCRIPTION	APPROVED
r1	DA	31/05/24	Updated legend	MT
r0	DA	10/04/2024	Prepare figures	AMo

A3 Original
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inspired to achieve
Ph (02) 8218 0500 Fax (02) 8218 0501

APPENDIX F Community consultation register

F.1 Evidence of receiver specific consultation

Provided as a spreadsheet table to allow to Martinus Rail to update with ongoing community consultation.

APPENDIX C – Sydney Metro Out-of-Hours Works Application Example

Out of hours work application form

This form is to be used for formal review and approval of out of hours (OOH) work as it may affect Residential and non-residential receivers. This form can be used in accordance with the SM-17-00005396 City & Southwest out of hours work 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. City & Southwest, Greater West. 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 10pm every day.
- **Night Time OOH:** 10pm to 7am weekday mornings and 10pm to 8am weekend and Public Holiday mornings.

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: Consideration of Additional Mitigation Measures	Use Table 4 and the exceedances in Table 3 to determine the applicable Additional Mitigation Measures for consideration. Use 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, small front end loader	70
	Light vehicle, hand-tools (no impact), small cement mixer, attenuated generator (inside housing)	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)			
	0 to 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 any 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 D – Consultation Records

Initial email to CBC

From: Phillip Matevski <phillip.matevski@martinus.com.au>
Sent: Friday, 12 July 2024 9:45 AM
To: Imran Khan <imran.khan@cbcity.nsw.gov.au>; Metro <metro@cbcity.nsw.gov.au>
Cc: Sam Ford <Samaneh.Ford@transport.nsw.gov.au>
Subject: Sydney Metro southwest EHVMT - CEMP Subplan consultation
Importance: High

Dear Imran,

Thank you for your time on the phone a couple weeks ago regarding our request for your review of several of our Construction Environmental Management Sub-plans.

The following Sub-plans are attached for your review and/or comment:

- Noise and Vibration Management Subplan
- Heritage Management Subplan
- Waste and Recycling Management Sub-plan.

For reference, I will briefly summarise the scope of works for our project.

The Southwest Metro works will convert and upgrade the existing T5 Bankstown Line between Sydenham station to Bankstown station to Sydney Metro standards. To meet the test level safety standards for Sydney Metro operations, the Southwest Metro project requires the delivery of safety critical works to secure critical points from errant and hostile vehicles at station overbridges, non-station overbridges and non-bridge locations along the Southwest Metro rail corridor.

Martinus will be delivering the scope of the Construction of Errant and Hostile Vehicle Mitigation Treatments, generally including:

- Errant vehicle mitigation (EVM) treatments consisting of:
  - Eight (8) station overbridge barriers
  - Seven (7) non-station road-over-rail overbridge barriers; and
  - 67 non-bridge locations along the southwest corridor
- Hostile vehicle mitigation (HVM) treatments in the eight (8) station precincts
- Road upgrades (kerbside ramps) across various locations
- Fencing, finishing works and other streetscaping elements across various locations
- Remediation works.

As discussed, we would appreciate your review of our attached Sub-plans at your earliest convenience.

Any questions at all throughout your review process, please feel free to call or contact me at any time.

Kind regards,

Phil Matevski | Environment and Sustainability Manager
M 0420 353 980 | W www.martinusrail.com.au
MARTINUS

Response email from CBC

RE: Sydney Metro southwest EHVMT - CEMP Subplan consultation

Phillip Matevski
To: Imran Khan; Metro
Cc: Sam Ford; Shelley Addison-Bell

This message is part of a tracked conversation. Click here to find all related messages or to open the original flagged message.

Sydney Metro EHVMT - Complaints Management.png .png File

Hi Imran,

Thank you for providing the below feedback from CBC's SMEs.

- Heritage Management Subplan (HMP) – please feel free to share the HMP with CBC's Aboriginal Liaison Officer. If you require any further action from our end, please let me know.
- Noise and Vibration Management Subplan (NVMP) – Shelley Addison-Bell is the Community Manager for the project, Shelley's contact details are below:

MARTINUS

I have also attached our complaints management procedure that the project will adhere to.

If you require any further information or have any questions, please forward through to myself and Shelley and we will endeavour to respond as soon as we can.

Kind regards,

Phil Matevski | Environment and Sustainability Manager
M 0420 353 980 | W www.martinusrail.com.au
MARTINUS

From: Imran Khan <imran.khan@cbcity.nsw.gov.au>
Sent: Monday, August 12, 2024 3:44 PM
To: Phillip Matevski <phillip.matevski@martinus.com.au>; Metro <metro@cbcity.nsw.gov.au>
Cc: Sam Ford <Samaneh.Ford@transport.nsw.gov.au>
Subject: RE: Sydney Metro southwest EHVMT - CEMP Subplan consultation

Hi Phillip,

The comments provided by council SME's :

- **Sydney Metro southwest EHVMT - CEMP Subplan consultation - Heritage Management sub-plan** : No comment. NOTE: The report should however be referred to Council's Aboriginal Liaison Officer for review and comment (if not already done so) given there are Aboriginal management measures proposed.
- **Sydney Metro southwest EHVMT - CEMP Subplan consultation - Noise and Vibration Management Sub-plan :** 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.

Regards,

Imran Khan - Project Engineer
T 02 9707 9051
E imran.khan@cbcity.nsw.gov.au

Closure email from CBC

RE: Sydney Metro southwest EHVMT - CEMP Subplan consultation

IK

Imran Khan <Imran.Khan@cbcity.nsw.gov.au>
To Phillip Matevski; Metro
Cc Sam Fard; Shelley Addison-Bell

This sender Imran.Khan@cbcity.nsw.gov.au is from outside your organization.

This message is part of a tracked conversation. Click here to find all related messages or to open the original flagged message.

HI Phillip,

The council has no issue with the complaints management.

Regards,

Imran Khan - Project Engineer
T 02 9707 9081
E Imran.Khan@cbcity.nsw.gov.au
www.cbcity.nsw.gov.au

CANTERBURY BANKSTOWN

@ourcbcity
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The City of Canterbury Bankstown acknowledges the traditional custodians of the land, water and skies of Canterbury-Bankstown, the Darug (Darag, Dharug, Daruk, Dharuk) People. We recognise and respect Darug cultural heritage, beliefs and relationship with the land. We acknowledge the First Peoples' continuing importance to our CBCity community.

From: Phillip Matevski <phillip.matevski@martinus.com.au>
Sent: Wednesday, 14 August 2024 2:20 PM
To: Imran Khan <Imran.Khan@cbcity.nsw.gov.au>; Metro <metro@cbcity.nsw.gov.au>
Cc: Sam Fard <Samaneh.Fard@transport.nsw.gov.au>; Shelley Addison-Bell <shelley.addison-bell@martinus.com.au>
Subject: RE: Sydney Metro southwest EHVMT - CEMP Subplan consultation

Hi Imran,

Thank you for providing the below feedback from CBC's SMEs.

Closure email from IWC

RE: EXTERNAL/2024/0015 - RE: Sydney Metro Southwest - Inner West Council Comments

MA Martin Amy <Martin.Amy@innerwest.nsw.gov.au>
To Phillip Matevski
Cc Tom Stanistreet; Conor Wilson; Minna Kilpelainen

This sender Martin.Amy@innerwest.nsw.gov.au is from outside your organization.

Follow up. Start by Friday, 23 August 2024. Due by Friday, 23 August 2024.
Click here to download pictures. To help protect your privacy, Outlook prevented automatic download of some pictures in this message.

Hi Philip,

Thank you for the responses. We acknowledge those responses and any further information that will be shared/submitted to us in the future.

Regarding the Traffic and Transport Management Plan we are currently reviewing it and will provide any comments as necessary. If any comments are needed, we will provide them by the end of next week.

Thanks and have a good weekend,

Martin Amy
Development Assessment Manager (North)
p +61 2 9392 5000 e Martin.Amy@innerwest.nsw.gov.au

Right-click or tap and hold here to download pictures. To help protect your privacy, Outlook prevented automatic download of this picture from the Internet.
Inner West Council

Council acknowledges the Traditional Custodians of these lands, the Gadigal-Wangal people of the Eora Nation.

Right-click or tap and hold here to download pictures. To help protect your privacy, Outlook prevented automatic download of this picture from the Internet.
Built Environment Awards

From: Phillip Matevski <phillip.matevski@martinus.com.au>
Sent: Friday, 16 August 2024 9:13 PM
To: Martin Amy <Martin.Amy@innerwest.nsw.gov.au>
Cc: Tom Stanistreet <tom.stanistreet@innerwest.nsw.gov.au>; Conor Wilson <conor.wilson@innerwest.nsw.gov.au>; Minna Kilpelainen <minna.kilpelainen@innerwest.nsw.gov.au>
Subject: EXTERNAL/2024/0015 - RE: Sydney Metro Southwest - Inner West Council Comments

Dear Martin,

Please find our following responses to comments made to our several Sub-plans:

Noise and Vibration Management Plan

- While the developments are likely to have amenity impacts, the measures presented in Section 8 of the report will minimise the impacts to sensitive receivers.
  Noted.
- In addition to the provided six-monthly Construction Monitoring Reports, we also request that a report outlining the complaints being received and the actions taken as a result be provided.
  Martinus will provide a report summarising the complaints received and the actions taken as a result.

Waste and Recycling Management Plan