



14/02/2022


Construction Environmental Management Plan

ST MARY'S - TEMPORARY BUS INTERCHANGE

725.MAN.04.CEMP

Rev 2.2

APPROVAL

Process	Process Owner Name	Approval Signature
Ward Approval	Patrick McMahon	

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DOCUMENT AND RECORD CONTROL

Document control, including approval and the handling of superseded versions, shall be in accordance with the **Document Control** procedure.

REFERENCE TO SUPPORTING WARD DOCUMENTATION

Documents required to complete the tasks in this procedure are referenced in **bold** throughout the procedure. Refer to the Related Documents section for the corresponding document numbers.

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CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN COMPLIANCE MATRIX

Table 1 CEMP CoA Compliance Matrix

Condition Reference	Condition Requirement	Document Reference															
Conditions of Approval SSI 10051																	
C1	Construction Environmental Management Plans (CEMPs) and CEMP Sub-plans must be prepared in accordance with the Construction Environmental Management Framework (CEMF) included in the documents listed in Condition A1 to detail how the performance outcomes, commitments and mitigation measures specified in the documents listed in Condition A1 will be implemented and achieved during construction	This document fulfils the requirements of C1. The Compliance Matrix in Appendix A tracks these requirements.															
C3	The CEMP(s) not requiring the Planning Secretary's approval must be submitted to the ER for endorsement no later than one (1) month before the commencement of construction or where construction is staged no later than one (1) month before the commencement of that stage. That CEMP must obtain the endorsement of the ER as being consistent with the conditions of this approval and all undertakings made in the documents listed in Condition A1	Section 1.1															
C10	Construction must not commence until the CEMP and all CEMP Sub-plans have been approved by the Planning Secretary or endorsed by the ER (whichever is applicable), unless otherwise agreed by the Planning Secretary. The CEMP and CEMP Sub-plans, as approved by the Planning Secretary or endorsed by the ER (whichever is applicable), including any minor amendments approved by the ER, must be implemented for the duration of construction	Section 1.1															
C13	The following Construction Monitoring Programs must be prepared in consultation with the relevant government agencies (as required by Condition A6) identified for each to compare actual performance of construction of the CSSI against the performance predicted in the documents listed in Condition A1 or in the CEMP. Where a government agency(ies) request(s) is not included, the Proponent must provide the Planning Secretary / ER (whichever is applicable) justification as to why. <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>Required Construction Monitoring Programs</th> <th>Relevant government agencies to be consulted for each Construction Monitoring Program</th> </tr> </thead> <tbody> <tr> <td>(a)</td> <td>Noise and vibration</td> <td>Relevant Councils and WaterNSW (in relation to its assets)</td> </tr> <tr> <td>(b)</td> <td>Surface water quality</td> <td>DPIE Water, DPI Fisheries, and Relevant Councils</td> </tr> <tr> <td>(c)</td> <td>Groundwater</td> <td>DPIE Water</td> </tr> <tr> <td>(d)</td> <td>Air Quality</td> <td>Relevant Councils</td> </tr> </tbody> </table>		Required Construction Monitoring Programs	Relevant government agencies to be consulted for each Construction Monitoring Program	(a)	Noise and vibration	Relevant Councils and WaterNSW (in relation to its assets)	(b)	Surface water quality	DPIE Water, DPI Fisheries, and Relevant Councils	(c)	Groundwater	DPIE Water	(d)	Air Quality	Relevant Councils	a) Refer to Noise and management procedure b) Section 11 c) Groundwater management not required as per staging report d) Section 12
	Required Construction Monitoring Programs	Relevant government agencies to be consulted for each Construction Monitoring Program															
(a)	Noise and vibration	Relevant Councils and WaterNSW (in relation to its assets)															
(b)	Surface water quality	DPIE Water, DPI Fisheries, and Relevant Councils															
(c)	Groundwater	DPIE Water															
(d)	Air Quality	Relevant Councils															
C14	Each Construction Monitoring Program must provide: (a) details of baseline data available including the period of baseline monitoring; (b) details of baseline data to be obtained and when; (c) details of all monitoring of the project to be undertaken; (d) the parameters of the project to be monitored; (e) the frequency of monitoring to be undertaken; (f) the location of monitoring;	Requirements included in Section 3.14.6															

Condition Reference	Condition Requirement	Document Reference
	<p>(g) the reporting of monitoring results and analysis results against relevant criteria;</p> <p>(h) details of the methods that will be used to analyse the monitoring data;</p> <p>(i) procedures to identify and implement additional mitigation measures where the results of the monitoring indicated unacceptable project impacts;</p> <p>(j) a consideration of SMART principles;</p> <p>(k) any consultation to be undertaken in relation to the monitoring programs; and</p> <p>(l) any specific requirements as required by Conditions C15 to C16.</p>	
C15	<p>The Noise and Vibration Construction Monitoring Program must include:</p> <p>(a) noise and vibration monitoring at representative residential and other locations (including at the worst- affected residences), subject to property owner approval, to confirm construction noise and vibration levels;</p> <p>(b) monitoring undertaken during the day, evening and night-time periods throughout the construction period and cover the range of activities being undertaken;</p> <p>(c) method and frequency for reporting monitoring results; and</p> <p>(d) a process to undertake real time noise and vibration monitoring.</p> <p>The results of the monitoring must be readily available to the construction team, the Proponent and ER. The Planning Secretary and EPA must be provided with access to the results on request</p>	Section 3.14.6
C16	<p>Groundwater Construction Monitoring Program must include:</p> <p>(a) groundwater monitoring networks at each construction excavation site predicted to intercept groundwater in the documents listed in Condition A1;</p> <p>(b) detail of the location of all monitoring bores with nested sites to monitor both shallow and deep groundwater levels and quality;</p> <p>(c) define the location of saltwater interception monitoring where sentinel groundwater monitoring bores will be installed between the saline sources and that of each construction excavation site predicted to intercept groundwater in the documents listed in Condition A1;</p> <p>(d) results from existing monitoring bores;</p> <p>(e) monitoring and gauging of groundwater inflow to the excavations predicted to intercept groundwater in the documents listed in Condition A1, appropriate trigger action response plan for all predicted groundwater impacts upon each noted neighbouring groundwater system component for each excavation construction site;</p> <p>(f) trigger levels for groundwater quality, salinity and groundwater drawdown in monitoring bores and / or other groundwater users;</p> <p>(g) daily measurement of the amount of water discharged from the water treatment plants;</p> <p>(h) water quality testing of the water discharged from treatment plants;</p> <p>(i) management and mitigation measures and criteria, including measures to address impacts on groundwater dependent ecosystems;</p> <p>(j) groundwater inflow to the excavations to enable a full accounting of the groundwater take from the Sydney Basin Central Groundwater Source;</p> <p>(k) reporting of groundwater gauging at excavations, groundwater monitoring, groundwater trigger events and action responses; and</p> <p>(l) methods for providing the data collected to Sydney Water where discharges are directed to their assets.</p>	Groundwater management not required as per staging report
C17	With the exception of any Construction Monitoring Programs expressly nominated by the Planning Secretary to be endorsed by the ER, all	NA – In accordance with the staging report

Condition Reference	Condition Requirement	Document Reference
	Construction Monitoring Programs must be submitted to the Planning Secretary for approval.	
C18	The Construction Monitoring Programs not requiring the Planning Secretary's approval must obtain the endorsement of the ER as being in accordance with the conditions of approval and all undertakings made in the documents listed in Condition A1. Any of these Construction Monitoring Programs must be submitted to the ER for endorsement at least one (1) month before the commencement of construction or where construction is staged no later than one (1) month before the commencement of that stage	Section 3.14.6
C20	Unless otherwise agreed with the Planning Secretary, construction must not commence until the Planning Secretary has approved, or the ER has endorsed (whichever is applicable), all of the required Construction Monitoring Programs and all relevant baseline data for the specific construction activity has been collected	Section 3.14.6
C21	The Construction Monitoring Programs, as approved by the Planning Secretary or the ER has endorsed (whichever is applicable), 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 or the ER (whichever is applicable), whichever is the greater	Section 3.14.6
C22	The results of the Construction Monitoring Programs must be submitted to the Planning Secretary, ER and relevant regulatory agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program. Note: Where a relevant CEMP Sub-plan exists, the relevant Construction Monitoring Program may be incorporated into that CEMP Sub-plan.	Section 3.14.6

Table 2 CEMP CEMF Compliance Matrix

CEMF Reference	Requirement	Document Reference
<i>Construction Environmental Management Framework</i>		
3.4 (c)	Principal Contractors are required to prepare and implement a Construction Environmental Management Plan (CEMP) relevant to the scale and nature of their off-airport scope of works. The CEMP shall comprise of a main CEMP document, issue specific sub plans, activity specific procedures and site based control maps. The CEMP shall illustrate the relationship between other plans required by the contract, in particular those that relate to design management. The CEMP will address the specific requirements of scope of works and address the off-airport environmental requirements.	This document fulfils this requirement
3.4 (d)	Depending on the scope and scale of the works, Sydney Metro may decide to streamline the CEMP and sub-plan requirements for off-airport works. For example, depending on the risk associated with particular environmental issues it may be appropriate to remove the need for a sub plan, or replace with a procedure as part of the CEMP. The CEMP and sub-plan requirements from this	Section 3.4 developed in accordance with the staging report

CEMF Reference	Requirement	Document Reference
	CEMF for each construction stage / contract will be detailed in the Staging Report / Construction (Rail) Plan for the project	
3.4 (e)	Environmental documentation prepared for works within the on-airport site will be in accordance with the approved SM-WSA on-airport CEMPs	N/A works are undertaken off-airport
3.4 (f)	The Principal Contractor CEMP will cover the requirements of the relevant planning approval documentation, the conditions of all other permits and licences, the Principal Contractor's corporate EMS, the environmental provisions of the contract documentation and this Construction Environmental Management Framework	Section 3.1
3.4 (g)	As a minimum the Principal Contractor CEMP will:	
i	Include a contract specific environmental policy	APPENDIX B
ii	Include a description of activities to be undertaken during construction;	Section 1.5
iii	For each plan under the CEMP include a matrix of the relevant SSI Conditions of Approval referencing where each requirement is addressed	Included within Noise and Vibration Management Procedure - APPENDIX J
iv	For each plan under the CEMP, set objectives and targets, and identify measurable key performance indicators in relation to these	Included within Noise and Vibration Management Procedure - APPENDIX J
v	For each role that has environmental accountabilities or responsibilities, including key personnel, provide a tabulated description of the authority and roles of key personnel, lines of responsibility and communication, minimum skill level requirements and their interface with the overall project organisation structure	Section 3.3
vi	Assign the responsibility for the implementation of the CEMP to the Environment Manager, who will have appropriate experience. The Principal Contractor's Project Director will be accountable for the implementation of the CEMP	Section 3.3
vii	Identify communication requirements, including liaison with stakeholders and the community	Section 4
viii	Include induction and training requirements and a summary of the Training Needs Analysis required in Section 3.11(b)	Section 3.11.1
ix	Management strategies for environmental compliance and review of the performance of environmental controls	Section 3.14
x	Procedures for environmental inspections and monitoring, auditing and review, and reporting on environmental performance including environmental compliance tracking	Section 3.14
xi	Include an annual schedule for auditing the CEMP and Sub-Plans that is updated at least monthly	Section 3.14.8

CEMF Reference	Requirement	Document Reference
xii	Include procedures for emergency and incident management, non-compliance management, and corrective and preventative action; and	Section 3.13 Section 3.15
xiii	Include procedures for the control of environmental records	Section 3.16
3.4 (h)	The Principal Contractor CEMP and associated sub-plans will be reviewed by Sydney Metro prior to any construction works commencing. For off-airport works approved under the CSSI, the independent environmental representative (see Section 3.13) will also review the CEMP	Section 1.1
3.4 (i)	Where a corresponding systems document exists within the Sydney Metro Integrated Management System, the Principal Contractor's procedures will be required to be consistent with any requirements in those documents	Section 3.4

Table 3 CEMP Revised Mitigation Measure Matrix

Clause	Requirement	Document Reference
<i>Revised Mitigation Measures</i>		
Nil	NA	NA

Table 4 CEMP Staging Report (Table 5) Matrix

CEMF Topic	Requirement	Document Reference
<i>Staging Report (Table 5)</i>		
Spoil	N/A	NA
Groundwater	N/A	NA
Noise & Vibration	CEMP – P*	Included within Noise and Vibration Management Procedure - APPENDIX J
Non-Aboriginal Heritage	CEMP	Section 8
Aboriginal Cultural Heritage Management Plan	Implement approved / updated ACHMP in accordance with CoA	Section 8
Flora and Fauna / Biodiversity	CEMP	Section 9
Visual Amenity	CEMP	Section 10
Carbon and Energy	N/A	Not required in accordance with Staging Report

CEMF Topic	Requirement	Document Reference
Materials	N/A	Not required in accordance with Staging Report
Soil & Water	CEMP*	Section 11
Air Quality	CEMP*	Section 12
Waste (and recycling)	CEMP	Section 12.4
Bushfire Management Plan	N/A	Not required in accordance with Staging Report
Cumulative Construction Impacts Plan	N/A	Not required in accordance with Staging Report
Workforce Development	WFDIP Plan	Developed by TfNSW

* CEMP / procedure will include monitoring requirements as relevant and proportionate to the potential risk posed by the activities within that sub-stage

1. INTRODUCTION

1.1. Purpose of this plan

This Construction Environmental Management Plan (CEMP) details environmental management measures, controls, resources and responsibilities required during the Advanced and Enabling Works (AEW) St Marys – Temporary Bus Interchange (TBI) (the Project) for the Sydney Metro – Western Sydney Airport (SM – WSA) to comply with all the requirements of relevant legislation, conditions of the contract, approvals and permits.

The SM-WSA was deemed as Critical State Significant Infrastructure and was approved for construction on 23 July 2021 by the Minister for Planning and Public Spaces (Application no: CSSI 10051). The Project is undertaken in accordance with this Approval.

In accordance with the Staging Report for the SM-WSA, AEW's for the SM-WSA are required to establish key construction sites and facilitate construction activities. The Project is included within the Staging Report as AEW – St Marys Temporary Bus Interchange.

The CEMP has been developed in accordance with the following:

- Ward Civil and Environmental Engineering (Ward) Environmental Management System (EMS) [W-EN-REF-001]
- SM - WSA's Construction Environmental Management Framework
- The department of Environment and planning's Guideline for the preparation of Environmental Management Plans

The purpose of this CEMP is:

- To provide a framework demonstrating and describing how Ward intends to undertake all Project construction activities in an environmentally sustainable manner that minimises impacts to the physical, biological, cultural and social environment.
- To evaluate Environmental aspects and potential environmental impacts at the planning stage and to ensure such impacts are minimised or avoided during the construction phase;
- To comply with relevant legislative requirements and any licences, permits or other approvals applicable to the Project;
- To ensure appropriate environmental management measures and controls are implemented during the construction phase; and
- To ensure that all Project personnel and sub-contractors involved in the Project are aware of their environmental responsibilities and are proactive in their approach to environmental management.

The CEMP applies to all works and activities to be undertaken by the Ward Project Team including sub-contractors. It is a requirement, therefore, that all Project personnel including sub-contractors comply with the CEMP and its requirements.

The CEMP has been developed to meet the requirements of the following documents:

- Project Conditions of Approval (Sydney Metro Western Sydney Airport – CSSI 10051 Conditions of Approval)
- SM - WSA's Construction Environmental Management Framework (CEMF)
- SM – WSA's Construction Traffic Management Framework
- SM – WSA's Construction Noise and Vibration Standard
- SM – WSA's Overarching Community Communications Strategy
- SM – WSA's Staging Report (Table 4 – Applicability of requirements relating to CEMP environmental management categories – AEW)
- Revised Environmental Mitigation Measures (REMMs)

- Environmental Performance Outcome (EPO)
- Contract requirements

In accordance with the Staging Plan, this management plan will be submitted and reviewed by:

- TfNSW (Ward's client)
- Sydney Metro – Western Sydney Airport
- Project Environmental Representative (ER) (Condition of Approval - C2)

In accordance with the CEMF, this CEMP will be reviewed by SM-WSA.

This plan is to be submitted to the ER for endorsement no later than one (1) month before the commencement of construction. Construction cannot commence until the CEMP has been endorsed and approved by the ER.

1.1.1. Project Implementation

Transport for New South Wales (TfNSW) (Principal Contractor) has been engaged by SM-WSA (Proponent) to construct the TBI. Ward have been engaged by TfNSW to construct the TBI on behalf of TfNSW. Refer to Section 3.3 for further details on roles and responsibilities.

1.2. Objective of this Plan

The key objective of this CEMP is to provide a management approach to manage and mitigate potential environmental impacts during construction of this Project (AEW – Temporary Bus Interchange). Key applicable environmental performance outcomes, commitments and mitigation measures for the Project have been sourced from the project's EIS, CEMF and Appendix C of the Staging Report and are summarised in Table 5.

Table 5 Key Objective and Targets

Environmental Performance Objective Topic	Environmental Performance Objective	Triggered in Staging Report	Target	Management Measure
<p><u>Supporting the provision of successful places -the project is integrated with and enhances the environment where it is located, including improved accessibility and connectivity for communities</u></p>	<p>The Applicable – Western Sydney Airport Design Guidelines and Design Quality Framework are implemented to deliver a rail corridor, stations and ancillary facilities that achieve the project vision and design objectives</p>	Yes	<p>The TBI will be built in accordance with the design prepared by SM-WSA/TfNSW that is consistent with the appropriate design guidelines.</p> <p>The TBI facility is a temporary infrastructure solution to allow the permanent construction of the SM – WSA Metro St Marys Station which will be designed by SM-WSA to meet the applicable design guidelines.</p>	<p>Any proposed changes to the design of the TBI facility during construction will be referred to SM-WSA for review to ensure it meets the applicable design guidelines.</p>
	<p>Design excellence is exhibited in the project to complement the anticipated character of the precincts in which the project is located</p>	Yes	<p>The works include the establishment of a TBI in the location of a former car park to facilitate access to the immediately adjacent train station. The works are therefore consistent with the current and anticipated character of the precinct.</p>	<p>The works will be delivered as per the design.</p>
	<p>Accessibility and connectivity between future communities is supported by the project through opportunities to integrate with key project components such as stations</p>	Yes	<p>The TBI project is designed to maintain access to the public bus transport system adjacent to St Marys Train Station throughout the construction of the SM-WSA Metro Station.</p> <p>The TBI also maintains pedestrian access around the works area, and access to the taxi rank and kiss and ride facilities.</p>	<p>The works will be delivered as per the design.</p>
	<p>Within Western Sydney International, the project is integrated with and supports the outcomes and design objectives set out in the Airport Plan, future master plans for Western Sydney International and design guidelines for Western Sydney International</p>	No	Not Applicable	Not Applicable
<p><u>The project contributes to greener places through</u></p>	<p>The number of trees within the project area is increased at a ratio of 2:1 (for vegetation removal not subject to biodiversity offset); and</p>	No	Not Applicable	Not Applicable

Environmental Performance Objective Topic	Environmental Performance Objective	Triggered in Staging Report	Target	Management Measure
<u>supporting the enhancement and provision of green infrastructure</u>	tree canopy coverage is increased, using a range of local species, subject to the constraints on tree planting associated with safe airport operations			
<u>Network connectivity, safety and efficiency of the transport system in the vicinity of the project are managed to minimise impacts</u> <u>The safety of transport system customers is maintained</u> <u>Impacts on network capacity and the level of service are effectively managed</u>	Safe and efficient routes are provided for pedestrians, cyclists and road users at/near construction sites	Yes	Impacts to traffic and transport are minimised. Motorist, pedestrian and cyclist safety will be maintained or improved during construction. Safe access to properties is maintained.	Management will be undertaken in accordance with the CTMP, REMMs and CoA's. The purpose of the TBI is to provide ongoing safe access to the public transport system throughout construction of SM-WSA St Marys Metro Station.
	Access to the existing St Marys Station is maintained while train services are operating	No	Not Applicable	Not Applicable
	Safe access to properties and businesses is maintained during construction, unless alternatives are agreed with property owners and businesses	Yes	Impacts to traffic and transport are minimised. Motorist, pedestrian and cyclist safety will be maintained or improved. Safe access to properties is maintained.	Management will be undertaken in accordance with the CTMP, REMMs and CoA's. The purpose of the TBI is to provide ongoing safe access to the public transport system throughout construction of SM-WSA St Marys Metro Station.
	Heavy vehicles access the arterial network as soon as practicable on route to, and immediately after leaving, a construction site	Yes		
	The local community and relevant authorities are informed of transport, access and parking changes/impacts to minimise inconvenience to the public	Yes		
	Safe and efficient interchanges are provided between transport modes	Yes		

Environmental Performance Objective Topic	Environmental Performance Objective	Triggered in Staging Report	Target	Management Measure
	Transport interchange facilities provided at station precincts are designed in accordance with the modal access hierarchy	Yes		
	Each station and station plaza is provided with sufficient customer capacity to achieve a minimum Fruin's Level of Service C (for 2056 demand)	No	Not Applicable	Not Applicable
	Stations and interchanges are fully accessible and compliant with the Disability Discrimination Act 1992 (Cth) and the Disability Standards for Accessible Public Transport (Australian Government, 2002)	No	Not Applicable	Not Applicable
<p><u>Works are compatible with existing infrastructure and future transport corridors</u></p>	The project is designed to be compatible with existing infrastructure and future transport corridors	Yes	<p>Motorist, pedestrian and cyclist safety will be maintained or improved.</p> <p>Safe access to properties is maintained.</p>	<p>Works would be undertaken in accordance with the CTMP, REMMs and CoA's.</p> <p>The purpose of the TBI is to provide ongoing safe access to the public transport system throughout construction of SM-WSA St Marys Metro Station.</p>
<p><u>Construction noise and vibration (including airborne noise, ground-borne noise and blasting) is effectively managed to minimise adverse impacts on acoustic amenity Construction noise and vibration (including airborne noise, ground-borne noise and blasting) are effectively managed to minimise adverse impacts on the structural integrity of buildings and items including</u></p>	Construction noise and vibration impacts on local communities (including airborne noise and ground-borne noise and vibration) are managed in accordance with the Construction Noise and Vibration Standard, the Interim Construction Noise Guideline, and the Airports (Environment Protection) Regulations 1997	Yes	The project will minimise impacts to the local community by controlling noise and vibration at the source to receiver, including practicable and reasonable measures to minimise the noise and vibration impacts of construction activities on local sensitive receivers.	Management of noise and impacts will be undertaken throughout delivery of the project in accordance with the noise and vibration management procedure.
	Structural damage to buildings, heritage items and public utilities and infrastructure, including the Warragamba to Prospect Water Supply Pipelines, from construction vibration to be avoided	Yes		

Environmental Performance Objective Topic	Environmental Performance Objective	Triggered in Staging Report	Target	Management Measure
<u>Aboriginal places and environmental heritage</u>				
<u>Increases in noise emissions and vibration affecting nearby properties and other sensitive receivers during operation of the project are effectively managed to protect the amenity and well-being of the community</u>	Operational noise and vibration levels from rail operations are managed in accordance with the Rail Infrastructure Noise Guidelines and Airports (Environment Protection) Regulations 1997	No	Not Applicable	Not Applicable
	Operational noise levels for the stabling and maintenance facility, stations and other fixed infrastructure are managed in accordance with the Noise Policy for Industry 2017	No	Not Applicable	Not Applicable
<u>The project design considers all feasible measures to avoid and minimise impacts on terrestrial and aquatic biodiversity</u>	Minimise or where possible avoid impacts on threatened flora and fauna species, and ecological communities listed under the Biodiversity Conservation Act 2016 (NSW) and Environment Protection and Biodiversity Conservation Act 1999 (Cth)	No	Not Applicable	Not Applicable
	Manage groundwater drawdown at Orchard Hills to avoid or minimise impacts on groundwater dependent ecosystems	No	Not Applicable	Not Applicable
	No removal of any vegetation within the Thompsons Creek riparian zone or any adjacent areas that are non-certified under the South West Growth Area	No	Not Applicable	Not Applicable
	Culverts and bridges would be appropriately sized to maintain fauna habitat connectivity	No	Not Applicable	Not Applicable
	Maintain integrity and functionality of rail corridor fencing to minimise wildlife-train collision while providing opportunities for cross-corridor wildlife movement	No	Not Applicable	Not Applicable

Environmental Performance Objective Topic	Environmental Performance Objective	Triggered in Staging Report	Target	Management Measure
	Re-establish native vegetation in accordance with the National Airports Safeguarding Framework Principles and Guidelines including Guideline C: Managing the Risk of Wildlife Strikes in the Vicinity of Airports (Australian Government, 2014)	No	Not Applicable	Not Applicable
<p><u>Offsets and/or supplementary measures are assured which are equivalent to any residual impacts of project construction and operation</u></p> <p><u>The design, construction and operation of the project facilitates, to the greatest extent possible, the long term protection, conservation and management of the heritage significance of items of environmental heritage</u></p> <p><u>The design, construction and operation of the project avoids or minimises impacts, to the greatest extent possible, on the heritage significance of environmental heritage</u></p>	Impacts on threatened ecological communities and threatened species are offset in accordance with the requirements of the NSW Biodiversity Assessment Method (OEH, 2017)	No	Not Applicable	Not Applicable
	The design of the project incorporates non-Aboriginal heritage interpretation	Yes	Impacts on heritage are managed in accordance with relevant legislation, including the EP&A Act, the Heritage Act 1977, and relevant guidelines. Works within the heritage curtilage will be delivered in accordance with the Heritage Management Plan for works at St Marys Station. The potential impacts identified are mitigated by the mitigation measures provided.	Management of non-Aboriginal heritage will be undertaken throughout the delivery of the Project in accordance with the Aboriginal Cultural Heritage Management Plan (ACHMP)
	Impacts on the State heritage significant St Marys Railway Station Group are avoided or minimised so that the overall heritage value of the item is maintained	Yes		
	Impacts on non-Aboriginal heritage items and archaeology are minimised or where possible avoided	Yes		
	The design of St Marys Station is sympathetic to retained and adjacent heritage items	No	Not Applicable	Not Applicable
	The design of the project incorporates non-Aboriginal heritage interpretation	Yes	Impacts on heritage are managed in accordance with relevant legislation, including the EP&A Act, the Heritage Act 1977, and relevant guidelines. The potential impacts identified are mitigated by the mitigation measures provided. The TBI works are temporary in nature, therefore a heritage interpretation in the design is not required for these works.	N/A - works do not relate to permanent built structures

Environmental Performance Objective Topic	Environmental Performance Objective	Triggered in Staging Report	Target	Management Measure
<p><u>The design, construction and operation of the project facilitates, to the greatest extent possible, the long term protection, conservation and management of the heritage significance of items of Aboriginal objects and places The design, construction and operation of the project avoids or minimises impacts, to the greatest extent possible, on the heritage significance of Aboriginal objects and places</u></p>	<p>The heritage significance of Aboriginal objects and places are protected, conserved and/or managed in order to ensure the project does not diminish the story and cultural understanding associated with the objects and places of Aboriginal people in New South Wales</p>	Yes	<p>Impacts on Aboriginal heritage are managed in accordance with relevant legislation, including the EP&A Act, the Heritage Act 1977, and relevant guidelines.</p> <p>The potential impacts identified are mitigated by the mitigation measures provided.</p>	<p>Management of non-Aboriginal heritage will be undertaken throughout the delivery of the Project in accordance with identified management measures</p>
	<p>Impacts on areas of archaeological sensitivity and significance are avoided or minimised, where practical</p>	Yes		
	<p>The design of the project incorporates Aboriginal heritage interpretation and Aboriginal cultural design principles in consultation with Aboriginal knowledge holders</p>	Yes		
<p><u>The project minimises adverse impacts on flooding characteristics Construction and operation of the project avoids or minimises the risk of, and adverse impacts from, infrastructure flooding, flooding hazards, or dam failure Long term impacts on surface water and groundwater hydrology (including drawdown, flow rates and volumes) are minimised The environmental values of nearby, connected and affected water sources, groundwater and dependent ecological systems including estuarine and marine water (if Applicable) are maintained (where values are achieved) or improved and maintained (where values are not achieved) Sustainable use of water resources The Project is</u></p>	<p>Land and property beyond the construction footprint would not be impacted by construction for the 0.5 Exceedances per Year (EY) storm event</p>	No	Not Applicable	Not Applicable
	<p>No aspect of construction to materially adversely affect existing water quality in receiving waters to a minimum 0.5 EY storm event, or in line with the 'Blue Book' (Managing Urban Stormwater: Soils & Construction Volume 1 (Landcom, 2004))</p>	Yes	<p>The project would protect or contribute to achieving the Water Quality Objectives, during Construction.</p> <p>Construction water quality discharge (if required) would comply with the requirements of the CoAs.</p> <p>Management of water within the construction works area would be completed in accordance with the Blue Book Vol 2.</p>	<p>Management of soil and surface water will be undertaken throughout the delivery of the Project in accordance with the mitigation measures</p>
	<p>No material change to channel shape within the construction footprint for the 0.5 EY storm event for streams classified first order and higher</p>	No	Not Applicable	Not Applicable
	<p>Water discharged from the project, including runoff from hardstand areas, surface and ground water storages would: contribute towards achieving ANZECC guideline water quality</p>	Yes	<p>The project would protect or contribute to achieving the Water Quality Objectives, during Construction.</p>	<p>Management of soil and surface water will be undertaken throughout the delivery of the Project in</p>

Environmental Performance Objective Topic	Environmental Performance Objective	Triggered in Staging Report	Target	Management Measure
<p><u>designed, constructed and operated to protect the NSW Water Quality Objectives where they are currently being achieved, and contribute towards achievement of the Water Quality Objectives over time where they are currently not being achieved, including downstream of the project to the extent of the project impact including estuarine and marine waters (if Applicable)</u></p>	<p>trigger values for physical and chemical stressors for slightly disturbed ecosystems in lowland rivers in southeast NSW, or meet any water quality criteria determined in consultation with the NSW Environment Protection Authority (off-airport) where an EPL is required or in consultation with Western Sydney Airport in accordance with the Airports (Environmental Protection) Regulations 1997 (on-airport)</p>		<p>Construction water quality discharge (if required) would comply with the requirements of the CoAs. Management of water within the construction works area would be completed in accordance with the Blue Book Vol 2.</p>	<p>accordance with the mitigation measures. Note that currently discharge of site water into the stormwater system is not proposed. If, it is proposed to discharge/pump site water into the stormwater system, a water pollution impact assessment will be developed in consultation with EPA prior to this being permitted.</p>
	<p>Drainage from the project (including the stabling and maintenance facility, service facilities and stations) designed in accordance with local council requirements for managing urban stormwater quality and quantity</p>	<p>Yes</p>		
	<p>For all land currently flooded up to the one per cent annual exceedance probability event, no change to peak flood levels up to the following limits, unless otherwise agreed with the affected property owner: residential, commercial, critical infrastructure no new above floor flooding, maximum change of 10 millimetres for existing flooded buildings and maximum of 50 millimetres for properties where flooding is below floor level roads maximum change of 50 millimetres Crown land open space, farming, grazing and cropping land maximum change of 200 millimetres</p>	<p>No</p>	<p>Not Applicable</p>	<p>Not Applicable</p>
	<p>Where flood water velocities are currently below one metre per second (m/s), the project is designed and operated to ensure they remain below one metre per second. Where velocities are above one m/s, an increase of no more than 20 per cent is permitted</p>	<p>No</p>	<p>Not Applicable</p>	<p>Not Applicable</p>

Environmental Objective Topic	Performance	Environmental Performance Objective	Triggered in Staging Report	Target	Management Measure
		No change to flood hazard vulnerability classification limits for residential and commercial buildings or road	Yes	<p>Construction is undertaken in a manner that minimises the potential for adverse flooding impacts, through staging of works and the implementation of mitigation measures.</p> <p>Construction compounds and work sites are laid out such that flows are not significantly impeded.</p> <p>The project avoids long term impacts to surface water</p>	Management of soil and surface water will be undertaken throughout the delivery of the Project in accordance with the mitigation measures
		No change to flood hazard vulnerability classification limits for all land types as a result of the location of the permanent spoil placement areas at Western Sydney International	No	Not Applicable	Not Applicable
		<p>No change to the one per cent annual exceedance probability duration of inundation up to the following limits:</p> <ul style="list-style-type: none"> • residential, commercial, critical infrastructure – no increase for above floor flooding • roads – maximum change of 10 per cent increase in duration • agricultural land for cropping – dependant on cropping type 	Yes	<p>The project would protect or contribute to achieving the Water Quality Objectives, during Construction.</p> <p>Construction water quality discharge (if required) would comply with the requirements of the CoAs.</p> <p>Management of water within the construction works area would be completed in accordance with the Blue Book Vol 2.</p> <p>Construction is undertaken in a manner that minimises the potential for adverse flooding impacts, through staging of works and the implementation of mitigation measures.</p> <p>Construction compounds and work sites are laid out such that flows are not significantly impeded.</p> <p>The project avoids long term impacts to surface water</p>	Management of soil and surface water will be undertaken throughout the delivery of the Project in accordance with the mitigation measures
		For moderate and high fragility watercourses impacted by the project (as defined by the NSW River Styles mapping (NSW, Department of	No	Not Applicable	Not Applicable

Environmental Performance Objective Topic	Environmental Performance Objective	Triggered in Staging Report	Target	Management Measure
	Planning, Industry and Environment 2019)), maintain existing flow regimes and velocities as best as possible to preserve and minimise changes to the watercourses			
	Critical infrastructure (including stations entries and tunnel portals) to have immunity against the probable maximum flood event	No	Not Applicable	Not Applicable
<u>Long term impacts on surface water and groundwater hydrology (including drawdown, flow rates and volumes) are minimised</u>	Groundwater availability and quality for water supply and environmental benefit (e.g. groundwater dependent ecosystems) is not affected beyond the requirements outlined in the NSW Aquifer Interference Policy	No	Not Applicable	Not Applicable
	Structural damage to buildings, heritage items and public utilities and infrastructure, including the Warragamba to Prospect Water Supply Pipelines, from ground movement to be avoided	Yes	<p>.</p> <p>Construction is undertaken in a manner that minimises the potential for adverse flooding impacts, through staging of works and the implementation of mitigation measures, construction will not impact groundwater levels.</p> <p>Construction compounds and work sites are laid out such that flows are not significantly impeded.</p> <p>The project avoids long term impacts to surface water</p> <p>Management of water within the construction works area would be completed in accordance with the Blue Book Vol 2.</p>	Management of soil and surface water will be undertaken throughout the delivery of the Project in accordance with the mitigation measures
<u>The environmental values of land, including soils, subsoils and landforms, are protected Risks arising from the disturbance and excavation of land and disposal of soil are minimised, including disturbance to acid sulfate soils and site contamination</u>	Contamination risks to human health and ecological receivers are minimised through effective management of existing contaminated land	Yes	Any unexpected contaminated finds would be managed in accordance with the SM-WSA Unexpected Finds Procedure and WHS guidelines.	Management of soil and surface water will be undertaken throughout the delivery of the Project in accordance with the mitigation measures
	Contaminated land and soil within the footprint of the project is remediated where required, to	Yes	Any soil waste is assessed, classified, managed and disposed of in accordance with the Waste Classification Guidelines (EPA, 2018)	

Environmental Performance Objective Topic	Environmental Performance Objective	Triggered in Staging Report	Target	Management Measure
	ensure the land is suitable for the intended future land use			
<u>The project reduces the NSW Government's operating costs and ensures the effective and efficient use of resources</u> <u>Conservation of natural resources is maximised</u>	The project achieves a minimum 'Design' and 'As built' rating score of Leading +75, using the Infrastructure Sustainability Council of Australia Infrastructure Sustainability Rating Scheme Version 1.2 or equivalent	Yes	The TBI works are temporary in nature to allow for the construction of permanent infrastructure at St Marys Metro Station. Sustainability considerations are integrated throughout design, construction, and operation	Management of natural resources will be managed throughout delivery in accordance with the mitigation measures
	Sustainability initiatives are incorporated into the planning, design and construction of the project	Yes	A minimum 95 per cent recycling target is achieved for construction and demolition waste Products made from recycled content are prioritised	
	100 per cent of the greenhouse gas emissions associated with consumption of electricity during operation are offset	Yes	The use of potable water for non-potable purposes is avoided if non-potable water is available	
	25 per cent of the greenhouse gas emissions associated with consumption of electricity during construction are offset	Yes	The reuse of water is maximised, either on-site or off-site	
<u>The project is designed, constructed and operated to be resilient to the future impacts of climate change</u>	The project is designed to withstand known impacts associated with climate change to year 2100	Yes	The TBI works are temporary in nature to allow for the construction of permanent infrastructure at St Marys Metro Station. The works would be removed at the completion of the SM-WSA Metro construction. Sustainability considerations are integrated throughout design, Construction, and operation	Management of natural resources will be managed throughout delivery in accordance with the mitigation measures
<u>Conservation of natural resources is maximised</u>	100 per cent of useable spoil is reused in accordance with the spoil reuse hierarchy	No	Not Applicable	Not Applicable
	A minimum 95 per cent recycling target is achieved for construction and demolition waste	Yes	Sustainability considerations are integrated throughout design, Construction, and operation	Management of natural resources will be managed

Environmental Performance Objective Topic	Environmental Performance Objective	Triggered in Staging Report	Target	Management Measure
	Products made from recycled content are prioritised	Yes	A minimum 95 per cent recycling target is achieved for construction and demolition waste Products made from recycled content are prioritised The use of potable water for non-potable purposes is avoided if non-potable water is available The reuse of water is maximised, either on-site or off-site	throughout delivery in accordance with the mitigation measures
	The use of potable water for non-potable purposes is avoided if non-potable water is available	Yes		
	The reuse of water is maximised, either on-site or off-site	Yes		
<u>Cumulative Impacts</u>	Cumulative impacts are managed through coordination of construction activities and communication processes with nearby projects (Western Sydney International, M12 Motorway, The Northern Road, St Marys Intermodal and St Marys Commuter Car Park Expansion)	Yes	Works undertaken in coordination with other projects to minimise impacts on surrounding receivers	Management of cumulative impacts will be managed throughout delivery in accordance with noise and vibration mitigation measures and in accordance with the Out of Hours Protocol, CoAs, and REMMs

1.3. Project Context

The Sydney Metro – Western Sydney Airport involves a new metro railway line around 23 kilometres in length between St Marys in the north and the Aerotropolis Core precinct in the south (the area to be called Bradfield). This will include a section of the alignment which passes through and provides access to Western Sydney International (Nancy-Bird Walton) Airport (Western Sydney International), currently under construction. Key operational features of the project include:

- around 4.3 kilometres of twin rail tunnels (generally located side by side) between St Marys (the northern extent of the project) and Orchard Hills
- a cut-and-cover tunnel around 350 metres long (including tunnel portal), transitioning to an in-cutting rail alignment south of the M4 Western Motorway at Orchard Hills
- around 10 kilometres of rail alignment between Orchard Hills and Western Sydney International, consisting of a combination of viaduct and surface rail alignment
- around two kilometres of surface rail alignment within Western Sydney International
- around 3.3 kilometres of twin rail tunnels (including tunnel portal) within Western Sydney International
- around three kilometres of twin rail tunnels between Western Sydney International and the Aerotropolis Core six new metro stations:
 - St Marys (providing interchange with the existing Sydney Trains suburban rail network)
 - Orchard Hills
 - Luddenham Road
 - Aerotropolis Core
 - Airport Business Park
 - Airport Terminal
- grade separation of the track alignment at key locations including:
- where the alignment interfaces with existing infrastructure such as the Great Western Highway, M4 Western Motorway, Lansdowne Road, Patons Lane, the Warragamba to Prospect Water Supply Pipelines, Luddenham Road, the future M12 Motorway, Elizabeth Drive, Derwent Road and Badgerys Creek Road
- crossings of Blaxland Creek, Cosgroves Creek, Badgerys Creek and other small waterways to provide flood immunity for the project modifications to the existing Sydney Trains station and rail infrastructure at St Marys (where required) to support interchange and customer transfer between the new metro station and the existing Sydney Trains suburban rail network
- a stabling and maintenance facility and operational control centre located to the south of Blaxland Creek and east of the proposed metro track
- new pedestrian, cycle, park-and-ride and kiss-and-ride facilities, public transport interchange infrastructure, road infrastructure and landscaping as part of the station precincts

1.3.1. Advanced and Enabling Works (AEW)

Enabling works for the SM-WSA are required to establish key construction sites and facilitate construction activities.

Activities within the AEW stage includes construction of:

- enabling works such as site investigation, clearance, demolition and modifications to the existing transport network (such as roads, bus interchanges, lift shaft relocation);
- power supply for Tunnel Boring Machines (TBMs)

- from Claremont Meadows Substation to Orchard Hills Intermediate Services Facility, with associated underbores under the M4 Motorway at Kent Road;
- from Kemps Creek Substation to the Western Sydney Airport site with associated underbores under Kemps Creek;
- construction power supply for the below sites:
 - St Marys;
 - Claremont Meadows Services Facility;
 - Airport Business Park;
 - Southern Intermediate Services Facility; and
 - Aerotropolis;
- construction water supply for the below sites:
 - Airport Business Park; and
 - Aerotropolis;
- stormwater diversion at St Marys adjacent to the railway station;
- some demolition works
- concurrent management of work sites; and
- utility diversions and connections as required to facilitate the project, including installation of a new gas main from the on-airport component of the project (subject to separate planning approval) and the existing connection at the intersection of Martin Road and Cuthel Road, Badgerys Creek.

Due to the broad range of activities that will be undertaken within the AEW stage, and the different contractors involved in delivering them, for the purposes of demonstrating compliance with the CSSI planning approval, AEW has been broken into the following sub-stages based on the activities that will be undertaken by different contractors.

The naming of the sub-stages reflects the nature of the activities, as follows:

- AEW – Demolition
- AEW - Gas
- AEW - Power
- AEW - Roadworks
- AEW - St Marys Station Lift Relocation
- AEW - St Marys Temporary Bus Interchange
- AEW - Water

In accordance with the Staging Report for the SM-WSA, the Project is included as an Advanced Enabling Works Activity and is identified within the Staging Report as AEW – St Marys Temporary Bus Interchange.

1.4. Client

Ward have been contracted to complete these works on behalf of Transport for New South Wales (TfNSW, Principal), who are delivering this component of works on behalf of Sydney Metro Western Sydney Airport (Metro - Proponent).

1.5. Project Scope of Works

The key features of the Project are identified below:

- Establishment of an ancillary facility in a vacant parcel of land off Station Street, St Marys (refer to APPENDIX H for an assessment of the area as a laydown area)
- Construct the permanent and temporary pavements for the St Marys TBI;

- Mill and place asphalt overlay to the existing pavement on Station Street to match existing levels and carpark to required levels;
- Raised pedestrian crossings on Queen Street and at grade pedestrian crossing on Nariel Street and pram ramps;
- Relocate Kiss and Ride to Nariel Street, and upgrading of footpaths and pram ramps on Nariel Street
- Bus stops on Phillip Street;
- Reconfiguration of existing carpark on East Lane;
- Utility relocations;
- Drainage installation;
- Install road furniture;
- Install CCTV Surveillance;
- Install wayfinding signage;
- Relocate bus shelters for customers and shades for kiss-and-ride passengers;
- Install street lighting;
- Upgrade of pedestrian walkways (pram ramps) on Phillip Street and Queen Street
- Lane resurfacing on Phillip Street/ Queen Street and Nariel Street;
- Construction of dedicated driver facility (DDF) unit in the temporary bus interchange; and
- Construction of stormwater drainage and pavement reconstruction along Station Street
- Construct two (2) raised pedestrian crossings, pedestrian fencing, traffic medians and new lighting poles at the Phillip Street and Lethbridge Street intersection (refer to Figure 2).
- Temporary removal of on-street parking on Lethbridge Street (approximately 16 car park spaces)

Key work areas are presented in Figure 1.



Figure 1 Key Work Area



Figure 2 Lethbridge Street and Phillip Street scope of works

1.6. Program Duration

Construction is programmed for a 22 week construction period. It is noted that this is subject to weather and productivity.

The Phillip Street and Lethbridge Street scope of works is anticipated to be undertaken over a seven (7) week duration. It is noted that the Phillip Street and Lethbridge St scope of works will be undertaken in parallel with the main works and is not anticipated to be impact the programmed construction period of 22 weeks.

2. LEGISLATIVE AND OTHER REQUIREMENTS

2.1. Statutory Context

The three principal statutory schemes that govern the planning and assessment process for the SM-WSA are:

- The Environmental Planning and Assessment Act 1979 (NSW) (EP&A Act) – applies to works located on State land outside the boundary of Western Sydney International (off airport)
- The Airports Act 1996 (Cth) (Airports Act) – applies to works located within the boundary of Western Sydney International (on-airport)
- The Environmental Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act):

- For works located north of Western Sydney International (off-airport), assessment and approval is required under Part 8 and 9 of the EPBC Act to address impacts on listed threatened species and communities and Commonwealth land
- For the lands located south of Western Sydney International (off-airport), impacts on matters of national environmental significance (MNES) and Commonwealth land have already been assessed and approved under a strategic assessment in accordance with Part 10 of the EPBC Act.

Detailed environmental impact assessments have been carried out and approved by the Minister for Planning (*Instrument of Approval: SSI 1005*), namely:

- Sydney Metro - Western Sydney Airport Environmental Impact Statement dated 21 October 2020; and
- Sydney Metro - Western Sydney Airport Submissions Report submitted April 2021

A consistency assessment was undertaken for the Phillip Street and Lethbridge Street scope of works. The consistency assessment titled *Roadworks on Phillip and Lethbridge Street: Alterations to bus and pedestrian facilities* (date October 2021) (document reference – SM-21-00400109) indicated that the scope of works was consistent with the EIS and is provided in APPENDIX N.

2.2. Legislative Requirements

The following table (Table 6) identifies key NSW environmental legislative requirements and their application to this Project.

Table 6 NSW Legislative Requirements

Legislation and Administering Authority	Requirements	Application and Relevance to project
Biodiversity Conservation Act 2016 DPIE	The relevant purpose of the Act is to conserve biodiversity and maintain the diversity and quality of ecosystems.	Projects assessed under Part 5, Division 5.2 of the Environmental Planning and Assessment Act 1979 (EP&A Act) are exempt from an order or direction under Part 11 of the Act. The Act also established that other permits and approvals are not required for projects assessed and determined under Part 5, Division 5.2 of the EP&A Act. Medium Relevance SSI projects are exempt from regulatory compliance mechanisms set out under Part 11 of the <i>Biodiversity Conservation Act</i> . Species listed within the act are recognised and are to be protected.
Biosecurity Act 2015	Under this Act, all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.	Control weeds as required on land under the management of the Contractor. Low Relevance: A review of the area has been undertaken by an ecologist. No weeds have been identified within the Project area.

Legislation and Administering Authority	Requirements	Application and Relevance to project
Contaminated Land Management Act 1997 NSW Environment Protection Authority (EPA)	The Act provides a process for the investigation and remediation of land where contamination presents a significant risk of harm to human health or some other aspect of the environment. The Act also outlines the circumstances in which notification to the Environment Protection Authority is required in relation to the contamination of land.	Follow the legislative process where contaminated land is identified. Medium Relevance The relevance of this Act to the Principal Contractor will be in the event suspected or potentially contaminated ground is found during Construction activities.
Dangerous Goods (Road and Rail Transport) Act 2008 EPA / SafeWork NSW	A licence is required for the storage (SafeWork NSW) and /or transport (EPA) of prescribed quantities of dangerous goods.	Obtain a licence where storage of dangerous goods would exceed licensable quantities. High Relevance The relevance of the Act is in respect to the transport of dangerous good to & from the site. The project will require the use of a variety of dangerous goods. The Principal Contractor will need to review and ensure Dangerous Goods requirements are addressed where transported by its vehicles, plant and equipment.
Environmental Planning and Assessment Act 1979 Department of Planning, Industry and Environment (DPIE)	Encourages proper environmental impact assessment and management of development areas for the purpose of promoting the social and economic welfare of the community and a better environment.	Adhere to performance outcomes, mitigation measures and Conditions of Approval within the planning approval documentation. Sydney Metro and their contractors must endeavour to deliver in a consistent manner within the assessed scope of works. High Relevance The Project has been declared Critical State Significant Infrastructure (CSSI) by virtue of Schedule 5, clause 4 of <i>State Environmental Planning Policy (State and Regional Development) 2011</i> . The development consent conditions and obligations are incorporated into the CEMP.
Heritage Act 1977 NSW Department of Premier and Cabinet	The Act aims to encourage the conservation of the State's heritage and provides for the identification and registration of items of State heritage significance. The Heritage Council must be notified 'of the location of the relic, unless he or she believes on reasonable grounds that the Heritage Council is aware of the location of the relic'.	Projects assessed under Part 5, Division 5.2 of the Environmental Planning and Assessment Act 1979 (EP&A Act) are exempt from approvals required under Part 4 and permits required under section 139. Medium Relevance Works will occur within the State Heritage register St Marys Train Station. Projects assessed under

Legislation and Administering Authority	Requirements	Application and Relevance to project
		<p>Division 5.2 of the EP&A Act are exempt from approvals required under Part 4 and permits required under section 139 of the Heritage Act.</p>
<p>National Parks and Wildlife Act 1974 DPIE</p>	<p>The objectives of the Act are for the conservation of nature and the conservation of objects, places or features (including biological diversity) of cultural value within the landscape.</p>	<p>Projects assessed under Part 5, Division 5.2 of the Environmental Planning and Assessment Act 1979 (EP&A Act) are exempt from obtaining an Aboriginal Heritage Impact Permit required under section 90.</p> <p>Low Relevance</p> <p>No identified Aboriginal artefacts have been identified within the Project's Construction area. Projects assessed under Division 5.2 of the EP&A Act are exempt from obtaining an Aboriginal Heritage Impact Permit required under section 90.</p>
<p>Protection of the Environment Operations Act 1997 EPA</p>	<p>The relevant objective of the Act is to prevent environmental pollution.</p>	<p>Where Sydney Metro projects are scheduled activities under Schedule 1 of the Act an Environment Protection Licence (EPL) must be obtained. Further details on the requirements to obtain an EPL are provided in Section 2.3 of the CEMF.</p> <p>High Relevance</p> <p>The POEO Act provides for the issuing of environmental protection notices to control work and activities not covered by licences. Section 148 of the Act requires a pollution incident causing or threatening material harm to the environment to be notified to the EPA and other authorities immediately.</p> <p>An EPL is not required for this scope of works</p>
<p>Roads Act 1993 Transport for NSW</p>	<p>The relevant objective of the Act is to regulate the carrying out of various activities on public roads.</p>	<p>Obtain consent under Section 138 for carrying out work in, on or over a public road, or digging up or disturbance of the surface of the road.</p> <p>Under Section 38N of the Transport Administration Act 1988, Section 138 of the Roads Act 1993 does not apply to Sydney Metro activities in relation to classified roads for which a council is the roads authority. However, consent from Transport for New South Wales is still required under Section 38N(2) of the</p>

Legislation and Administering Authority	Requirements	Application and Relevance to project
		<p>Transport Administration Act 1988 for those activities described in Section 138(1) of the Roads Act 1993, when carried out in relation to a classified road.</p> <p>Medium Relevance</p> <p>This act governs Road Occupancy Licences (ROL) that will be required for works on and round roads. An ROL cannot be refused to carry out works required under an SSI approval as per Section 115ZH of the EP&A Act.</p>
<p>Waste Avoidance and Resource Recovery Act 2001 EPA</p>	<p>The objectives of the Act are to reduce environmental harm, provide for the reduction in waste generation and the efficient use of resources.</p>	<p>Implement strategies to reduce waste volumes and report on waste generated.</p> <p>High Relevance</p> <p>The relevance of the Act to this project is to implement the strategies by adopting the hierarchy of avoidance; avoidance of unnecessary resource consumption; resource recovery (including reuse, reprocessing, recycling and energy recovery), disposal (as a last resort).</p>
<p>Water Management Act 2000 DPIE</p>	<p>The relevant objective of the Act is to protect, enhance and restore water sources, their associated ecosystems, ecological processes and biological diversity and their water quality.</p>	<p>Sydney Metro projects assessed under Part 5, Division 5.2 of the Environmental Planning and Assessment Act 1979 (EP&A Act) are exempt from obtaining water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91.</p> <p>No Relevance</p> <p>Projects assessed under Division 5.2 of the EP&A Act are exempt from obtaining water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91.</p>

The following table (

Table 7) identifies key Commonwealth environmental legislative requirements and their application to this Project.

Table 7 Commonwealth Legislative Requirements

Legislation and Administering Authority	Requirements	Application to the project
Airports Act 1996 Department of Infrastructure, Transport, Regional Development and Communications	The Act regulates federally leased airports and includes provision for planning and building activities on the airport site as well as environmental management for activities undertaken on airports.	Compliance with regulatory requirements and standards as required for on-airport works No relevance: No works undertaken on airport
Airports (Environment Protection) Regulations 1997	Establishes a framework for the regulation and management of activities at airports that could have potential to cause environmental harm.	Compliance with requirements for on-airport works that may generate pollution, duties to avoid pollution and preserve habitat and heritage. Improving environmental management practices. Management processes for minimising environmental impacts, monitoring and incident response processes for on-airport works. No relevance: No works undertaken on airport
Airports (Building Control) Regulations 1996 WSA	Following variation of the Airport Plan and prior to construction, the Airports Act provides a regime requiring building approvals to be obtained from the Airport Building Controller (ABC) in respect of building activities on the airport site. WSA required to provide its consent to any applications for building approvals. Applications for building approvals must satisfy the requirements of the Airports (Building Control) Regulations 1996.	On-airport works to be undertaken in accordance with relevant building approvals. No relevance: No works undertaken on airport
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) Department of Agriculture, Water and the Environment	The relevant objective of the Act is to provide for the protection of the environment, especially those aspects of the environment that are matters of national environmental significance.	A referral was made under Part 7 of the EPBC Act for the off-airport works to the north of Western Sydney International. The Project has been deemed to be a controlled action by the Commonwealth Environment Minister and an assessment of impacts is required to be undertaken in accordance with the assessment requirements issued by the Minister, which is to be in the form of preliminary documentation. Part 13 of the EPBC Act requires a permit to be obtained for activities that may kill, injure, take, trade, keep or move a member of a listed threatened species or ecological community, a member of a list migratory species, or a member of a list marine species in or on a Commonwealth area. No Relevance The Project would not impact on any matters of national environmental significance or Commonwealth land

Legislation and Administering Authority	Requirements	Application to the project
National Greenhouse and Energy Reporting Act 2007 Department of Climate Change and Energy Efficiency	The Act established a framework for reporting of greenhouse gas emissions, abatement actions, energy consumption and production data.	Report on greenhouse gas and energy usage data as required by the Act for both on and off airport works. No Relevance In accordance with the staging report, greenhouse gas reporting is not required for this scope of works

2.3. Permits and Licences

The following permits and/or licences are required on the Project:

- Road Occupancy Licences. Required prior to the commencement of traffic related works that require access to the roads. This process is managed through the Construction Traffic Management Plan (CTMP)

2.4. Guidelines and Standards

Other guidelines, specifications and policy documents relevant to this Plan include:

- ISO 14001 Environmental Management System – Requirements with Guideline Use
- Interim Construction Noise Guidelines (OEH 2010)
- Managing Urban Stormwater: Soils and Construction, Volume 1 and Volume 2 (DEC 2004) (the “Blue Book”),
- AS4282:1997 Control of the Obtrusive Effect of Outdoor Lighting
- Waste Classification Guidelines (Department of Environment, Climate Change and Water, 2014)
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018)
- AS 1742.3 Manual of uniform traffic control devices Part 3: Traffic control for work on roads
- RMS Traffic Control at Worksites Manual
- Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (Revision 0/September 2011)
- Code of Practice for Water Management
- Environmental Procedure: Management of Wastes on Roads and Maritime Services Land
- Environment Incident Classification and Reporting Procedure
- Environmental Noise Management manual
- Guideline for the Management of Contamination
- Standard Management Procedure: Unexpected Heritage Items
- Technical Guide: Management of road construction and maintenance wastes
- Roads and Traffic Authority, 2001, Environmental Noise Management Manual, Practice Note vii – Road Work outside Normal Working Hours.
- Code of Practice for Water Management - Road Development and Management (April 1999)
- Erosion and Sedimentation Management Procedure – RTA Procedure PN143
- TfNSW Technical Guideline - Environmental Management of Construction Site Dewatering - EMS-TG-011 (April 2011)
- Technical Guideline - Temporary stormwater drainage for road construction (DECEMBER 2011)
- Environmental Direction- Management of Tannins from Vegetation Mulch (JANUARY 2012)
- Technical Direction – Coal Tar Asphalt handling and disposal - ETD 2015/021
- AS/ NZS 1940: 2017 – The Storage and Handling of Flammable and Combustible Liquids Australian Dangerous Goods Code

3. ENVIRONMENTAL MANAGEMENT PLAN IMPLEMENTATION

3.1. Ward Business Management System

3.1.1. Ward Business Management System

Ward operates an effective Environmental Management System, which, is part of the fully developed and accredited Ward Business Management System. Ward Business Management Systems accreditations include;

- Quality ISO 9001
- Health and Safety AS 4801
- Environment ISO 14001
- Office of the Federal Safety Commissioner

The complete suite of Policies, Procedures, associated standards, forms, registers, work instructions, guides etc forming part of Ward Environmental Management System must be used in conjunction with this CEMP.

A copy of Ward's Environmental Accreditation is available in **Appendix A**.

3.1.2. Environmental and Sustainability Policy

Ward has developed an environmental policy and a sustainability policy which demonstrates our commitment to act in a socially, ecologically sustainable and environmentally responsible manner. Ward will operate in a manner that drives down the environmental and health impacts of our operations by preventing or minimising pollution, reducing waste and minimising the Project's carbon footprint.

All Project personnel including sub-contractors will be made fully aware of the Environmental and Sustainability Policy and its objectives.

The Ward Sustainability Policy is consistent with the sustainability management plan developed for the Project which is included within APPENDIX F. The SMP has been developed in consultation with SM-WSA

A copy of the Environmental Policy is available in **Appendix B**.

3.2. Construction Environmental Management Framework

This CEMP provides the system to manage and control the environmental aspects of the Project during construction. It identifies all requirements applicable to activities described in Section 1.5. It also provides the overall framework for the system and procedures to ensure environmental impacts are minimised and legislative and other requirements are fulfilled. The CEMP has been developed based on the Ward Environmental Management Systems.

The strategies defined in this CEMP have been developed in accordance with the Conditions of Approval (COAs) within CSSI (*Instrument of Approval: SSI 10051*), Revised Environmental Mitigation Measures (REMMs) included within the Submissions Report, and SM-WSA Construction Environmental Management Framework (CEMF). This CEMP establishes the system for implementation, monitoring and continuous improvement to minimise impacts from the Project on the environment.

This CEMP, in accordance with Condition of Approval C2 and the Staging Report (SM-WSA CSSI Staging Report) is required to be Endorsed by the ER. The relevant Environmental Approval Management Framework for the Project is displayed in Figure 3.

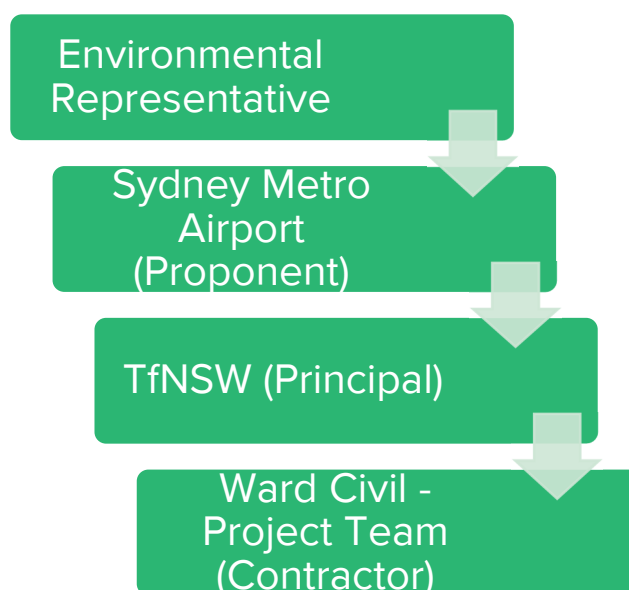


Figure 3 – Project Environmental Approval Management Framework

3.3. Roles and Responsibilities

Appropriate responsibilities are provided to all key Ward personnel and the wider project team to ensure effective environmental management for the duration of the Project. Achievement of identified environmental objectives and targets relies on all site personnel to diligently carry out their duties and to report all environmental incidents and hazards immediately to the Environmental Site Representative.

Each member of the Ward wider project team and sub-contractors will be site inducted and made aware of their responsibilities in the site inductions. Sub-contractors will be made aware of CEMP requirements during tendering and will be expected to demonstrate as part of their tender response how they intend to meet the Project’s CEMP and sustainability requirements. This will ensure that environmental competence is retained for all Ward sub-contractors. The responsibilities of key Ward personnel are summarised in the table below. The relationship between Ward, TfNSW personal and SM-WSA is depicted in an organisation chart presented in

Table 8 – Roles and Responsibilities

Roles	Responsibilities
WCEE CEO	<ul style="list-style-type: none"> ▪ Endorse and support the WCEE Environmental Policy attached in APPENDIX B; ▪ Liaise with Sydney Metro, TfNSW and other government authorities as required; and ▪ Provide adequate resources (personnel, financial and technological) to ensure effective development, implementation and maintenance of this CEMP.
Ward Project Director	<ul style="list-style-type: none"> ▪ Be accountable for the implementation of the CEMP ▪ Be aware of their environmental responsibilities as detailed in the management plans; ▪ Actively ensure that subcontractors and suppliers are complying with environmental requirements; and ▪ Liaise with Sydney Metro, TfNSW and other government authorities as required.
Ward Project Manager	<ul style="list-style-type: none"> ▪ Plan construction works in a manner that avoids or minimises impact to environment; ▪ Be responsible for the implementation of the CEMP

Roles	Responsibilities
	<ul style="list-style-type: none"> ▪ Be accountable for environmental controls; ▪ Be responsible for environmental compliance and performance; ▪ Be aware of their environmental responsibilities as detailed in the management plans; ▪ Stop work immediately if an unacceptable impact on the environment is likely to occur. ▪ Actively ensure that subcontractors and suppliers are complying with environmental requirements; ▪ Liaise and Co-operate with Sydney Metro, TfNSW and other government authorities as required. ▪ Be contactable 24hrs to shut down construction work in the event of an emergency.
<p>Ward Environmental & Sustainability Manager (EMR) – oversee onsite implementation by Environmental Site Representative)</p>	<ul style="list-style-type: none"> ▪ Liaise with the TfNSW Environmental Officer and the SM-WSA Environmental Manager in relation to environmental management aspects related to the Project. ▪ Assist the TfNSW Environmental Officer and SM-WSA Environmental Manager in developing and submitting environmental documentation to the independent environmental representative (ER). ▪ Advise the Project team on environmental matters specified in the TfNSW Specification G36, G38 and 40 related Specification, SW-WSA CEMF, Instrument of Approval SSI 10051, Revised Environmental Mitigation Measures, Low Impact Minor Works Approvals, Out of Hours Approvals, unexpected finds procedures and compliance with all other relevant statutory approvals, licences, permits, guidelines and authorisations; ▪ The EMR must have tertiary qualification in Environmental Science, Environmental Engineering or equivalent, and a minimum of three (3) years' experience in environmental management on road construction or other equivalent works. ▪ Oversees and advises the onsite Environmental Site Representative in the establishment, implementation, maintenance and compliance with Instrument of Approval SSI 10051, CEMF, REMMs, SM-WSA approval documents and the TfNSW Specification G36, 38 and 40 including all procedures and upgrades to these documents (as needed) to remain current with the progress of the Works; ▪ Ensure all personnel are aware of their roles and responsibilities in accordance with the CEMP to ensure the CEMP is fully implemented ▪ Carrying out regular (weekly) inspections and auditing of the works to ensure that environmental safeguards are being followed; ▪ Identifying where the mitigation measures identified in the CEMP and relevant sub-plans are not meeting the targets set, and identifying areas where improvements can be achieved; ▪ Stop activities where there is an actual or immediate risk of harm to the environment or to prevent environmental non-conformities until deficiencies are rectified and advise the Project Manager and the General Super Intendant. ▪ Assess any change to the Project scope and activities against approvals and licences; ▪ Ensure environmental actions raised by Sydney Metro, TfNSW and the ER are closed out and reported by the project team ▪ Develop progressive sediment and erosion plans (PESCPs) for works (included within the ECM)
<p>Ward Environmental Site Representative (ESR)</p>	<ul style="list-style-type: none"> ▪ The ESR is a full time onsite to oversee the implementation of the environmental aspects of the project. ▪ Must have completed a training course in Blue Books 1 and 2D and Erosion and Sedimentation Control (with a certificate as proof of training). ▪ Advise the project on environmental matters specified in this Specification, related Specifications and compliance with all other relevant statutory approvals, licences, permits and authorisations; ▪ Liaise with the Principal and with all relevant authorities on environmental matters, including inspection requirements; ▪ Maintain a register of all environmental management documents for the Contract; ▪ Ensuring that the CEMP is established, implemented and maintained in compliance TfNSW Specification G36, 38 and 40, SW-WSA CEMF, Instrument of Approval SSI 10051, Revised Environmental Mitigation Measures, Low Impact Minor Works Approvals, unexpected finds

Roles	Responsibilities
	<p>procedures including, procedures and upgrades to these documents (as needed) to remain current with the progress of the Works;</p> <ul style="list-style-type: none"> ▪ Overall responsibility for the establishment, management, monitoring and maintenance of erosion and sediment controls within the Site; ▪ Carry out regular inspections and auditing of the works to ensure that environmental safeguards are being followed; ▪ Identify where the implemented environmental measures are not meeting the targets set, and identifying areas where improvement can be achieved; ▪ Prepare monthly reports outlining the works that have been undertaken and the achievements that have been met, as well as identifying those areas where improvements were made, and detailing environmental performance; ▪ Facilitate environmental induction and toolbox talks for all site personnel; ▪ Specific authority to stop work on any activity where the ESR deems it necessary to prevent environmental nonconformities; ▪ Notify relevant parties of any environmental incidents. ▪ Undertake relevant environmental monitoring, such as noise monitoring; and ▪ Assist the communications representative with the management and close out of complaints.
Supervisor	<ul style="list-style-type: none"> ▪ The supervisor reports to the Project manager and is responsible for the onsite implementation of the environmental requirements ▪ Authority to direct personnel and/or subcontractors to carry out actions to avoid or minimise unintended environmental impacts ▪ Supervisor must have at least 15 years of working experience in construction with a minimum of 5 years' experience in roadworks construction and at least 5 years' experience as a Project Supervisor in similar works ▪ Communicate with all personnel and sub-contractors regarding compliance with the CEMP and site-specific environmental issues; ▪ Be responsible for checking the site on a regular basis and ensuring that regular maintenance is undertaken to minimise environmental impacts and that personnel are provided with appropriate environmental "toolbox" training; ▪ Have a direct role in the compliance with identified environmental procedures and controls; ▪ Identify resources required for implementation of the CEMP; ▪ Assist with and participate in environmental inspections; and ▪ Co-ordinate action in emergency situations and allocate required resources. ▪ Be contactable 24hrs to shut down construction work in the event of an emergency.
Engineer	<ul style="list-style-type: none"> ▪ Reports to the Project Manager ▪ Authority to stop work immediately if an unacceptable impact on the environment is likely to occur. ▪ Must have a tertiary degree in civil / environmental engineering with a minimum of three (3) years of construction experience. ▪ Provide input into the preparation of the environmental planning documents as required; ▪ Ensure that environmental considerations are integral to the decision making for all construction activities; ▪ Liaise closely with the Environmental Site Representative to ensure that the environmental controls and procedures contained in the CEMP are implemented; ▪ Conduct regular checks of the site to ensure environmental controls such as sediment controls and dust suppression are functioning effectively; ▪ Ensure that any work performed by external parties meets with the requirements of the CEMP and Sub-plans, including and documenting the environmental risks of the proposed works; ▪ Ensure that any Safety Health Environmental Work Methods Statements (SHEWMS) from external parties have been reviewed with the form W-RC-FM-15 SHEWMS Review Checklist. ▪ Identify any environmental risks;

Roles	Responsibilities
	<ul style="list-style-type: none"> ▪ Report and activity that resulted, or has the potential to result in an environmental incident immediately to the General Supervisor and Environmental Site Representative; and ▪ Assist in the close out of actions identified in environmental inspections/audits.
All WCEE Personnel	<ul style="list-style-type: none"> ▪ Reports to the Project Manager ▪ Comply with the relevant Acts, Regulations and Standards ▪ Comply with the Company's environmental policy and procedures ▪ Promptly report to management on any non-conformances, non-compliances environmental incidents and/or breaches of the system ▪ Undergo induction and training in environmental awareness as directed by management ▪ Report all incidents ▪ Act in an environmentally responsible manner ▪ Must complete corporate and project induction covering environmental responsibilities and Principal Contractor's environmental management system. ▪ Provide information to the Independent Environment Representative as requested and where appropriate, via the Project Environmental Manager.
<p>It is noted that; "Subcontractors" and "All personnel" are categorised as "Operational Personnel". All other roles as listed above are categorised as "Management". Refer to Section 3.11 for training requirements for each category. Minimum skill requirements are described with the individual role and responsibility tables It is the responsibility of Sydney Metro to engage an appropriate ER and seek approval from DPIE.</p>	

3.3.1. Key TfNSW Roles and Responsibilities

The key Environmental Role and responsibilities are presented in Table 9.

Table 9 TfNSW Roles and Responsibilities

Role	Responsibility
TfNSW Project Manager	<ul style="list-style-type: none"> • Reports to the SM-WSA Project Manager • Support the Project in environmental matters as required • Oversight of environmental requirements for design and Construction • Supervise all site Construction activities and personnel by ensuring that they meet environmental and other requirements • Ensure that site environmental controls are properly maintained and provide support for the Environmental Officer • Take action to resolve non-conformances, non-compliances and incidents • Provide information to the Independent Environment Representative as requested and where appropriate, via the Project Environmental Manager.
TfNSW Environmental Officer	<ul style="list-style-type: none"> • Reports to the TfNSW Project Manager • Ensure that the CEMP is effectively established, implemented and maintained at the project level • Ensure relevant licences, approvals and permits are obtained • Ensure compliance with all relevant statutes, regulations, rules, procedures, standards and policies

	<ul style="list-style-type: none"> • Carry out six monthly reviews of the CEMP and Sub-plans • Liaise with the SM-WSA, ER and/or Ward EMR on environmental issues, including the written notification of non-conformances (incidents, emergencies or deviations from the CEMP) and non-compliances • Provide support to the project team to enable them to meet their environmental commitments • Regular compliance checking as required by this CEMP • Ensure that non-conformances, non-compliances and environmental incidents are recorded and written reports provided to the Client's Representative within 48-hours. Liaise with the required stakeholders to confirm the nature of the corrective action required and comply with the timeframe within which corrective actions must occur. • Ensure that environmental controls, materials and equipment are maintained • Conduct six monthly review of the CEMP • 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. The Project Environmental Manager will be the primary contractor contact for the Independent Environment Representative • Must have tertiary qualifications in environmental engineering / science along with relevant experience working in environmental management roles in Australia. Infrastructure Sustainability Accredited Professional preferred • Must complete corporate and project induction covering environmental responsibilities and Principal Contractor's environmental management system <p>Minimum skill levels:</p> <ul style="list-style-type: none"> • Minimum 10 years' experience post qualification, with extensive experience in the preparation and implementation of environmental management systems and plans • Tertiary qualification in environmental science or engineering discipline or equivalent • Recent relevant experience in environmental management on major infrastructure projects.
TfNSW Communications Manager	<ul style="list-style-type: none"> • Leadership and management of the Communications, Stakeholder and Community Relations Team • Build and maintain effective working relationship with SM-WSA representative and Stakeholder and Community Liaison team • Approves the Communications, Stakeholder and Community Relations team roles, role descriptions and responsibilities • Liaising with the Community Complaints Mediator, where required • Ensures the 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 Principal Contractor (subject to media protocols) • 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.

3.3.2. Independent Roles and Responsibilities

Table 10 describes the key roles and responsibilities for key independent parties.

Table 10 Key Independent Roles and Responsibilities

Role	Responsibility
<p>Independent Environment Representative</p>	<p>(a) receive and respond to communication from the Planning Secretary in relation to the environmental performance of the CSSI;</p> <p>(b) consider and inform the Planning Secretary on matters specified in the terms of this approval;</p> <p>(c) consider and recommend to the Proponent any improvements that may be made to work practices to avoid or minimise adverse impact to the environment and to the community;</p> <p>(d) review documents identified in Conditions A10, A18, A20, C1, C5 and C13 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:</p> <ul style="list-style-type: none"> (i) endorse the documents before submission of such documents to the Planning Secretary (if those documents are required to be approved by the Planning Secretary); or (ii) endorse the documents before the implementation of such documents (if those documents are only required to be submitted to the Planning Secretary / Department for information or are not required to be submitted to the Planning Secretary / Department); (iii) provide a written statement to the Planning Secretary advising the documents have been endorsed. <p>(e) for documents that are required to be submitted to the Planning Secretary / Department for information under (d) (ii) above, the documents must be submitted as soon as practicable to the Planning Secretary / Department after endorsement by the ER, unless otherwise agreed by the Planning Secretary; regularly monitor the implementation of the documents listed in Conditions A10, A18, A20, C1, C5 and C13 to ensure implementation is being carried out in accordance with the document and the terms of this approval;</p> <p>(g) as may be requested by the Planning Secretary, help plan or attend 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 A36;</p> <p>(h) as may be requested by the Planning Secretary, assist the Department in the resolution of community complaints received directly by the Department;</p> <p>(i) consider or assess the impacts of minor ancillary facilities as required by Condition A22; and</p> <p>(j) consider any minor amendments to be made to the Site Establishment Management Plan, CEMP, CEMP Sub-plans and construction monitoring programs without increasing impacts to nearby sensitive land use(s), and are consistent with the terms of this approval and the Site Establishment Management Plan, CEMP, CEMP Sub-plans and construction monitoring programs 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;</p> <p>(k) prepare and submit to the Planning Secretary and other relevant regulatory agencies, for information, an Environmental Representative Monthly Report providing the information set out in the Environmental Representative Protocol under the heading “Environmental Representative Monthly Reports”. 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 or as otherwise agreed by the Planning Secretary; and</p> <p>(l) assess the impacts of activities as required by the Low Impact Work definition. With respect to (d) above, the ER is not required to endorse the specialist content in documents requiring specialist review and / or endorsement.</p> <p>The ER must complete project induction covering Principal Contractor’s environmental management system</p>
<p>Independent Certifier</p>	<p>Assess and certify the Project for compliance, including environmental requirements.</p>

3.3.3. Responsibilities and authority

A number of additional roles are required by the Project CoA and Ward’s commitment to continuous improvement. The Ward will work closely with these people to identify and minimise environmental risk and associated impacts.

These roles are detailed below.

- Sydney Metro is the “Proponent” under the CoA with ultimate responsibility to DPIE for compliance with the Planning Approval.
- TfNSW is the Principal Contractor implementing the TBI.
- Ward are constructing the TBI on behalf of TfNSW.

CoA A28 to 32 requires a suitably qualified and experienced Environmental Representative (ER) to be engaged for the Project. The nominated and approved ER is independent of the design and construction personnel. The ER for the SM-WSA has been engaged by SM-WSA.

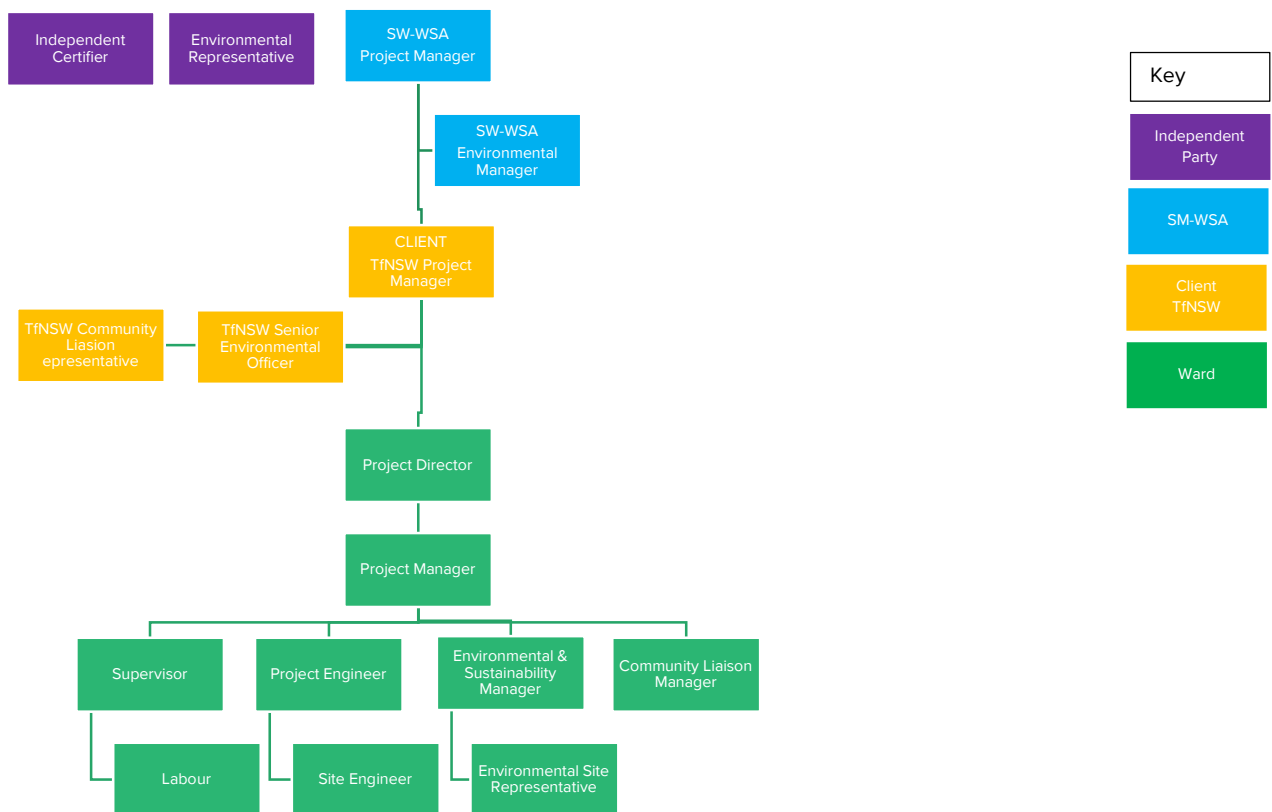


Figure 4 – Organisational Chart

In addition to the conditions set out in the Planning Approval, Ward personnel will work with the ER and comply with the reporting, review and inspection requirements. The Ward Environment Manager will be the primary contact for the ER on behalf of the project.

3.4. Environmental Management Framework

In accordance with the Staging Plan, Environmental Management Sub-Plans are **not** required to be developed for this scope requiring submission and Approval to the Secretary.

The location of the relevant environmental management categories, as defined in Table 4 of the Staging Report are presented below in Table 11.

In accordance with the CEMF, Environmental Management Procedures are to include:

- a) A breakdown of the work tasks relevant to the specific activity and indicate responsibility for each task;
- b) Potential impacts associated with each task;
- c) A risk rating for each of the identified potential impacts;
- d) Mitigation measures relevant to each of the work tasks; and
- e) Responsibility to ensure the implementation of the mitigation measures.

Where a corresponding systems document exists within the *Sydney Metro Integrated Management System*, the Ward's procedures will be updated to be consistent with any requirements in those documents or the SM-WSA documentation will be adopted for use.

3.4.1. Risk Assessment

A risk assessment has been undertaken to assist in streamlining the CEMP in accordance with Section 3.4, Part (c) and Part (d) of the SM-WSA CEMF. The risk assessment is presented in APPENDIX D.

Table 11 CEMP Environmental Management Categories

Environmental Category	Document name	Location
Spoil	NA	Not required
Groundwater	NA	Not required
Noise and Vibration	725.EMP.06.CNVMP	APPENDIX J
Non-Aboriginal Heritage	NA	Section 8
Aboriginal Cultural Heritage	NA	Section 8 Approved / Updated ACHMP - APPENDIX K
Flora and Fauna / Biodiversity	NA	Section 9
Visual Amenity	NA	Section 10
Carbon and Energy	NA	Not required
Materials	NA	Not required
Soil and Water	NA	Section 11
Air Quality	NA	Section 14
Waste (and recycling)	NA	Section 12.4
Bushfire Management Plan	NA	Not required
Cumulative Construction Impacts Plan	NA	Not required

Construction Traffic, Transport and Access Management Plan	725.MAN.10.TMP	Stand alone document
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3.5. Environmental Control Maps

Environmental Control Maps (ECMs) are live documents prepared to assist in the planning and delivery of the Project. The Project traverses a range of environmental and socially sensitive areas/sites. To assist construction planning and management, these site constraints are consolidated on series of map-based sheets that extend the length of the Project.

ECMs will be prepared in accordance with Section 3.6 of the CEMF and include:

- a) Depicting the current representation of the site;
- b) Indicate which environmental procedures, environmental approvals, or licences are applicable;
- c) Illustrate the site, showing significant structures, work areas and boundaries;
- d) Illustrate the environmental control measures and environmentally sensitive receivers;
- e) Is endorsed by the Principal Contractors Environmental Manager or delegate;
- f) Include all the training and competency requirements for relevant workers; and.
- g) Be communicated to relevant workers, including sign off the appropriate procedures prior to commencing works on the specific site and / or activity.

The ECMs will be prepared prior to the commencement of relevant construction activities and will incorporate relevant sensitive areas, mitigation measures and controls. They also identify key procedures to be used concurrently with the ECMs. ECMs are specifically designed to communicate requirements, actions, processes and controls to construction personnel using plans, diagrams and simply written instructions.

The ECMs are a live document encompassing the whole Project. They will be further developed as construction progresses and input is provided from the Project management team, Sydney Metro, the ER and TfNSW. They will also be more focused when individual construction sites are identified.

All construction personnel and Subcontractors undertaking a task governed by an ECM must participate in training on relevant ECMs and acknowledge that they have read and understood their obligations by signing an attendance record prior to commencing work.

The implementation of the ECMs, including regular monitoring, inspections and auditing of compliance with the ECMs will be undertaken by project management and environmental personnel to ensure that all controls are being followed and that any non-conformances are recorded, and corrective actions implemented.

The ECMs will be prepared and maintained by the Environment Manager or delegate with input from specialists as required. The current version of the ECMs are included as APPENDIX D. An update to the ECMs will not require the CEMP to be updated as they will be document controlled separately to the CEMP. The current version will be available to all construction personnel and Subcontractors undertaking a task governed by an ECM.

3.6. Sustainability Management Plan

A sustainability management plan relevant to the scale of the Project has been developed and is included within APPENDIX F. The SMP has been developed in consultation with SM-WSA.

3.7. Changes to the Project

Refinements to the Project may result from detailed design refinements or changed circumstances throughout construction.

As the Proponent, Sydney Metro are required to seek formal approval from the Minister for any Project modifications and for documenting refinements that are consistent with the approved Project.

Changes to the project may require an assessment to determine consistency with the Project Approval and Environmental Documents. This assessment would be carried out in accordance with the CEMF, Section 3.7.

The assessment will include:

- A description of the existing surrounding environment;
- Details of the ancillary works and Construction activities required to be carried out including the hours of works;
- An assessment of the environmental impacts of the works, including, but not necessarily limited to traffic, noise and vibration, air quality, soil and water, ecology and heritage;
- Details of mitigation measures and monitoring specific to the works that would be implemented to minimise environmental impacts; and
- Identification of the timing for completion of the Construction works, and how the sites would be reinstated (including any necessary rehabilitation).

Any design changes, changes in scope of works, changes to methodologies, facilities or processes must be communicated to the Project Manager and the Environmental Manager. The Environmental Manager will then consult with TfNSW To determine if an additional consistency assessment or environmental review is required.

Should the consistency assessment determine that a project modification may be required i.e. the impacts are of a nature and scale that it is not considered consistent with the Planning Approval, the ER will be informed and modification will be prepared by TfNSW / SW-WSA.

It is noted that a consistency assessment was undertaken for the Phillip Street and Lethbridge Street scope of works. The consistency assessment (*Roadworks on Phillip and Lethbridge Street: Alterations to bus and pedestrian facilities, October 2021*) (Document reference – SM-21-00400109) indicated that the scope of works was consistent with the EIS and is provided in APPENDIX N. The following text outlines the Scope of Works included within the consistency assessment:

Permanent works

These works would be permanent and extend past the SMWSA construction period:

- provision of new permanent raised pedestrian crossings:
 - one on Phillip Street to the east of the intersection with Lethbridge Street including permanent removal of two car spaces
 - one on Lethbridge Street north of the intersection with Phillip Street including permanent removal of two car spaces
 - associated pedestrian fencing, installation of lighting poles, trench grates and drainage, adjustments to concrete islands and medians, pavement works, kerb adjustments and line-marking
- intersection upgrade works at the Phillip and Lethbridge Street intersection including removal of the existing islands to the north and east of the Phillip Street and Lethbridge Street and installation of new full depth pavement and chevron marking

Temporary works

These works would be temporary (about 5 years) and occur for the duration of SMWSA construction:

- provision of two new bus stops on Phillip Street for the temporary adjustment/relocation of bus services (routes and stops)
- adjustments to: kerb and gutter; line marking; concrete islands and medians, pavement works, street furniture; signage; utilities; and pedestrian paths and fencing to facilitate the works
- closure of Gidley Street pedestrian access during construction of the proposed works

3.8. Cumulative Impacts

In accordance with the Staging Report (Table 5), a cumulative construction impacts management plan is not required for this Project. The potential for cumulative impacts will be continually monitored by Sydney Metro and the ER during construction, and appropriate mitigation measures will be considered and implemented if required. These would be plan will be developed and implemented by SM-WSA.

It is noted that the cumulative construction impacts plan would detail coordination and consultation requirements with the following stakeholders (as relevant) would occur where required to manage the interface of projects under construction at the same time

- a) Western Sydney Airport
- b) Transport for NSW
- c) Department of Planning, Industry and Environment
- d) Western Parkland City Authority (and their contractors)
- e) Emergency service providers
- f) Utility providers

Co-ordination and consultation requirements with these stakeholders would be detailed in the plan to include:

- a) Provision of regular updates to the detailed construction program, construction sites and haul routes
- b) Identification of key interfaces with other construction projects
- c) Development of mitigation strategies to manage cumulative impacts associated with these interfaces

Cumulative impacts would be managed by TfNSW and SM-WSA. Ward will liaise with TfNSW and SM-WSA to ensure that the construction program is clearly communicated to TfNSW and SM-WSA and will participate as required.

3.9. Condition Surveys

3.9.1. Properties

Prior to the commencement of works, building condition surveys will be undertaken on receivers which may be impacted by vibration from the works.

A vibration risk assessment has been undertaken which identifies the building identified to require a building condition survey. This assessment is included with the Detailed Noise and Vibration Impact Statement (DNVIS).

3.9.2. Road Dilapidation

In accordance with CoA E107: Before any local road is used by a Heavy Vehicle for the purposes of construction of the CSSI, a Road Dilapidation Report must be prepared for the road. A copy of the Road Dilapidation Report must be provided to the Relevant Road Authority(s) within three (3) weeks of completion of the survey and at no later than one (1) month before the road being used by Heavy Vehicles associated with the construction of the CSSI.

3.10. Register of Hold Points

For this Scope of works the following hold points will be implemented:

Table 12 Register of Hold Points

Item	Process Held	Acceptance Criteria	Approval Authority
Construction Environmental Management Plan	Site activities	Site specific Construction Environmental Management Plan have been developed, reviewed and approved.	ER Endorsement
Monitoring Program Amendments (CoA C13)	Amendments to Monitoring Program(s) (during Construction, as per CoA C13)	Amendments have been reviewed and approved for implementation.	ER Endorsement
DNVIS	Site activities (Prior to Construction commencement)	DNVIS to be prepared by Specialist Consultant.	ER Endorsement
Specific Environmental Control Maps (ECMs)/ progressive ESCPS	Site activities. Specifically: <ul style="list-style-type: none"> ▪ Tree removal ▪ Pavement removal / excavation 	ECMs/PESCPs are developed with site specific environmental controls/mitigation measures with site supervisor/engineers for work activities and are to be implemented prior to works commencing (or a new work stage as appropriate). Preparation and approval of PESCP for the area proposed for vegetation clearing / pavement removal	TfNSW Environmental Officer
Works that require a Project Approval Consistency Assessment	Specific site activities related to Consistency Assessment.	Consistency Assessment approval.	Sydney Metro (Approval)
Reuse or Discharge of water	Dewatering activities (During Construction)	<i>An EPA endorsed / approved water pollution impact assessment has been developed in consultation with EPA prior to this being permitted (in accordance with E130)</i> Criteria outlined with Section 11	Environmental Manager or Coordinator
Vegetation removal	Commencement of site clearing or vegetation removal.	Pre-clearing surveys and inspections for endangered and threatened flora and fauna species have been undertaken by qualified ecologists.	TfNSW Environmental Officer
Vegetation removal	Commencement of site clearing or vegetation removal.	Clearing limits have been verified against the project approval environmental assessment, limits have been set-out and vegetation to be retained has been delineated and or protected. Tree Report has been completed and submitted to SM-WSA for reporting. Preparation and approval of PESCP for the area proposed for clearing / pavement removal	TfNSW Environmental Officer

Item	Process Held	Acceptance Criteria	Approval Authority
Vegetation removal	Commencement of site clearing or vegetation removal.	Trained ecologist to be present during the clearing of native vegetation or removal of potential fauna habitat.	TfNSW Environmental Officer
OOHW Applications – individual works scenarios	Works to be performed outside of approved Construction hours (Pre-Construction and during Construction)	OOHW Protocol and Application Form and Community Notification	ER Endorsement and Approval
Use of local roads by heavy vehicles	Use of local roads by heavy vehicles	Preparation of Road Dilapidation Report	Project Manager (or delegate)
Construction identified as affecting buildings	Vibration works within safe working distance	Completion of Building Condition Survey	Project Manager (or delegate)
Encounter of Unexpected Heritage Item	Commencement of works in the affected area	The Unexpected Finds Process as outlined in the Sydney Metro Unexpected Finds Procedure must be applied in the event of encountering unexpected/potential heritage items.	TfNSW Environmental Officer
Encounter of unexpected soil / water contamination	Recommencement of works following unexpected contamination	Contamination management strategy developed, review and endorsed	TfNSW Environmental Officer
Ancillary Facilities	Establishment of new ancillary facilities not identified in the planning approval documents	Demonstration that the ancillary facility meets the requirements of CoA A17. Where facilities don't meet the requirements of CoA A17, complying with the requirements of CoA A18. Where CoA A18 is triggered develop a Site Establishment Management Plan Endorsement by the ER for minor ancillary facilities in accordance with CoA A22.	ER Endorsement DPIE approval

3.11. Training, Awareness and Competence

3.11.1. Inductions

Prior to the commencement of construction, Ward and all other Project permanent and temporary site staff including sub-contractors, plant operators and truck drivers will be required to undertake a Ward issued site induction, which includes an environmental component to achieve a suitable level of training to complete their assigned task. Workers are not to commence their assigned task without having a suitable level of environmental training.

The site induction will include the following:

- The purpose and objectives of the CEMP
- Contractor's environmental and sustainability policy (s) and key performance indicators
- Requirements of due diligence and duty of care

- Approval / licence conditions
- Site specific issues and controls including those described in the environmental procedures
- Potential environmental emergencies on the site and emergency response procedures (including locations and training in the use of spill kits)
- Reporting, notification and management requirements
- Communication protocols for interactions with community and stakeholders
- High risk issues and sensitive areas, including traffic impacts, noise and vibration impacts
- Site specific issues including the following:
 - Access requirements
 - Transport to and from site and parking
 - Flora and fauna management
 - Noise and vibration
 - Air quality
 - Weed management
 - Sediment and Erosion Management
 - Waste Management
 - Concrete management
 - Heritage management
 - Incident response and reporting
 - Unexpected finds

Additional specific targeted training workshops may be held on a case-by-case basis and will identify any sensitive receivers, cover all relevant environmental issues/risks identified within the Project's environmental risk assessment to minimise potential environmental impacts (for e.g. noise, air pollution, water pollution, waste and contamination and heritage) and provide direction on the proper implementation and maintenance of environmental controls etc. These workshops (if required) will include representatives from Ward project team, TfNSW Project team (including the TfNSW Environmental Officer), relevant sub-contractors. These workshops will be coordinated by the Ward EMR.

The ESR may authorise amendments to the induction at any time. Amendments may be required due to project modifications, legislative changes or amendments to this CEMP or related documentation.

3.11.2. Environmental Training Requirements

A training needs analysis has been undertaken which identifies the competency requirements of staff that hold environmental roles and responsibilities as outlined in Table 8.

The training Needs Analysis considered the following:

- a) Identifies that all staff are to receive an environmental training;
- b) Identifies the competency requirements of staff that hold environmental roles and responsibilities documented within the Construction Environmental Management Plan and sub-plans;
- c) Identifies appropriate training courses/events and the frequency of training to achieve and/or maintain these competency requirements; and
- d) Implements and documents as part of the CEMP a training schedule that plans attendance at environmental training events, provides mechanisms to notify staff of their training requirements, and identifies staff who do not attend scheduled training events or who have overdue training requirements

Training	Project Manager	Supervisor	Engineers	Environmental Manager	Environmental Site Representative	Community Staff	Labourers and subcontractors
Project Induction	✓	✓	✓	✓	✓	✓	✓
Environmental Induction	✓	✓	✓	✓	✓	✓	✓
Tertiary qualifications in Environmental Science or Engineering and 5 years experience				✓			
Blue Book Training (4 day course) Note: Refresher not required				✓			
Blue Book Training (2 day course) Note: Refresher not required					✓		
Environmental Control Maps / Erosion and sediment controls	✓	✓	✓	✓	✓		✓
Emergency response, reporting and spill response*	✓	✓	✓	✓	✓		✓

3.11.3. Continual Improvement - Environmental Awareness

Environmental awareness training will be provided within the project induction and to individuals or groups of workers with a specific authority or responsibility for environmental management or those undertaking an activity with a high risk or environmental impact.

Ward will conduct environmental awareness training before commencing construction and when new personnel commence work on the Construction Site as part of the Contractor's Site Induction. Ward will undertake refresher environmental awareness training as required, but not less than 6 monthly intervals, based on environmental risk assessment and turnover of project personnel. Include refresher environmental awareness training on the register of environmental training

To promote environmental awareness amongst the construction team, environmental toolboxes will be implemented. The EMR will also review and approve the training program and monitor implementation as required.

3.11.4. Training Records

A register of personnel who have attended site inductions will be maintained by the Ward Safety Team. In addition, a training plan that describes the minimum level and type of training, experience and qualifications required for employees (including subcontractors), scheduled dates for training, procedures for training and details of the trainer shall be developed for the Project.

3.11.5. Toolbox Talks

Toolbox talks will be one method of raising awareness and educating personnel on issues related to all aspects of construction including environmental issues. The toolbox talks are used to ensure environmental awareness continues throughout construction.

Prior to commencing works in a new area of the site or activity, a toolbox include but not limited to:

- A description of the activity and the area;
- Identification of the environmental issues and risks for the area (including fauna or flora); and
- Outline the mitigations measures for the works and the area.

Toolbox talks will also be tailored to specific environmental issues relevant to upcoming works. Relevant environmental issues may include (but are not limited to):

- Noise Management.
- Vibration management
- Emergency and spill response.
- Dust Control.
- Unexpected finds, including potential contamination.
- Erosion and sedimentation control.
- Flora and Fauna Management, including staged vegetation process (if required) and stop work procedures.
- Heritage management.

Toolbox attendance is mandatory and attendees of toolbox talks are required to sign an attendance form and the records maintained.

Targeted environmental awareness training will be provided to individuals or groups of workers with a specific authority or responsibility for environmental management or those undertaking an activity with a high risk of environmental impact. Topics covered may include those detailed above, or others deemed necessary during construction.

3.11.6. Daily Pre-Start Meetings

The pre-start meeting is a tool for informing the workforce of the day's activities, safe work practices, environmental protection practices, work area restrictions, activities that may affect the works, coordination issues with other trades, hazards and other information that may be relevant to the day's work.

The Ward Supervisor will conduct a daily pre-start meeting with the site workforce before the commencement of work each day (or shift) or where changes occur during a shift. The environmental component of pre-starts will be determined by relevant Supervisor with supplier from the ESR and will include any environmental issues that could potentially be impacted by, or impact on, the day's activities. All attendees will be required to sign on to the pre-start sheet and acknowledge their understanding of the issues explained. Pre-start topics, dates delivered, and a register of attendees will be recorded and managed.

3.12. Selection and Management of Subcontractors

Ward will ensure subcontractor compliance with duties including planning, implementing and monitoring environmental protection measures and for keeping environmental records by developing and maintaining a

training and environmental awareness matrix that describes the minimum level and type of training, experience and qualifications required for all employees and subcontractors. The required environmental awareness / training matrix is presented in Section 3.11.

Ward will retain the environmental protection responsibilities for the implementation of Wards contracted works. All sub-contractors will work on the Project in accordance with the CEMP, procedures and out of hours approvals. This requirement is included within all subcontractors. All sub-contractors will be inducted and provided with additional environmental training where required based on the environmental risk of their activities.

Ward is responsible for the surveillance of all Ward's subcontractors' environmental protection measures to monitor the effectiveness of these measures. The surveillance program includes monitoring the following measures:

- Site activities and approvals
- Air quality, including dust
- Noise and vibration
- Waste management and disposal (using designated bins, concrete wash outs)
- Storage and use of hazardous materials and spill kits
- Erosion and sediment controls

Ward will ensure sub-contractor compliance with duties through the surveillance of the subcontractors works and implementation of environmental protection measures to ensure that works are being undertaken in accordance with the CEMP and sub-plans. The surveillance program includes weekly environmental inspections by the ESR or suitably trained Project personnel to ensure environmental control measures are implemented and are effective. An Environmental Inspection Checklist [W-E-FORM-010] will be completed upon site inspection. Environmental observations from other site inspections (for e.g. safety inspections) may also be recorded in site diaries and notified to the ESR.

Environmental Checklists have been updated with checks to be made on Subcontractor's activities.

The ESR will report on compliance of construction activities with appropriate approvals and licences and identifies corrective actions/non-conformances to be addressed appropriately by the Ward Project Team.

Inspection reports and findings will be circulated typically to the Project Manager, Project Engineer and Supervisor. Actions will be managed and tracked for close out in the Dashpivot App and depending on the nature of actions (high, medium or low priority), close out will be within appropriate timeframes or as agreed with the ESR

All environmental documentation submitted by subcontractors will be subject to review and approval Ward staff to ensure compliance with TfNSW contract requirements, before works may begin.

3.13. Emergency and Incident Response

The following section details the management and reporting of environmental incidents and non-compliances for the Project.

Potential events on the Project that will trigger an Emergency Response and Incident Reporting:

- Spills of fuels, oils, chemicals and other hazardous materials
- Unauthorised discharge from containment devices
- Unauthorised clearing or clearing beyond the extent of the Project boundary or premises
- Inadequate installation and subsequent failure of temporary erosion and sediment controls
- Unauthorised damage or interference to threatened species, endangered ecological communities or critical habitat
- Unauthorised harm or desecration to Aboriginal objects and Aboriginal places
- Unauthorised damage or destruction to any State or locally significant relic or Heritage item

- Potential contamination of waterways or land
- Accidental starting of a fire or a fire breaking out of containment
- Any potential breach of legislation, including a potential breach of a condition of an CoA; or any agency permit condition
- Works undertaken without appropriate approval or assessment under the EP&A Act 1979
- Unauthorised dumping of waste.

All environmental incidents, reportable events and regulatory action would be reported to TfNSW as outlined in the SM-WSA Environmental Incident and Non-compliance Reporting Procedure.

Where environmental non-compliance or incidents arise during the Project, they will be classified and reported in accordance with the SM-WSA Environmental Incident and Non-compliance Reporting Procedure.

TfNSW hold the primary responsibility for fulfilling the obligations detailed in CoA A41 to A45 with respect to incident notification and reporting to SM-WSA. Ward will assist and cooperate with TfNSW and SM-WSA to fulfil these obligations.

All efforts will be undertaken immediately to avoid and reduce impacts of incidents and suitable controls put in place. Incidents will be closed out as quickly as possible, taking all required action to resolve each environmental incident and reduce the likelihood of a similar incident reoccurring. The Project Manager, Construction Manager and the Environmental Manager are 24-hour contacts. They have the authority to halt the progress of the works if necessary. They are the key emergency response personnel during an environmental site emergency or incident.

The Ward Environment Manager or delegate will maintain all records relating to environmental incidents and regulatory action and provide them to TfNSW as soon as practicable.

3.13.1. Environmental Incident Classification

Incidents will be reported and classified in accordance with the Sydney Metro – Western Sydney Airport Environmental Incident and Non-Compliance Reporting Procedure (SM-17-00000096). (refer APPENDIX G)

An Environmental Incident as defined by the Conditions of Approval is:

An occurrence or set of circumstances that causes or threatens to cause material harm and which may or may not be or cause a non compliance with the terms of this approval

Material Harm: Is harm that:

(a) involves actual or potential harm to the health or safety of human beings or to the environment that is not trivial, or

(b) results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding \$10,000, (such loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good the harm to the environment)

An Environmental non-compliance is: An occurrence or set of circumstances or development that is a breach of this approval.

When an Environmental Event (as defined by the Sydney Metro Environmental Incident and Non-compliance Reporting Procedure) occurs that causes Environmental Harm and also breaches one or more Environmental Requirements, then an Incident Notification Report will be created which records what requirements were breached.

SM-WSA has defined an Environmental Incident as:

An occurrence or set of circumstances, as a consequence of which pollution (air, water, noise, and land) or an adverse environmental impact has occurred or is likely to have occurred.

Adverse environmental impact includes contamination, harm to flora and fauna (either individual species or communities), damage to heritage items, or adverse community impacts.

The Instrument of Approval defines an incident as:

An occurrence or set of circumstances that causes or threatens to cause material harm and which may or may not be or cause a non-compliance.

If a Non-compliance is identified, then it must be raised using the Environmental Incident and Non-compliance Report Form within 48 hours by the party responsible for the breach.

Environmental incidents are classified into three classes that are based upon the consequence descriptors for environmental risks in the Sydney Metro Risk Matrix (refer to Sydney Metro Risk Management Standard). These classifications trigger a variety of management actions and/or legislative requirements depending on the severity of the consequence described where Class 3 represents minor consequences and Class 1 represents major consequences.

This matrix is further sub-divided into consequence ratings ranging from C6 (low impact) to C1 (high impact). An incident transitions between a Class 3 to a Class 2 incident once material harm has been caused, and transitions into a Class 1 incident once it is determined that the Environmental Harm caused is large-scale and cannot be remediated (see Table 13).

Table 13 Classification System for Environmental Incidents

Class 3			Class 2	Class 1	
C6	C5	C4	C3	C2	C1
No appreciable changes to environment and/or highly localised event	Change from normal conditions within environmental regulatory limits and environmental effects are within site boundaries	Short-term and/or well-contained environmental effects. Minor remedial actions probably required	Impacts external ecosystem and considerable remediation is required	Long-term environmental impairment in neighbouring or valued ecosystems Extensive remediation required	Irreversible large-scale environmental impact with loss of valued ecosystems

All incidents and complaints (including potential incidents) must be reported so that they can be investigated and prevented from recurring. Incidents, non-conformances and non-compliances are to be recorded using the Environmental Incident and Non-compliance Report Form (SM ES-FT-403), by the Principal Contractor (TfNSW). It is expected that the person responsible for completing the Environmental Incident and Non-compliance Report Form makes appropriate enquiries to determine the likely causal factors involved and assigns effective corrective actions. Corrective actions are to be raised, addressed and closed-out in accordance with the Principal Contractors own internal relevant management system procedure.

When an environmental incident occurs which causes environmental harm, in all cases both verbal and written communication of the incident must be carried out immediately and within 48 hours respectively. Incident Notification Reports must satisfy the requirement for written communication to SM-WSA and are to be completed using the Environmental Incident and Non-compliance Notification Report (SM ES-FT-403) or a similar and consistent form approved by SM-WSA.

3.13.2. ER and Secretary Notification (COA A41-A43)

In Accordance with COA A41 the Planning Secretary will be notified via phone or in writing via the Major Projects website immediately after the Proponent becomes aware of an incident. Any notification via phone must be followed up by a notification in writing via the Major Projects website within 24 hours of the initial phone call. Note that Ward will notify Metro who will then notify the ER and the Secretary.

The written 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 general nature of the incident.

Any incident within or potentially affecting the Controlled Areas of the WaterNSW Pipelines corridor must also be reported to WaterNSW on the WaterNSW 24-hour Incident Notification Number 1800 061 069.

Subsequent notification must be given and reports submitted in accordance with the requirements set out in Appendix A of the COAs

The written notification and reporting requirements, as shown in Appendix A of the Instrument of Approval are as follows:

1. A written incident notification addressing the requirements set out below must be submitted to the Planning Secretary via the Major Projects website within seven (7) days after the Proponent becomes aware of an incident. Notification is required to be given under this condition even if the Proponent fails to give the notification required under **Condition A41** or, having given such notification, subsequently forms the view that an incident has not occurred.
2. Written notification of an incident must:
 - (a) identify the CSSI and application number;
 - (b) provide details of the incident (date, time, location, a brief description of what occurred and why it is classified as an incident);
 - (c) identify how the incident was detected;
 - (d) identify when the Proponent became aware of the incident;
 - (e) identify any actual or potential non-compliance with conditions of approval;
 - (f) describe what immediate steps were taken in relation to the incident;
 - (g) identify further action(s) that will be taken in relation to the incident; and
 - (h) identify a project contact for further communication regarding the incident.
3. Within 30 days of the date on which the incident occurred or as otherwise agreed to by the Planning Secretary, the Proponent must provide the Planning Secretary and any relevant public authorities (as determined by the Planning Secretary) with a detailed report on the incident addressing all requirements below, and such further reports as may be requested.
4. The Incident Report must include:
 - (a) a summary of the incident;
 - (b) outcomes of an incident investigation, including identification of the cause of the incident;
 - (c) details of the corrective and preventative actions that have been, or will be, implemented to address the incident and prevent recurrence; and
 - (d) details of any communication with other stakeholders regarding the incident.

3.13.3. Internal Incident and Emergency Notification Process

The procedure for notification in the event of an incident is as follow:

1. Control the spill using spill kit and make area safe
2. Immediately notify the Ward supervisor of the incident
3. The supervisor is to notify (verbally) the ESR and the Project Manager
Note: The project manager is responsible for ensuring that the ESR and EMR are notified of an event
4. The ESR is to notify (verbally) the TfNSW Environmental Officer who will notify Sydney Metro. Should Ward be unable to contact TfNSW. Ward will notify Sydney Metro directly.

- Sydney Metro will subsequently notify the Planning Secretary in accordance with COA A41-A45.

3.13.4. External Incident and Emergency Notification Process (Class 1)

The procedure for notification in the event of a major incident or emergency is to call 000 in the first instance if the incident presents an immediate threat to human health or property. Fire and Rescue NSW, the NSW Police, and the NSW Ambulance Service are the first responders, as they responsible for controlling and containing incidents. If the incident does not require an initial combat agency, or once the 000 call has been made, notify the relevant authorities in the following order (where relevant):

- Notify TfNSW verbally immediately and SM-WSA (SM-WSA will subsequently notify the Planning Secretary in accordance with COA (A41-A45)
- The Environment Protection Authority (EPA) on 131555
- The Department of Health (via the local Public Health Unit – 02 9391 9000)
- The WorkCover Authority (13 10 50).

3.13.5. Environmental Emergency Preparedness

The key to effective prevention of environmental incidents/non-compliances is monitoring, surveillance and training. During construction activities, inspections and preventative actions will include:

- Regular inspections of construction areas and the surrounding environment;
- Identification of potential and actual environmental issues / non-compliances; and
- On-going environmental training.

Environmental and safety information on hazardous materials (for e.g. Safety Data Sheets (SDSs)) will be available at the site compound/designated chemical storage areas. Spill kits and other emergency supplies (i.e. sand bags and silt fence equipment) will also be made available. The handling, storage and use of hazardous materials (which includes both Hazardous Substances and Dangerous Goods) shall be in accordance with the Ward Hazardous Substances Procedure (B.PR.21). Note that the burning of any materials is not permitted at site.

The Project will use the definition of “Material Harm to the Environment”, as an environmental emergency situation trigger.

3.13.6. Emergency Contacts

An updated list of emergency response personnel and organisations will be maintained at work sites and compounds at all times including a 24-hour contact number. The numbers below in

Table 14 are Emergency 24 hours contacts for the Project.

Table 14 - Ward Emergency Contacts

Item	Name	Role	Organisation	Contact Number
1	[REDACTED]	Environmental Manager	Ward	[REDACTED]
2	[REDACTED]	Project Manager	Ward	[REDACTED]
3	[REDACTED]	Field Supervisor	Ward	[REDACTED]
4	-	24 Hours Contact Line	TfNSW	1800 684 490

It is noted that the 24 hour Project line is maned 24 hours a day.

3.13.7. Liaison with EPA

The Project Manager (Patrick McMahon), and Rowan Grace (EMR) are the authorised Ward contacts for communications with the client and the EPA and/or any other Government agencies on environmental matters.

A report will be prepared on each occasion the site is visited by EPA and/or any other Government agencies, and the Principal will be immediately notified. The Report will be provided to the Principal within 1 working day of the visit.

Table 15 – Additional Project Contacts

Role	Name	Contact details
<i>Contractor</i>		
Construction Manager	[REDACTED]	[REDACTED]
Project Manager	[REDACTED]	[REDACTED]
Supervisor	[REDACTED]	[REDACTED]
Environmental Manager	[REDACTED]	[REDACTED]
Project Engineer	[REDACTED]	[REDACTED]
Communications Manager	[REDACTED]	[REDACTED]
Traffic Manager	[REDACTED]	[REDACTED]
<i>TfNSW Project Team</i>		
[REDACTED]	Delivery Project Manager	[REDACTED]
[REDACTED]	Construction Manager	[REDACTED]
[REDACTED]	Lead Project Manager	[REDACTED]
[REDACTED]	Design Project Manager	[REDACTED]
[REDACTED]	Project Engineer	[REDACTED]
[REDACTED]	Sr Environment & Sustainability Officer	[REDACTED]
[REDACTED]	Community Manager	[REDACTED]
[REDACTED]	Health and Safety Partner	[REDACTED]
<i>Independent Representatives</i>		
[REDACTED]	Environmental Representative	[REDACTED]
<i>Sydney Metro</i>		
[REDACTED]	Project Manager	[REDACTED]
[REDACTED]	Senior Environmental Manager	[REDACTED]
[REDACTED]	Environmental Manager	[REDACTED]

3.13.8. Emergency Construction Works

On becoming aware of the need for emergency construction works, the Ward will notify the TfNSW Environmental Officer of the need for those activities or works. Ward will also use best endeavours to notify all affected sensitive receivers of the likely impact and duration of those works.

The TfNSW environmental officer will notify the Sydney Metro Environmental officer of the requirement.

3.13.9. Hazardous Materials

The following section outlines the process to be followed for managing spills and refuelling and maintaining construction vehicles/equipment and to minimise potential for groundwater quality impacts due to chemical spills. This section provides management measures for the storage of hazardous materials, refuelling/maintenance of construction plant and spill response. These management measures include:

- The storage of hazardous materials, and refuelling/maintenance of construction plant and equipment would be carried out in clearly marked and bunded areas within the construction site that are designed to contain spills and leaks in accordance with Australian Standards and DECCW guidelines. Where possible these will not be located within 50m of a water way
- Hazardous Materials will not be stored below the 10 per cent AEP flood level
- Chemical spill kits would be readily available and accessible to construction workers. Kits would be kept at site compounds and on specific construction vehicles, and all hazardous materials spills and leaks would be reported to site managers and actions would be immediately taken to remedy spills and leaks
- Hazardous materials spills and leaks would be reported to site managers and actions would be immediately taken to remedy spills and leaks
- Employees would be trained in the correct use of spill kits.

3.14. Environmental Monitoring, Inspections and Auditing

This section outlines the processes and procedures that will be implemented to monitor and review environmental performance and compliance with environmental requirements.

3.14.1. Continuous Improvement

Opportunities and methods for continual improvement will be promoted through the processes of monitoring and inspections and ongoing communications between the environmental team and construction personnel.

More formal continuous improvement will be driven through the Auditing and Management review process where corrective actions and recommendations will provide a closed loop into the parent CEMP.

3.14.2. Environmental Inspections

Environmental inspections will include (in accordance with Section 3.16 of the CEMF):

- a) Surveillance of environmental mitigation measures by the Site Supervisor; and
- b) Periodic inspections by the Principal Contractor's Environmental Manager (or delegate) to verify the adequacy of all environmental mitigation measures. This will be documented in a formal inspection record.

The Environmental Manager and/or delegate will undertake pre-work inspections, weekly and pre and post-rainfall inspections of the work sites to evaluate the effectiveness of environmental controls and to ensure controls are in place in accordance with the ECMs and CEMP.

The environmental inspection checklist will be used to ensure that all environmental aspects are reviewed during inspection. Positive compliance and actions arising from the inspections will be recorded on the actions register and each action will be allocated to the supervisor for the work area for close-out. The environmental inspection

checklist is a live document and will focus on high risk environmental areas. It will be updated regularly based on the progress of the Project and the outcomes of the quarterly Risk Assessment review.

The environmental inspections will cover high risk activities and processes, works in environmentally sensitive areas and site preparedness for adverse weather conditions. The Environment Manager or delegate will record inspection findings on an inspection checklist form. Actions from the inspection will then be issued to the relevant Foreman for actioning. Actions will be assigned an implementation priority in a collaborative way based on environmental risk.

If any maintenance and/or deficiencies in environmental controls or in the standard of environmental performance are observed, they will be recorded on an environmental action list. The environmental action list will then be issued to the relevant Foreman for actioning. Actions will be assigned an implementation priority by the Environmental Team based on environmental risk.

Environmental inspections will be undertaken regularly throughout delivery of the Project and where safe and feasible the inspections will be scheduled whilst work is occurring. Table 16 details the various inspections which will occur, their frequency and who within Ward will attend or arrange.

Records of monitoring and inspection will be documented and will be used to:

- Evaluate performance against legal, regulatory, contract, permit, licence and other commitments
- Identify required corrective actions
- Provide input into the process of review and improvement of environmental
- Track and trend progress against objective and targets
- Inform compliance requirements for environmental reporting.

Additional inspections that will be undertaken are described in the following sections

Where relevant, members of the wider Project team will participate in environmental inspections.

Table 16 – Environmental inspections

Activity	Type of Inspection	Frequency	Responsibility
Site inspection Quality, Safety & Environment	Visual	Daily	Site Supervisor
Environmental inspection	Visual	Weekly or prior to and following significant rainfall	Environmental Manager or site environmental delegate
Environmental Representative / Sydney Metro / TfNSW Representative inspection	Visual	As requested	Environment Manager to accompany third party
EPA or stakeholder inspection	Visual	As requested	Environment Manager / Project Manager to accompany third party

3.14.3. Site Inspections

Site Supervisors will complete a visual inspection of works each day. The inspection will identify any potential or actual environmental impacts associated with construction activities and inform housekeeping requirements. Any

potential environmental hazards or risks identified during the inspection will be reviewed by Ward Environmental Manager or their delegate and included in the environment action register as appropriate.

3.14.4. Environmental Representative, TfNSW and Independent Certifier Inspections

The ER will complete regular site inspections (initially fortnightly) to review environmental aspects. The ER will report on areas visited, performance of mitigation / controls and any issues and actions for improvement. Close-out of actions will be tracked.

The SM-WSA and TfNSW will complete site inspections as required. The frequency of site inspections will be determined by the nature of activities being undertaken and their associated environmental risks.

The Environment Manager or delegate will accompany the ER, SM-WSA, TfNSW Representatives on inspections. If any maintenance and/or deficiencies in environmental controls or in the standard of environmental performance are observed, they will be recorded on an environmental action list. The environmental action list will then be issued to the relevant Foreman for actioning. Actions will be assigned an implementation priority in a collaborative way by the inspection team based on environmental risk.

Actions arising from the inspections will be recorded on the actions register. Each action will be agreed at the end of the inspection and allocated to the appropriate member of the Project team for close-out.

3.14.5. Agency Inspections

If an inspection by a representative of Regulatory Authority or Agency is requested, Ward will notify TfNSW of the request. TfNSW will subsequently notify Sydney Metro.

Ward will provide access to any work area and facilitate the inspection. The Environment Manager will accompany any regulatory representative during the inspection. Other relevant site staff or team members will be made available if required.

Outcomes from the inspection will be documented and communicated to TfNSW.

3.14.6. Environmental Monitoring

Environmental monitoring will be undertaken for the duration of the Project. Table 17 provides the general environmental monitoring that will occur during the construction of the Project. Monitoring will be undertaken to validate the impacts predicted for the Project, to measure the effectiveness of environmental controls and implementation of this CEMP, and to address Planning Approval requirements. The monitoring requirements for required aspects are included in the relevant environmental management section/procedure and summarised in Table 17 below.

All environmental monitoring equipment shall be maintained and calibrated according to manufacturer's specifications and appropriate records kept.

Table 17 – Summary of monitoring required by the Planning Approval

CoA / REMM	Description	Relevant Sub-Plan or CEMP Chapter	Reporting Requirements
CoA C13 (a)	Noise and Vibration Monitoring Program to measure effectiveness of noise	Construction Noise and Vibration Procedure (725.EMP.06.CNVMP)	Submitted to the ER and relevant regulatory authorities for information at a frequency as specified in the monitoring program.

	and vibration mitigation measures		
CoA C13 (b)	<p>Surface Water Quality Monitoring Program (prior to discharge of surface / stormwater).</p> <p>Note: Currently discharge of water into the stormwater system is not proposed. if, it is proposed to discharge/pump site water into the stormwater system, a water pollution impact assessment will be developed in consultation with EPA prior to this being permitted. This has not been completed to date</p>	CEMP Section 11	Submitted to the ER and relevant regulatory authorities for information at a frequency as specified in the monitoring program.
CoA C13 (d)	Air Quality Monitoring Program to measure effectiveness of dust controls	CEMP Section 12	Submitted to the ER and relevant regulatory authorities for information at a frequency as specified in the monitoring program.

In accordance with CoA C14, each Construction Monitoring Program must include the following:

- a) details of baseline data available including the period of baseline monitoring;
- b) details of baseline data to be obtained and when;
- c) details of all monitoring of the project to be undertaken;
- d) the parameters of the project to be monitored;
- e) the frequency of monitoring to be undertaken;
- f) the location of monitoring;
- g) the reporting of monitoring results and analysis results against relevant criteria;
- h) details of the methods that will be used to analyse the monitoring data;
- i) procedures to identify and implement additional mitigation measures where the results of the monitoring indicated unacceptable project impacts;
- j) a consideration of SMART principles;
- k) any consultation to be undertaken in relation to the monitoring programs; and
- l) any specific requirements as required by Conditions C15 to C16.

In accordance with CoA C15, The Noise and Vibration Construction Monitoring Program must include:

- a) noise and vibration monitoring at representative residential and other locations (including at the worst-affected residences), subject to property owner approval, to confirm construction noise and vibration levels;
- b) monitoring undertaken during the day, evening and night-time periods throughout the construction period and cover the range of activities being undertaken;
- c) method and frequency for reporting monitoring results; and
- d) a process to undertake real time noise and vibration monitoring.

The Construction Monitoring Programs must be prepared in consultation with the relevant government agencies endorsed by the ER and submitted at least one month before the commencement of construction.

Construction must not commence until the ER has endorsed all of the required Construction Monitoring Programs and all relevant baseline data for the specific construction activity has been collected.

The Construction Monitoring Programs, which the ER has endorsed, 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 or the ER (whichever is applicable), whichever is the greater.

The results of the Construction Monitoring Programs must be submitted to the Planning Secretary, ER and relevant regulatory agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program.

3.14.6.1. Surface Water Quality Monitoring Program

It is noted that Ward is proposing not to implement a broad scale Surface Water Quality Monitoring program, in accordance with CoA C13 based on the following:

- The nearest surface water body is located approximately 1km to the west of the site (South Creek). Between the site and the nearest water body, there are commercial and industrial properties that also have surface water that flows into South Creek.
- There are developments throughout the catchment that also have overland flows that contribute to water to South Creek.
- The size of the respective work area in comparison to the overall catchment size is comparatively small and any run off would have a negligible impact on the water quality of south creek
- The Project consists primarily of improvements to road pavement and road infrastructure including drainage. The majority of the works will be below grade, therefore will collect rainfall and overland flow rather than allowing its release.
- Currently discharge of water into the stormwater system is not proposed. if, it is proposed to discharge/pump site water into the stormwater system, a water pollution impact assessment will be developed in consultation with EPA prior to this being permitted. This has not been completed to date. Should water be discharge from site, water that is discharged from the site, will be required to meet Water Quality discharge criteria which is presented in Section 11, ensuring water discharged from site is of suitable quality.

Based on the scope of the Project it would be unlikely to have measurable impacts on South Creek. Furthermore, any measured changes within the river would be difficult to directly attribute to the Project in isolation from other contributors to the catchment flow. Therefore, monitoring of surface water is not proposed as part of delivery of this Project.

3.14.6.2. Groundwater Monitoring Program

Ward is not proposing to implement a Groundwater Monitoring program, in accordance with CoA C13, this can be endorsed by the ER.

- Groundwater is unlikely to be encountered during the project. The EIS has identified that groundwater is expected to be encountered between 2.0 m – 7.0 m below the existing surface (Table 15-4, Hydrogeological Conditions at Project elements – off airport). Excavation for the project is currently designed to have a maximum depth of 1.5 m below the existing surface.

- Typically soils are removed from site, and select materials are imported for pavement construction, subsequently, contaminated soils are not anticipated to impact groundwater
- No groundwater dewatering is anticipated to be required as part of this scope of works.

As a result, groundwater monitoring is not proposed as part of delivery of this Project.

3.14.7. Auditing

Audits will be completed at regular intervals in accordance with all Project environmental obligations, including the CEMP, CoAs, REMMs and CEMF.

Independent Audits of the CSSI will be conducted and carried out in accordance with the Independent Audit Post Approval Requirements (DPIE, 2020) as follows:

- Within 12 weeks of the commencement of construction
- At intervals, no greater than 26 weeks from the date of the initial Independent Audit or as otherwise agreed by the Secretary.

Whether an independent audit of the Temporary Bus Interchange will be conducted will be dependent on timing and stage of the works.

Ward will participate as required with *Independent Audits* of the Project in accordance with COA A36. These audits will be instigated and coordinated by Sydney Metro as the Proponent of the project.

Ward will participate as required in accordance with Sydney Metro's audit program in accordance with CoA A37.

3.14.8. Internal CEMP audits

Based on the duration of the Project (it is envisaged that the works will go for 4 months) an internal audit will be undertaken within 20 working days of commencing construction. Subsequent audits will be undertaken quarterly.

The purpose of audit is to verify compliance with:

- Compliance with any approval, permit or licence conditions;
- Compliance with the E&SMS, CEMP, SMP, sub-plans and procedures;
- Community consultation and complaint response;
- Environmental training records; and
- Environmental monitoring and inspection results

The internal audit scope will focus on activities of high environmental risk. An audit checklist will be developed and amended as necessary to reflect changes to this CEMP, subsequent approvals and changes to Acts, regulations or guidelines.

In addition, SM-WSA will undertake periodic audits of the CEMP and compliance with the environmental aspects of contract documentation, including this CEMF. An audit schedule from SM-WSA has not been set.

3.14.9. Road Safety Audits

In accordance with CoA E119, Road Safety Audits (RSAs) will be undertaken to demonstrate consistency with relevant design, engineering and safety standards and guidelines. Safety audits will be prepared in consultation with the relevant Traffic and Transport Liaison Group before completion and use.

3.14.10. Sub-Contractor Audits

Where they are required by risk assessment, sub-contractor will be audited as determined by the Environment Manager using a risk based approach and/or in response to repeat incidents.

The Environment Manager may initiate audits at a greater frequency. Sub-contractor audits will be undertaken by the Environment Manager or delegate.

Based on the scope of works, subcontractors internal subcontractor audits will be undertaken at a minimum quarterly.

3.15. Environmental Non-Compliances and Non-Conformances

All environmental incidents, non-conformances and non-compliances must be reported to the ER and Sydney Metro in accordance with Sydney Metro Environmental Incident and Non-compliance Reporting Procedure.

3.15.1. Environmental Non-Compliance

In accordance with the Conditions of Approval, a non-Compliance is defined as:

An occurrence or set of circumstances or development that is a breach of this approval

Where an environmental non-compliance is identified and is substantiated, a Non-compliance and Corrective Action report will be issued in accordance with Sydney Metro – Western Sydney Airport Environmental Incident and Non-Compliance Reporting Procedure (SM-17-00000096) (refer to APPENDIX G).

If a Non-compliance is identified then it must be raised using the Environmental Incident and Non-compliance Report Form within 48 hours by the party responsible for the breach.

3.15.2. Non-Compliance Notification (A44-A45)

The Planning Secretary must be notified in writing via the Major Projects website within seven (7) days after the Proponent becomes aware of any non-compliance with the terms of this approval. This notification will be undertaken by SM-WSA.

A non-compliance notification must identify the CSSI (including the application number for it), set out the condition of approval that the development is non-compliant with, the way in which it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be undertaken to address the non-compliance.

Note: A non-compliance which has been notified as an incident does not need to also be notified as a noncompliance

3.15.3. Non-Compliance Notification Process

The procedure for notification in becoming aware of a non-compliance is as follow:

1. Relevant personal is to notify the Ward environmental officer.
Note: The project manager is responsible for ensuring that the environmental officer is notified of a non-compliance
2. The ESR is to notify (verbally) the TfNSW Environmental Officer who will notify Sydney Metro using the Environmental Incident and Non-compliance Report Form within 48hours. Should Ward be unable to contact TfNSW. Ward will notify Sydney Metro directly.
3. Sydney Metro will subsequently notify the Planning Secretary in accordance with COA A41-A45.

Sydney Metro may raise non-compliances against environmental requirements. The ER also has the authority to raise a non-compliance for their respective areas of work.

3.15.4. Corrective and Preventative Actions

Corrective actions will be identified as follows:

- Where an issue is identified and raised, the Environment Manager or delegate will liaise with the appropriate project personnel or qualified person(s) or seek advice from TfNSW or the ER to determine the most appropriate corrective action to implement
- Where assessed by the Environment Manager to be appropriate, the corrective action will be actioned through the Corrective Action Request (CAR) to prevent a re-occurrence of the non-compliance. Contractors will also maintain a register of non-compliances, corrective actions and preventative actions

3.15.5. Preventative actions will be identified as follows:

- Relevant incidents, complaints and non-conformances are discussed at relevant meetings
- Trends relating to environmental incidents and non-compliance findings are reviewed at these meetings to identify any reoccurring issues that are indicative of the need to take preventative action
- Any member of the Ward project team, including subcontractors as well as the ER and TfNSW can contribute and provide suggestion to any required or appropriate preventative action
- Where assessed by the Environment Manager as necessary, a preventive action will be raised and action undertaken through a Corrective Action Request (CAR).

3.15.6. Non-Compliance Reports and Close-out

Where a non-compliance is detected a Non-Compliance Report (NCR) will be raised using the Environmental Incident and Non-compliance Notification Report (SM ES-FT-403) or a similar and consistent form approved by Sydney Metro .

The Ward, ER, and TfNSW representatives will determine if issues identified during an environment inspection or audit will be closed out as part of the inspection or audit reporting process or via the issue of an NCR based on the severity of the issue and its potential to impact sensitive receivers or the environment.

Where a non-compliance is a result of non-compliance with the requirements of any law or CoA regarding the Environment, Ward will immediately notify TfNSW in writing.

In the event that repetitive observations are made i.e. if non-corrected low risk site improvement actions are not corrected within the agreed timing for actions (for more than a month in most cases) the Environment Manager will request that a NCR be raised.

Environmental related non-compliances are raised with the Environment Manager to determine appropriate actions and dates. On completion of agreed actions, the Environment Manager shall sign-off the NCR to signify close-out and provide a copy to TfNSW. Any changes to operations or practices resulting from actions are to be communicated to employees and sub-constructors as required. A register of all NCRs raised on the Project will maintained on the Ward system.

3.16. Records

Project specific environmental compliance and verification records will be accessible onsite for the duration of works.

Records to be maintained shall include:

- a) All environmental monitoring, inspection and compliance reports/records (including but not limited to);
 - i. Copies of current ESCPs for all active construction sites;
 - ii. Records of soil and water inspections undertaken;
 - iii. Records of testing of any water prior to discharge (dependent on NSW EPA endorsed / approved water impact assessment);
 - iv. Records of the release of the hold point to discharge water from the construction site to the receiving environment (dependent on NSW EPA endorsed / approved water impact assessment).

- v. Records of any meteorological condition monitoring;
 - vi. Records of any management measures implemented as a result of adverse, windy
 - vii. Weather conditions; and
 - viii. Records of air quality and dust inspections undertaken
 - ix. Records of inspections and waste docket for all waste removed from the site
- b) Environmental monitoring data;
 - c) Documentation as required by performance conditions, approvals, licences and legislation;
 - d) Reports on environmental incidents, other environmental non-compliances or non-conformances and follow-up action;
 - e) Results of internal and external audits;
 - f) Minutes of CEMP and Construction environmental management system review meetings and evidence of any action taken;
 - g) Modifications to site environmental documentation;
 - h) Induction and training records;
 - i) Procedures and protocols;
 - j) Checklists, forms and templates;
 - k) Correspondence with public authorities;
 - l) Complaints and enquiries received, and follow-up action;
 - m) Notifications received by regulators;
 - n) Community engagement information;
 - o) CEMP and Sub-plans; and
 - p) Additional documents and requirements as identified in the CEMF, CoA and REMMs.

Records will be retained by Ward for a period of no less than 7 years. Records will be made available in a timely manner to TfNSW and SM-WSA (or their representative) upon request.

Compliance reports detailing the outcome of any environmental surveillance activity including internal and external audits will be produced by the Principal Contractors Environmental Manager or delegate. These reports will be submitted to SM-WSA with one month of completing the surveillance activity.

3.17. Review and Improvement of Management System

In accordance with Section 3.19 of the CEMF, management reviews will be undertaken as part of the continual improvement process. The ESR will review the CEMP, Environmental Procedures and mitigation measures, and implementation within 20 days of the commencement of construction. Between the scheduled reviews, a register of issues will be maintained to ensure that any issue raised by internal and external personnel associated with the Project is recorded.

The purpose of the review is to ensure that the system is meeting the requirements of the standards, policies and objectives and, if not, to amend the CEMP to ensure compliance.

The review will be held more frequently if:

- Issues arise during environmental surveillance and monitoring
- Response to environmental incidents and non-compliances
- There is a change in scope/program
- If a series of community complaints are received
- Unexpected finds are encountered

The review will consider:

- Client comments.
- Agency comments.
- Complaints.

- New environmental assessments or updated risk assessments.
- Effectiveness of environmental management documentation implementation.
- Potential improvements to the environmental management documentation.
- Adequacy of resources.
- Findings of audits.
- Environmental objectives and targets.
- Environmental performance.
- Compliance with legal and other requirements.
- Critical non-conformance or repeated non-conformances.
- Organisation changes.
- Effectiveness of training and inductions.

The outcomes of the review could include amendments to this CEMP and related documentation, revision to the Project's environmental management system, risk assessment review, re-evaluation of the Project objectives and targets as well as feeding into other Project documents.

A formal review of the management systems by the Ward's Senior Management Team will also occur on a bi-annual basis. This review shall generate actions for the continual improvement of the systems.

3.17.1. CEMP Revision

Continual improvement is achieved through regular measurement, evaluation, audit and review of the effectiveness of the CEMP, Project environmental outcomes and the Principal Contractor's EMS. A review process ensures that environmental documentation is updated as appropriate for the specific works that are occurring on site. Reviews undertaken as described in Section 3.17 will provide specific opportunities to identify improvements in the environmental management system and/or this CEMP.

Should the document review process identify any issues or items within the documents that are either redundant or in need of updating, it is the responsibility of the Principal Contractor's Environmental Manager or Environmental Coordinators to prepare the revised documents.

This CEMP, and subsequent revisions, must be authorised by the Principal Contractor's Environmental Manager and approved by the ER.

The ER can approve minor amendments to the CEMP and construction monitoring programs, where the ER is satisfied that the amendment to the CEMP is necessary.

Where the ER deems it necessary, the amended CEMP will be forwarded to relevant stakeholders for review and comment if required and forwarded to the Planning Secretary for information. All updates to the CEMP are to be communicated to Sydney Metro prior to finalisation and/or update of document.

3.17.2. Document Control

The Ward, TfNSW the ER, and SM-WSA where relevant, will coordinate the preparation, review and distribution, as appropriate, of the environmental documents and records listed above in Section 3.17. During the Project, the environmental documents and records will be stored at the site compound.

Ward will implement a Project document control management system to control the flow of documents within and between the Ward, TfNSW, Sydney Metro, stakeholders and subcontractors.

The process will also ensure that documentation is:

- Developed, reviewed and approved prior to issue;
- Issued for use;
- Controlled and stored for the legally required timeframe;

- Removed from use when superseded or obsolete; and
- Archived.

A register and distribution list will identify the current revision of particular documents, records or data

4. STAKEHOLDER AND COMMUNITY INVOLVEMENT

4.1. Overview

A range of mitigation measures will be employed to mitigate community impacts. The stakeholder and community interaction will be undertaken in accordance with the Sydney Metro Airport Overarching Community Communication Strategy (OCCS), Section 4 of the Construction Environmental Management Framework (CEMF), the Construction Noise and Vibration Standard (CNVS) and Part B of the Instrument of Approval (CSSI 10051).

Stakeholders and the community will be kept up to date with construction update notifications detailing specific milestones, plus specific notifications for highly impactful activity such as night works, or major traffic changes. Notification for planned utility outages will be managed by the relevant utility service providers or design changes which affect the receiver.

4.2. Community Communication Strategy

This Construction Community Strategy (CCS) will support the Overarching Community Construction Strategy for SM-WSA. This strategy meets the conditions of approval B1 to B10 of CSSI 10051. Note that this CCS will comply with the OCCS, which will be in place for the duration of the work, per CSSI 10051 Part B, B1.

Table 18 outlines the engagement tools to be utilised on the Project.

Table 18 Community Engagement Strategies

Tools	Method
Notification for any works that may disturb local residents and businesses (such as noisy activities and night works) at least seven days prior to those works commencing	Delivery of letters or emails to resident and business addresses within the area (according to the NVMP), and/or per the OOHW application Doorknocks Face-to-face information for severely impacted members of the community/for start of works (subject to adherence to COVID-19 requirements)
Notification (including targeted letterbox drops and email) of works that may affect transport (such as road closures, changes to pedestrian routes and changes to bus stops)	Delivery of letters or emails to resident and business addresses within the area
Traffic alerts (to all key traffic and transport stakeholders advising of any changes to access and local traffic arrangements)	Delivery of letters or emails to resident and business addresses within the area at least seven days prior to significant events

Tools	Method
	Print and radio advertisements regarding major traffic changes
1800 project line (24-hour)	A 24-hour hotline open to the general public. This will be managed by TfNSW.
Complaints Management process	See section 4.3
Stakeholder Meetings (as required)	Meetings with key stakeholders, providing them with an opportunity to stay involved with the project
Website Updates (managed by TfNSW) including uploading of all relevant documents, and contact details for the stakeholder and community relations team	The TfNSW projects website will be updated to reflect progress and/or changes or events that occur throughout construction.
Sydney Metro Community Information Centre (Managed by TfNSW)	Provision of information to the Sydney Metro Community Information Centre including community newsletters, information brochures and fact sheets and interactive web-based activities
General Project Information Distribution	<p>Clear signage at the construction sites</p> <p>Regular newspaper advertisements in local and metropolitan papers (managed by TfNSW)</p> <p>Community, business and stakeholder satisfaction surveys and feedback forms (managed by TfNSW)</p> <p>Translator and interpreter services (managed by TfNSW)</p>
Regular Inter Agency Meetings (Managed by TfNSW)	Regular participation in meetings as required
Email Blasts	Important project information will be distributed to those who have indicated their desire to receive email updates.
Email Address (Inbound)	A public email address that will be managed TfNSW.

Tools	Method
Social Media Posts	i.e., Facebook, Twitter (if required by TfNSW)

Community and Stakeholder Engagement for this project will be led by TfNSW, supported by Ward Civil. The TfNSW Community and Stakeholder team will be the primary point of contact for the SM-WSA Communications team as the point of contact for the community. The project team will assist TfNSW to inform stakeholders about construction activities. We will do this by:

- Providing timely and accurate information to TfNSW for use in notifications
- Gaining internal alignment on key messages and management of community risks
- Supporting Door knocking and stakeholder meetings as required (noting adherence to COVID-19 requirements)
- All community and stakeholder interactions will be recorded in Consultation Manager by Transport for NSW.
- Wider community engagement to provide further information regarding timing and local changes regarding the proposed works by community updates, webpage construction updates and social media posts as required.
- Construction updates on the TfNSW website and distributed via letterbox drop
- Email notifications to stakeholders who have indicated they wish to receive information electronically project updates

4.2.1. Business Communication Strategy

As part of the CCS businesses impacted by the proposed works would be proactively consulted with and kept up to date with the works schedule and progress. This will include:

- Notifications of start of works and regular updates on progress
 - Information to be included in the notification will be consistent with those outlined in section 4.5 of the CEMF
 - Initial contact for the works will include face-to-face meeting (door knocking, where viable due to COVID restrictions) and will include provision of a contact number should the business have any concerns throughout construction
- Notifications of any works that may disturb local businesses
- Notifications around any works that may impact traffic movements, parking availability or access to properties
- Consultation with properties that back onto East Lane to ensure access is managed throughout construction
- Website updates and a 24 hour Project Line.

All formal communications with businesses will be managed by SM-WSA Communications Team with input from Ward around the status of construction works and activities.

4.3. Complaints handling procedure

Complaints handling is described below and is undertaken in accordance with Section 4.3 of the CEMF and CoAs B3-B10. The complaints management system is managed by TfNSW, in which Ward will support the TfNSW team

The project complaints handling procedure is outlined below, which says:

Members of the community will raise complaints and enquiries over the course of the project. Ward will assist TfNSW in managing these complaints and enquiries. Stakeholders such as business owners and elected officials may also request site meetings to discuss issues. Contact may occur via:

- A 24 hours telephone number - 1800 684 490
- Written correspondence including letters, emails and Facebook comments
- Emails to projects@transport.nsw.gov.au
- Direct engagement – face-to-face interactions including meetings or site visits
- A mediation system for complaints unable to be resolved (complaints mediator)

4.3.1. Complaints Management

Phone call complaints will be acknowledged within two (2) hours of receipt. When a complaint or enquiry cannot be resolved immediately, a follow-up verbal response on proposed action(s) to within 24 hours of a complaint being received.

Email complaints will be responded to within two (2) hours of receipt. However, if an email complaint is received between 10pm and 5am, it will be acknowledged and/or responded to by 9am on the same day.

The TfNSW Communications Manager will advise the Ward of any complaints received and the actions to be taken to resolve the issue. For complaints and/or enquiries which require escalation, TfNSW Communications Manager will respond accordingly.

Sydney Metro's OCCS details the Complaints Management System, which includes a Complaints Register, which has been developed for the Project.

In accordance with CoA B4, the complaint register will record:

- a) number of complaints received;
- b) date and time of the complaint;
- c) number of people (in the household) affected in relation to a complaint, if relevant;
- d) method by which the complaint was made;
- e) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
- f) issue of the complaint;
- g) means by which the complaint was addressed and whether resolution was reached, with or without mediation; and
- h) if no action was taken, the reason(s) why no action was taken

In accordance with CoA B5, Complainants must be advised of the following information before, or as soon as practicable after, providing personal information:

- a) the Complaints Register may be forwarded to government agencies, including the Department (Department of Planning Industry and Environment, 4 Parramatta Square, 12 Darcy Street, Parramatta NSW 2150), to allow them to undertake their regulatory duties;
- b) by providing personal information, the complainant authorises the Proponent to provide that information to government agencies;
- c) the supply of personal information by the complainant is voluntary; and
- d) the complainant has the right to contact government agencies to access personal information held about them and to correct or amend that information (Collection Statement)

The Collection Statement must be included on the Proponent or development website to make prospective complainants aware of their rights under the Privacy and Personal Information Protection Act 1998 (NSW). For any complaints made in person, the complainant must be made aware of the Collection Statement.

In accordance with CoA B7, the Complaints Register must be provided to the Planning Secretary upon request, within the timeframe stated in the request. This process will be managed by SM-WSA Communications Team.

4.3.2. Complaints Mediator

Should a complaint be unable to be resolved, a Community Complaints Mediator will be engaged and managed by SM-WSA. A complaint will be referred by the ER in accordance with the OCCS.

The role of the Community Complaints Mediator is to provide independent mediation services for any reasonable and unresolved complaint referred by the ER where a member of the public is not satisfied by the Proponent's response. Where a Community Complaints Mediator is required, a mediator accredited under the National Mediator Accreditation System (NMAS), administered by the Mediator Standards Board must be appointed.

The Community Complaints Mediator will:

- a) review any unresolved disputes, referred by the ER in accordance with the Overarching Community Communication Strategy;
- b) make recommendations to the Proponent to satisfactorily address complaints, resolve disputes or mitigate against the occurrence of future complaints or disputes; and
- c) provide a copy of the recommendations, and the Proponent's response to the recommendations, to the Planning Secretary within one month of the recommendations being made

Community Complaints Mediation will not be enacted before the Complaints Management System required by Condition B2 has been executed for a complaint and will not consider issues such as property acquisition, where other dispute processes are provided for in this approval, statute or clear government policy and resolution processes are available, or matters which are not within the scope of this CSSI

4.3.3. Community Interaction Roles and Responsibilities

Roles and Responsibilities

Project Manager

Project Manager Patrick McMahon will have the overall accountability for the implementation, maintenance, and evaluation of this Plan. The functional responsibilities will be delegated to the nominated CCA.

Management Team

The community relations responsibilities of the Project Manager, as well as all senior managers, are as follows:

- Ensure they, and staff reporting to them, are familiar with the requirements of this plan and they receive the appropriate induction
- Ensure all subcontractors have been inducted and comply with the community relations policies and procedures
- Identify potential community issues at the detailed design phase for early resolution
- Identify potential construction impacts on the community
- Incorporate practical stakeholder suggestions into designs and project plans

- Ensure relevant impact mitigation, consultation, complaint and communication requirements of the plans they manage are satisfied
- Attend stakeholder and community meetings as required to report on construction progress, issues of concern or interest to the community
- Respond to community feedback and resolve or alleviate the root cause of complaints, as required

Transport for NSW Communications Manager

The TfNSW Communications Manager will be responsible for managing community and stakeholder engagement for the St Marys TBI project. The TfNSW Communications Manager will undertake the following tasks as required:

- Respond to community and/or stakeholder complaints
- Attend stakeholder meetings to provide Senior TfNSW representation
- Manage internal approvals of public communications materials, including newspaper adverts, social media, community updates, website content and stakeholder letters and emails
- Ensure relevant project updates are provided to the Minister's office
- Input all interactions into Consultation Manager
- Media liaison
- Review and approve all communications, including written responses to enquiries and complaints
- Responsible for interactions with businesses and monitoring for business disturbance

Construction Community Advisor

The role of the Construction Community Advisor (CCA) is to support the Transport Communications Manager with the implementation of communications tools and management of community and stakeholder relationships.

The Ward CCA will provide input and details for project notifications and reactionary responses to complaints and enquiries, as well as enquiries from the SM-WSA communications team.

4.4. Urban Design of Temporary Works

TfNSW will supply branded shade cloth to be placed temporary fencing surrounding the construction site. Once on the fencing, if required, neat slashes will be cut into the shade cloth to allow for wind to pass through. The shade cloth will be visually inspected for damage and dirt and replaced where required.

TfNSW will design the shade cloth in accordance with Sydney Metro branding requirements. The design of the branding will consider:

- a) Artwork, graphics and images to enhance the visual appearance of temporary works in high visibility locations;
- b) Project information to raise awareness on benefits, explain the proposed works at each site and provide updates on construction progress;
- c) Community information, including contact numbers for enquiries / complaints;
- d) Signage and information to mitigate impacts on local businesses which may be obscured by the construction site;
- e) Sydney Metro advertising / public awareness campaigns; and
- f) Logos / branding, including Sydney Metro, NSW and Commonwealth Government, and Contractor branding

All community-facing site signage is to be graphically designed by TfNSW' design consultant and will be reviewed by SM-WSA for approval.

It is noted that construction hoardings, scaffolding and shade clothe etc will be regularly inspected and kept clean and free of dust build up. Graffiti will be removed or painted over promptly.

The principles of Crime Prevention through Environmental Design (CPTED) will be applied to all works, including temporary works that have a public interface.

4.5. Business and Property Impacts

TfNSW and Ward will work proactively with business to minimise impacts to business during construction.

Construction works will be undertaken to:

- a) Minimise the potential impact of the project to businesses affected by construction works;
- b) Ensure businesses are kept informed of the project and consulted in advance of major works or factors that are likely to have a direct impact;
- c) Consult with all business directly affected by changes to access arrangements regarding specific requirements at least two weeks prior to those changes coming into effect; and
- d) Ensure that business stakeholder enquiries and complaints regarding the project are managed and resolved effectively

The following interactions with business owners have occurred prior to the start of works.

- Doorknock of affected business surrounding project area completed by TfNSW in June 2021
- Community update sent out by TfNSW in August 2021 (update covers start of construction in September 2021)
- Liaison with Centrelink regarding maintaining emergency access
- Signage erected in the car park to inform users of September 27, 2021 closure

A detailed stakeholder scan is provided in Appendix 1 of the CCLMP. The stakeholder scan documents the contact details, key issues and proposed approach to managing each relationship.

The project will be delivered in accordance with section 4.5- A, B & C of the CEMF, as outlined below in Table 19:

Table 19 CEMF Communications Measures

CEMF reference	Details	Implementation on the project
4.5a	Principal Contractors will proactively work with potentially affected stakeholders to identify the likely impacts and put in place measures to minimise impacts.	Stakeholder identification process through stakeholder scan and DNVIS process. Doorknock prior to work starting to discuss impacts. Seek feedback from sensitive receivers on noise mitigation measures,
4.5b. (i)	Minimise the potential impact of the project to businesses affected by construction works	The project team will implement mitigation measures such as completing noisier tasks prior to midnight, using noise blankets where feasible, using the hand tools where possible and

CEMF reference	Details	Implementation on the project
		coordinating deliveries of plant and materials outside of peak business hours.
4.5b (ii)	Ensure businesses are kept informed of the project and consulted in advance of major works or factors that are likely to have a direct impact	Regular construction updates will be provided to all business and residents surrounding the works. Specific notifications will be provided to businesses where the work will directly impact access, or impact on the business' ability to trade normally.
4.5b (iii)	Consult with all business directly affected by changes to access arrangements regarding specific requirements at least two weeks prior to those changes coming into effect	Prior to the start of the main works, Specific Notification (doorknock) will be undertaken with identified sensitive receivers (St Mary's Hotel and 34-26 Phillips Street).
4.5b (iv)	Ensure that business stakeholder enquiries and complaints regarding the project are managed and resolved effectively.	All complaints and enquiries will be managed in accordance with the Complaints Handling Procedure.
4.5c	The Community Communication Strategy (Section 4.2) will document key issues relating to business impacts by locality with a particular focus on proactive consultation with affected businesses.	See section 4.2 – 725.MAN.04.CEMP
4.5c (i)	identification of specific businesses which are sensitive to construction activity disturbances	A stakeholder scan featuring details impacted businesses sensitive to the construction activity has been completed for the project.
4.5c (ii)	<p>Summary of the commercial character of the locality, its general trading profile (daily and annually) and information gained from the business profiling such as:</p> <ul style="list-style-type: none"> ▪ Operating hours; ▪ Main delivery times ▪ Reliance on foot traffic ▪ Any signage or advertising that may be impacted ▪ Customer origin; and <p>Other information specific to the business that will need to be considered in construction planning.</p>	Doorknock undertaken by TfNSW in June 2021 documented the information gained from interaction with businesses. Details collected, including operating hours, delivery requirements and other information has been documented in Consultation Manager by the Principal Contractor.

CEMF reference	Details	Implementation on the project
4.5c (iii)	Define the roles and responsibilities in relation to the control and monitoring of business disturbances	Refer section 4.3.3 roles and responsibilities which applies to overall community and stakeholder engagement for the project, including interactions with businesses.
4.5c (iv)	Identification of locality specific standard business mitigation measures which would be implemented	During June 2021 consultation completed by TfNSW, it was established that deliveries for businesses on the western side of Queen Street are received on East Lane. Additionally, the rear emergency access to the Centrelink Office (Phillips Street) will be maintained.
4.5c (v)	Maps and diagrams to illustrate the information for easy identification of measures which would be implemented	Project notifications feature maps and diagrams to elucidate key information about planned work activities and likely impacts.
4.5c (vi)	Description of the monitoring, auditing and reporting procedures	<p>Monitoring and evaluation activities will include:</p> <ul style="list-style-type: none"> ▪ Delivery of communications material on time and within budget ▪ Evaluating the cohesiveness of stakeholder relationships ▪ Recording the number and nature of comments received by the community at all stages of the program ▪ Monitoring, analysing, and reporting of stakeholder contacts/enquiries, including complaints ▪ Responding to community enquiries and concerns in a timely manner

CEMF reference	Details	Implementation on the project
4.5c (vii)	Procedure for reviewing performance and implementing corrective actions	<p>Effectiveness of the consultation process can be measured by considering:</p> <ul style="list-style-type: none"> ▪ The number of individual enquiries/complaints over the duration of the project and/or in comparison to similar projects ▪ Whether complaints/enquiries increased over the period of the project ▪ The tone of feedback and media coverage ▪ Whether the project was refined through community engagement ▪ The absence of construction disruptions due to community unrest and/or escalating complaints.
4.5c (viii)	Description of the complaints handling process	Refer to section 4.3.1 – Complaints Management Process for a description of the complaints handling procedure.
4.5c (ix)	Procedure for community consultation and liaison	<p>Generally, the overarching procedure for community consultation and liaison</p> <ul style="list-style-type: none"> ▪ Identify key stakeholders, impacts and influence levels ▪ Provide strategic direction for communications throughout the delivery of the project ▪ Provide a framework for managing and implementing complaints and enquiries ▪ Describe communications tools ▪ Define the communication protocols and procedures to ensure consistency across all projects

5. GENERAL SITE WORKS

5.1. Standard Working Hours

In line with CoA E38, standard working hours for the Project are as follows:

- Monday to Friday 7:00am – 6:00pm
- Saturday 8:00am- 1:00pm
- No works on Sundays or Public Holidays

Works which can be undertaken outside of standard construction hours without any further approval include:

- a) Those which have been described and assessed in the environmental assessments. For example, tunnelling and underground excavations and supporting activities or works within Western Sydney International
- b) Works which are determined to comply with the relevant Noise Management Level at sensitive receivers;
- c) The delivery of materials outside of approved hours as required by the Police or other authorities (including Transport for NSW) for safety reasons;
- d) Where it is required to avoid the loss of lives, property and / or to prevent environmental harm in an emergency; and
- e) Where written agreement is reached with all affected receivers

In line with the *Environmental Planning and Assessment (COVID-19 Development – Infrastructure Construction Work Days No. 2) Order 2020*, the following standard work hours will be employed:

- Saturday, Sunday and public holidays 7am-6pm

The following is noted will be complied with including:

- a) be the subject of an approval, and
- b) comply with all conditions of the approval other than any condition that restricts the hours of work or operation on a Saturday, Sunday or public holiday, and
- c) for work or operation on a Saturday, Sunday or public holiday—
 - i. comply with the conditions of the approval that restrict the hours of work or operation on any other day as if the conditions applied to work or operation on a Saturday, Sunday or public holiday, and
 - ii. not involve the carrying out of rock breaking, rock hammering, sheet piling, pile driving or similar activities during the hours of work or operation that would not be permitted but for this Order, and
 - iii. take all feasible and reasonable measures to minimise noise.

It is noted that these work hours are currently valid until 31 March 2022. After this date, works will be undertaken in accordance with the approved construction hours outlined in CoA E38

5.2. Site Layout

Discussion of the site layout is included in APPENDIX H.

Lay outs of work areas will be presented with work area Environmental Control Maps (ECMs). Refer to Section 3.5 for further details on ECMs. When setting out the site, the following will be considered:

- The location of noise intensive works and 24 hours activities related to sensitive receivers
- The location of site access and egress points in relation to noise and light receivers
- 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 out side of daytime hours: and
- Set out to minimise the requirements for reversing, especially heavy vehicles.

5.2.1. Ancillary facilities approval pathways

As per CoA A17 ancillary facilities not identified in the Approval Documents can be established and used if:

- a) they are located within the Construction boundary of the CSSI; and
- b) they are not located next to a sensitive receiver (including access roads) (unless landowners and occupiers have accepted in writing the carrying out of the relevant facility in the proposed location); and
- c) they have no impacts on heritage items (including areas of archaeological sensitivity), and threatened species, populations or ecological communities beyond the impacts approved under the terms of this approval; and
- d) the establishment and use of the facility can be carried out and managed within the outcomes set out in the terms of this approval, including in relation to environmental, social and economic impacts.

If proposed ancillary facilities are not identified in the Approval Documents and satisfy the conditions of CoA A17 they can only be established and operated when a Site Establishment Management Plan (SEMP) has been prepared as per CoA A18. The SEMP would require approval of the Planning Secretary.

Minor ancillary facilities are defined in CoA A22 as:

Lunch sheds, office sheds, portable toilet facilities, and the like, where they have been assessed in the documents listed Condition A1 or satisfy the following criteria:

- a) are located within or adjacent to the Construction boundary; and
- b) have been assessed by the ER to have –
 - i. minor amenity impacts to surrounding residences and businesses, after consideration of matters such as compliance with the Interim Construction Noise Guideline (ICNG) (DECC, 2009), traffic and access impacts, dust and odour impacts, and visual (including light spill) impacts, and
 - ii. minor environmental impact with respect to waste management and flooding, and
 - ii. no impacts on biodiversity, soil and water, and heritage items beyond those already approved under other terms of this approval

Refer to APPENDIX H for the assessment of the proposed laydown location on Station Street.

5.2.2. Boundary Screening

Boundary screening will be erected around ancillary facilities that are adjacent to sensitive receivers as required under CoA A23 and A24. This will be for the duration of Construction unless otherwise agreed with relevant councils, and affected residents, business operators or landowners. All boundary screening will minimise visual, noise and air quality impacts. Boundary screening at sites would be consistent with the requirements identified in the Detail Noise and Vibration Impact Statement's (DNVIS) prepared for the ancillary facilities.

In accordance with A24 boundary screening will minimise visual impacts on adjacent sensitive land uses. This will be achieved through the use of TfNSW designed / approved banner mesh being erected on the site fences.

5.3. Reinstatement of Work Areas

On completion of the works, any areas disturbed by Construction activities (such as areas for site compounds, material storage, access and haul roads and the provision of the Principal’s Project accommodation) will be reinstated and restored in accordance with consultation with Sydney Metro, the community and stakeholders. As a minimum, reinstatement will include the following:

- The Principal Contractor will clear and clean all working areas and accesses at project completion;
- At the completion of Construction all plant, temporary buildings or vehicles not required for the subsequent stage of Construction will be removed from the site;
- All land, including roadways, footpaths, loading facilities or other land having been occupied temporarily will be returned to their pre-existing condition or better; and
- Reinstatement of community spaces, infrastructure and services will occur as soon as possible after completion of Construction.

6. TRAFFIC MANAGEMENT

The construction traffic management requirements have been developed in accordance with CoA 103 – C119, the CEMF, The Sydney Metro Construction Traffic Management Framework (CTMF) as stated in Appendix F of the Staging Report and TfNSW General Specification G10 in the site-specific Construction Traffic Management Plan. The CTMP is managed as a standalone document.

6.1. Traffic Impact – Risk Assessment

Table 20 traffic Impact Risk Assessment

Risk Area	Risk Statements	C	L	Initial Risk Rating	Controls	C	L	Residual Risk Rating
Transport / traffic - construction	A lack of mitigation measures and management systems in relation to traffic management leads to frequent non-compliance with the Planning Approval. Complaints from the public Traffic incidents due to change in conditions	C4	L1	High	<ul style="list-style-type: none"> • CTMF/CTMP • ROLs to be developed, approved by TMC and implemented during works 	C5	L4	Low

7. CONSTRUCTION NOISE AND VIBRATION MANAGEMENT

The construction of the TBI would generate noise and vibration impacts to receivers. In accordance with the SM-WSA CNVS and CoA E47 Detailed Noise and Vibration Impact Statement (s) (DNVIS) have been developed for the project. The construction noise and vibration management requirements of the COAs, REMMs, CEMF and the SM-WSA CNVS are consolidated within the DNVIS. This DNVIS (provided in Appendix I) are used to assess noise and vibration impacts associated with the works and to developed mitigation measures to minimise impacts on the receivers

The findings of DNVIS have been incorporated into a Construction Noise and Vibration Management Procedure provided in Appendix J, prepared as required by the Staging Report based on the risk assessment presented in Table 21. .

7.1. Noise and Vibration Risk Assessment

Table 21 Noise and Vibration Risk Assessment

Risk Area	Risk Statements	C	L	Initial Risk Rating	Controls	C	L	Residual Risk Rating
Noise and vibration - construction	<p>A lack of mitigation measures and management systems in relation to Noise and Vibration management leads to unreasonable impacts on residents and businesses, and structural damage to buildings or heritage items.</p> <p>Disturbance to residents or neighbouring businesses during standard hours and out of hours works .</p> <p>Potential for complaints.</p>	C5	L3	Medium	<ul style="list-style-type: none"> ▪ Mitigation measures as per NVMP are to be implemented. ▪ Respond to community enquiries and complaints in accordance with Sydney Metro requirements and implement the OCCS. ▪ Consult with the community in relation to upcoming activities that may result in concern. ▪ Monitor noise for compliance as the works progress at receiver locations. ▪ Provide periods of respite for high noise generating activities. ▪ Apply noise mitigation measures during entire project. ▪ Control Measures as per the NVMP are to be implemented ▪ Noise efficient equipment to be used on site. ▪ Implement noise mitigation strategies for OOHW ▪ Monitor noise for compliance to project goals ▪ Determine vibration limits and structure/receiver offset distances. ▪ Consult with potentially affected parties prior to commencement of works on their upcoming activities that may be impacted by construction vibration. ▪ Ongoing vibration monitoring during vibration intensive works 	C5	L3	Medium

The noise and vibration procedure has been developed based on the risk assessment in Table 21, and is included in APPENDIX J.

8. HERITAGE MANAGEMENT

The following are the minimum general control measures to be implemented on the project. These control measures are in accordance with the CoAs, REMMs, CEMF and Aboriginal Cultural Heritage Management Plan (ACHMP).

8.1. Heritage Risk Assessment

Table 22 Heritage Risk Assessment

Risk Area	Risk Statements	C	L	Initial Risk Rating	Controls	C	L	Residual Risk Rating
Non-Aboriginal heritage - construction	<p>A lack of mitigation measures and management systems in relation to Heritage management leads to poor integration of heritage values in design and impacts on heritage items outside of what has been approved.</p> <p>Damage to heritage fabric of heritage items by Project works.</p> <p>In line with the EIS, and consistency assessment (document reference – SM-21-00400109) no works are anticipated to impact heritage items</p>	C5	L4	Low	<ul style="list-style-type: none"> ▪ If suspected heritage item encountered. Works to stop immediately and implement the Sydney Metro Unexpected Heritage Finds Procedure ▪ Mitigation measures to be included within CEMP ▪ General inductions toolbox training on heritage management protocols. ▪ Label any known heritage items on Environmental Control Maps. ▪ Work within the safe working distances nominated in the NVMP. ▪ Undertake vibration compliance monitoring as per the NVMP. ▪ Clearly highlight no-go zones on the ECM and communicate requirements to construction personnel during pre-start briefs, inductions and tool-box talks. ▪ Demarcation of worksites and communicate it clearly with all construction personnel. ▪ Works within the Heritage Curtilage would be completed in accordance with the SM-WSA Heritage Management Plan. 	C5	L5	Low
Aboriginal heritage – construction	<p>A lack of mitigation measures and management systems in relation to Heritage management leads to poor integration of heritage values</p>	C4	L6	Low	<ul style="list-style-type: none"> • Unexpected Finds Procedure to be implemented • Approved / updated ACHMP 	C5	L6	Low

	<p>in design and impacts on heritage items outside of what has been approved.</p> <p>In line with the EIS and consistency assessment (document reference – SM-21-00400109) , no works are anticipated to impact Aboriginal heritage items</p>							
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Based on the risk assessment, heritage management measures are included within the following sections of this CEMP.

8.2. Aboriginal Heritage

The Chapter 13 of the EIS, reported that Aboriginal items are not anticipated to be impacted with the Project footprint. Aboriginal Heritage will be management via the SM-WSA Unexpected Finds Protocol.

8.3. Non-Aboriginal Heritage

As reported in the Sydney Metro – Western Sydney Airport, Archaeological Research Design (Artefact, 2021), archaeological management zones have been developed for the Project footprint. These are shown in Figure 5.

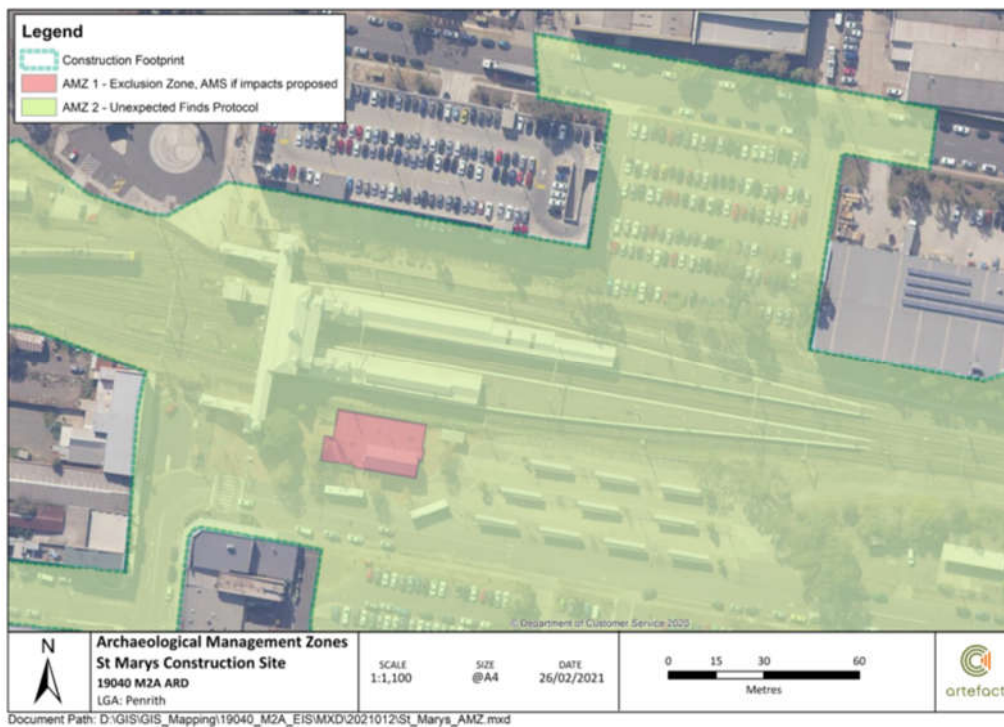


Figure 5 Archaeological Management Zones – St Marys Station

A review of the original Project scope of works was undertaken in comparison with the Archaeological Management Zones depicted in Figure 5. It was subsequently determined that all project works are undertaken outside of the AMZ-1 – Exclusion Zone. Refer to Figure 6 for a depiction of the works footprint. Consequently, all works will be undertaken under the SM - Unexpected Finds Protocol.

Additionally, the consistency assessment for the Phillip Street and Lethbridge Street reported that no known non-Aboriginal or Aboriginal heritage items are present in that area of those works.

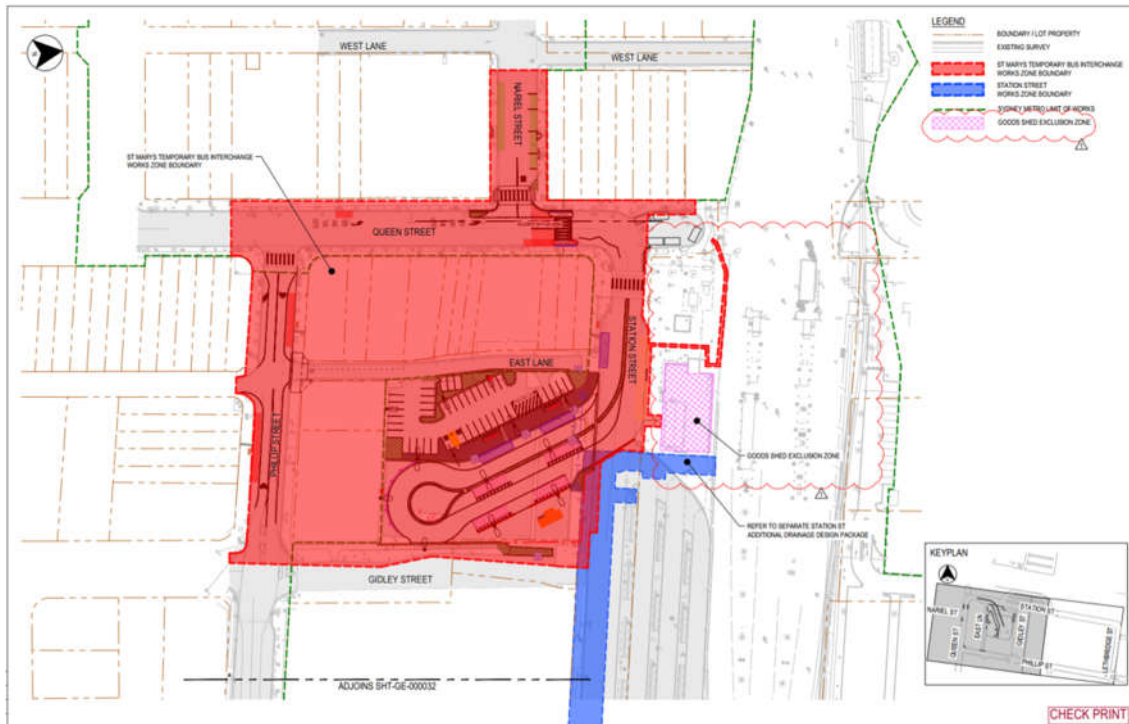


Figure 6 Works Footprint and Archaeological Exclusion Zone

8.4. Heritage Mitigation Measures

The Project will be undertaken with the following commitments in Table 23, Table 24, Table 25 and Table 26. The heritage mitigation measures identified are summarised in Table 27.

Table 23 Relevant Heritage CoAs Commitments

COA Reference	COA	How Addressed	Responsibility
E19	The Proponent must not destroy, modify or otherwise physically affect any Heritage item not identified in documents referred to in Condition A1. Unexpected heritage finds identified by the CSSI must be managed in accordance with the Unexpected Heritage Finds and Human Remains Procedure outlined in Conditions E34 to E36. Consideration of avoidance and redesign to protect unexpected finds of state heritage significance must be addressed where this condition applies	The SM-WSA Unexpected Finds Protocol will be implemented for the duration of the Project (refer to APPENDIX M). Commitment included in Table 27 Note where an unexpected find triggers additional CoAs, this management plan will be reviewed and updated in accordance with Section 3.17.	Project Manager Supervisor Environmental Manager
E20	The dismantling and reassembly of the jib crane at St Marys Station, if required, must only be undertaken under the supervision of a consultant experienced in the conservation of heritage machinery	Not triggered for this Scope of Works.	N/A
E21	The St Marys Goods Shed must not be destroyed, modified or otherwise adversely affected, except as identified in the documents listed in Condition A1	Not triggered for this Scope of Works. All works undertaken outside of identified exclusion zone.	N/A
E22	The Archaeological Research Design included in the documents listed in Condition A1 must be implemented during construction	Not triggered by this Scope of Works. Refer to Staging Plan	N/A
E23	Before commencement of archaeological excavation, the Proponent must, in consultation with Heritage NSW, nominate a suitably qualified Excavation Director, who complies with Heritage Council of NSW's Criteria for Assessment of Excavation Director (September 2019), to oversee and advise on matters associated with historical archaeology for the approval of the Planning Secretary. The Excavation Director must be present to oversee excavation, advise on archaeological issues, advise on the duration and extent of oversight required during archaeological excavations consistent with the Archaeological Research Design and Excavation Methodology(s) identified in the documents listed in Condition A1.	Not triggered for this scope of works. No archaeological excavation required for this Scope of Works	N/A

COA Reference	COA	How Addressed	Responsibility
	<p>More than one Excavation Director may be engaged for CSSI to exercise the functions required under the conditions of this approval</p>		
E24	<p>Archival photographic digital recording must be undertaken for all listed heritage items which will be affected by the CSSI. The recordings must be undertaken prior to the commencement of Work which may impact the items and documented in an Archival Recording Report. The recordings must include buildings, structures and landscape features and detailed maps showing the location of features. The archival recording must be prepared in accordance with How to Prepare Archival Records of Heritage Items (NSW Heritage Office, 1998) and Photographic Recording of Heritage Items Using Film or Digital Capture (NSW Heritage Office, 2006)</p>	<p>Prior to works commencing within the St Marys Station heritage curtilage, an Archival recording of the Good Shed would be completed. The archival recording is limited to the Goods Shed structure and immediate surface surrounds (ie no archaeological investigations would be undertaken) due to utility works being undertaken in this area.</p> <p>Further Archival recordings of other heritage buildings and archaeological investigations would be completed by subsequent SM-WSA contractors undertaking works that impact on those features.</p>	<p>Project Manager Environmental Manager</p>
E25	<p>The Archival Recording Report must be submitted to the Planning Secretary, relevant councils and Heritage NSW for information within 12 months of completing all work described in the documents listed in Condition A1 in relation to heritage items. Copies of the Archival Recording Report must also be provided to relevant local historical societies</p>	<p>The archival recording outlined above, will be provided to SM-WSA for inclusion in the overall Archival Recording Report for the complete SM-WSA Project, which will be submitted to the Planning Secretary by SM-WSA as required by COA 25.</p>	<p>Environmental Manager</p>

COA Reference	COA	How Addressed	Responsibility
E26	Following completion of all work described in the documents listed in Condition A1 in relation to heritage items, a non-Aboriginal Archaeological Excavation Report including the details of further historical research either undertaken or to be carried out and archaeological excavations (with artefact analysis and identification of a final repository for finds) and addressing the research design, must be prepared in accordance with any guidelines and standards required by the Heritage Council of NSW and Heritage NSW	COA currently not triggered and no archaeological investigations are proposed/required as part of these works. Works undertaken within heritage curtilage will apply the SM-WSA Unexpected Finds Protocol for the duration of the Project (refer to APPENDIX M). Commitment included in Table 27	Supervisor Environmental Manager
E27	The non-Aboriginal Archaeological Excavation Report must be submitted to the Planning Secretary, relevant councils and Heritage NSW for information within 12 months of completing all Work described in the documents listed in Condition A1 in relation to heritage items. Copies of the Report must also be provided to relevant local historical societies and local libraries	COA currently not triggered. If required, the non-Aboriginal Archaeological Excavation report will be submitted in accordance with the timing required of E27	Environmental Manager
E28	All reasonable steps must be taken so as not to harm, modify or otherwise impact Aboriginal objects or places of cultural significance except as authorised by this approval	Scope of Works are not anticipated to impact Aboriginal heritage. The SM-WSA Unexpected Finds Procedure is to be implemented for the duration of the Project	Supervisor Environmental Manager
E29	The Registered Aboriginal Parties (RAPs) must be kept regularly informed about the CSSI. The RAPs must continue to be provided with the opportunity to be consulted about the Aboriginal cultural heritage management requirements of the CSSI throughout construction	TfNSW / SM-WSA will keep RAPs regularly informed as required.	TfNSW Environmental Officer
E30	The Aboriginal Cultural Heritage Management Plan included in the documents listed in Condition A1 must be updated to include:	The ACHMP will be implemented for the duration of the Project. The ACHMP is provided in APPENDIX K It is noted that Aboriginal artefacts are not anticipated based on the scope of works	TfNSW Environmental Officer
	(a) a methodology for the completion of pedestrian surveys for all areas within the project footprint yet to be surveyed;		
	(b) procedures for undertaking further test excavation and, if necessary, salvage excavations prior to the commencement of works in areas subject to further test excavation;		

COA Reference	COA	How Addressed	Responsibility
	<p>(c) mapping that clearly outlines all areas yet to be subject to survey, test excavations, and salvage excavations;</p> <p>(d) a procedure to update mapping following the completion of survey, test excavations, and salvage excavations that detail the archaeological works conducted across the project footprint;</p> <p>(e) a procedure for updating the predictive model following the identification of new Aboriginal heritage items; and</p> <p>(f) a procedure to report and update the effectiveness of the Aboriginal Cultural Heritage Management Plan following the completion of survey, test excavation activities or significant artefact finds.</p> <p>The updated Plan must be submitted to the Planning Secretary for information prior to works in areas identified for further test excavations.</p> <p>Note: Salvage excavations in the areas identified for salvage in documents in Condition A1, may occur prior to additional test excavations occurring</p>		
E31	The updated Aboriginal Cultural Heritage Management Plan must be implemented for the duration of salvage activities and construction.	<p>The ACHMP will be implemented for the duration of the Project. The ACHMP is provided in APPENDIX K</p> <p>Note that Aboriginal Heritage is not anticipated to be impacted by this scope of works</p>	Project Manager Environmental Manager
E32	<p>At the completion of Aboriginal cultural heritage test and salvage excavations, an Aboriginal Cultural Heritage Excavation Report(s) must be prepared by a suitably qualified person. The Aboriginal Cultural Heritage Excavation Report(s) must:</p> <p>(a) be prepared in accordance with the Guide to Investigation, assessing and reporting on Aboriginal cultural heritage in NSW, OEH 2011 and the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales, DECCW 2010; and</p>	The ACHMP will be implemented for the duration of the Project. The ACHMP is provided in APPENDIX K.	Project Manager Supervisor Environmental Manager

COA Reference	COA	How Addressed	Responsibility
	<p>(b) document the results of the archaeological test excavations and any subsequent salvage excavations (with artefact analysis and identification of a final repository for finds).</p> <p>The RAPs must be given a minimum of 28 days to consider the report(s) and provide comments before the report(s) is finalised. The final report(s) must be provided to the Planning Secretary, Heritage NSW, the relevant Councils, Gandangara LALC and Deerubbin LALC, the RAPs and local libraries within 24 months of the completion of the Aboriginal archaeological excavations (both test and salvage)</p>	Note that Aboriginal Heritage is not anticipated to be impacted by this scope of works	
E33	Where previously unidentified Aboriginal objects or places of cultural significance are discovered, all work must immediately stop in the vicinity of the affected area. Works potentially affecting the previously unidentified objects or places must not recommence until Heritage NSW has been informed. The measures to consider and manage this process must be specified in the Unexpected Heritage Finds and Human Remains Procedure required by Condition E34 and include registration in the Aboriginal Heritage Information Management System (AHIMS), where required	The SM-WSA Unexpected Finds Protocol will be implemented for the duration of the Project (refer to APPENDIX M). Commitment included in Table 27	Project Manager Supervisor Environmental Manager
E34	An Unexpected Heritage Finds and Human Remains Procedure must be prepared to manage unexpected heritage finds (heritage items and values) in accordance with any guidelines and standards prepared by the Heritage Council of NSW or Heritage NSW	The SM-WSA Unexpected Finds Protocol will be implemented for the duration of the Project (refer to APPENDIX M). Commitment included in Table 27	Project Manager Supervisor Environmental Manager
E35	The Unexpected Heritage Finds and Human Remains Procedure must be prepared by a suitably qualified and experienced heritage specialist in consultation with the Heritage Council of NSW (with respect to non-Aboriginal cultural heritage) and in relation to Aboriginal cultural heritage, in accordance with the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW 2010) and submitted to the Planning Secretary for information no later than one (1) month before the commencement of construction	The SM-WSA Unexpected Finds Protocol will be implemented for the duration of the Project (refer to APPENDIX M). Commitment included in Table 27	Project Manager Supervisor Environmental Manager
E36	The Unexpected Heritage Finds and Human Remains Procedure, as submitted to the Planning Secretary, must be implemented for the duration of construction. Where archaeological investigations have been undertaken as a result of Unexpected Finds notifications then a Final Archaeological Report must be provided in accordance with Heritage Council guidance and standard requirements for final reporting under Excavation Permits.	The SM-WSA Unexpected Finds Protocol will be implemented for the duration of the Project (refer to APPENDIX M). Commitment included in Table 27	Project Manager Supervisor Environmental Manager

COA Reference	COA	How Addressed	Responsibility
	Note: Human remains that are found unexpectedly during the carrying out of work may be under the jurisdiction of the NSW State Coroner and must be reported to the NSW Police immediately. Management of human remains in NSW is subject to requirements set out in the Public Health Act 2010 (NSW) and Public Health Regulation 2012 (NSW). Nothing in these conditions prevents separate procedures for the Unexpected Heritage Finds and Human Remains Procedure		

Table 24 Relevant Heritage REMMs as identified in the Staging Report

REMM Reference	REMM Requirement	How Implemented	Responsibility
NAH1	Potential moveable heritage items would be identified and assessed and a significant fabric salvage schedule would be prepared by an appropriately qualified and experienced heritage specialist for St Marys Railway Station, Bringelly RAAF Base, McGarvie-Smith Farm, and McMasters Farm. Significant fabric would only be salvaged if it can be salvaged in such a way that it can be reused and is likely to be able to be reused	Not triggered Works are undertaken outside of St Marys Train Station exclusion zone.	NA
NAH5	Archaeological investigations would be undertaken in accordance with recommendations in the non-Aboriginal Archaeological Research Design	Works are undertaken outside of St Marys Train Station exclusion zone. Works to proceed under SM-WSA Unexpected Finds Protocol will be implemented for the duration of the Project (refer to APPENDIX M)	Project Manager Supervisor Environmental Manager
NAH6	The following heritage items would be monitored for potential vibration impacts during construction: • St Marys Railway Station Group • Queen Street Post-War Commercial Building	Vibration monitoring to be undertaken as identified in DNVIS	Supervisor Environmental Manager

REMM Reference	REMM Requirement	How Implemented	Responsibility
	<ul style="list-style-type: none"> • St Marys Munitions Workers Housing 		
	<ul style="list-style-type: none"> • McGarvie Smith Farm 		
	<ul style="list-style-type: none"> • McMaster Farm 		
NAH7	If required, the St Marys Station jib crane would be temporarily relocated prior to construction that may impact on this item, safely stored and appropriately maintained and conserved before reinstatement. If relocation is required, a detailed methodology for the removal and reinstatement of the jib crane would be prepared in consultation with an appropriately qualified heritage advisor	NA - Not triggered by this scope of works	NA
NAH9	If suspected human remains or unexpected items of potential heritage significance are discovered within the on-airport area, all activity would cease and the unexpected/chance finds requirements specified in the Western Sydney Airport European and Other Heritage Construction Environmental Management Plan would be followed	Works to proceed under SM-WSA Unexpected Finds Protocol will be implemented for the duration of the Project (refer to APPENDIX M)	Supervisor Environmental Manager
AH1	Aboriginal stakeholder consultation would continue to be carried out in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (NSW Office of Environment and Heritage, 2010). Registered Aboriginal Parties would be provided with opportunities to participate in survey and testing in unverified areas of Aboriginal archaeological sensitivity, archaeological salvage works and unexpected find assessments (if required).	TfNSW / SM-WSA will keep RAPs regularly informed as required.	TfNSW Environmental Officer
AH2	Areas of unverified Aboriginal archaeological sensitivity would be subject to archaeological survey, if required, and test excavation prior to construction in accordance with the Aboriginal Cultural Heritage Management Plan	<p>EIS has identified that Aboriginal heritage is unlikely to be encountered during this scope of works</p> <p>Works to proceed under SM-WSA Unexpected Finds Protocol will be implemented for the duration of the Project (refer to APPENDIX M)</p>	Supervisor Environmental Manager

REMM Reference	REMM Requirement	How Implemented	Responsibility
AH6	Aboriginal Heritage Information Management System site cards would be produced for all newly identified sites other than those identified on Commonwealth land. and These should be submitted to the Aboriginal Heritage Information Management System Registrar as soon as practicable within one month of being identified. Newly identified sites within the revised boundaries of Defence Establishment Orchard Hills (Commonwealth land) would be reported to the Department of Defence to be managed in accordance with the relevant provisions of the Defence Establishment Orchard Hills Heritage Management Plan	This CoA will be implemented if requirement is triggered.	TfNSW Environmental Manager
AH7	Aboriginal Site Impact Recording forms for sites subject to archaeological salvage would be submitted to the Aboriginal Heritage Information Management System register within one month of the completion of salvage works within their bounds	This CoA will be implemented if requirement is triggered.	TfNSW Environmental Manager
AH8	If any suspected human remains or unexpected Aboriginal cultural heritage objects are discovered within the on-airport area, all activity will cease and the unexpected finds protocol and discovery of human remains protocol specified in the Western Sydney Airport Aboriginal Cultural Heritage Construction Environmental Management Plan would be followed	Works to proceed under SM-WSA Unexpected Finds Protocol will be implemented for the duration of the Project (refer to APPENDIX M)	Supervisor Environmental Manager
AH9	Works within the bounds of existing Aboriginal Heritage Impact Permit areas should be undertaken in accordance with the conditions of those permits and with permission from the relevant Aboriginal Heritage Impact Permit holder. Works undertaken within the revised boundaries on Defence Establishment Orchard Hills (Commonwealth land) should be undertaken in accordance with the Defence Establishment Orchard Hills Heritage Management Plan	Not triggered by this scope of works	NA
AH10	Impacted Aboriginal Sites would be managed in accordance with the Aboriginal Cultural Heritage Management Plan	Not triggered by this scope of works	NA
AH11	Measures would be implemented to ensure that Aboriginal sites located outside of the construction footprint, but within 100m of it, would not be affected by construction activities	Not triggered by this scope of works	NA
AH12	An Archaeological Salvage Report detailing the results of the archaeological salvage program (including the results of any post excavation analyses) would be completed within two years of the completion of the fieldwork component of the program. The Archaeological Salvage Report would be consistent with the best practice guidelines suggested by the	Not triggered by this scope of works	NA

REMM Reference	REMM Requirement	How Implemented	Responsibility
	Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (DECCW 2010) and the Aboriginal Cultural Heritage Standards & Guidelines Kit (NSW NPWS 1997)		
AH13	Measures to manage and protect the identified cultural values would be developed collaboratively through a consultation process with knowledge holders to inform construction planning and design development	Not triggered by this scope of works	NA

Table 25 ACHMP Management Requirements

ACHMP Reference	ACHMP Requirement	How Implemented	Responsibility
Specific Management Requirement - Nil	No specific ACHMP requirement related to the project footprint	NA	NA
4.5	Unexpected Aboriginal heritage finds are to be managed in accordance with Section 6.24 of Sydney Metro's Unexpected Heritage Finds Procedure [SM-18-00105232]	SM-WSA Unexpected Finds Procedure to be implemented (APPENDIX M)	Project Manager Environmental Manager Supervisor
4.6	In the event that suspected human skeletal material is exposed within the off-airport component of the construction footprint, Sydney Metro's Unexpected Heritage Finds Procedure [SM-18-00105232], will be followed	SM-WSA Unexpected Finds Procedure to be implemented (APPENDIX M)	Project Manager Environmental Manager Supervisor

Table 26 CEMF Heritage Management Requirements

CEMF Reference	CEMF Requirement	How Implemented	Responsibility
9.1 a	<ul style="list-style-type: none"> a) Embed significant heritage values through any architectural design, education or physical interpretation; b) Minimise impacts on items or places of heritage value; c) Avoid accidental impacts on heritage items; d) Maximise worker's awareness of indigenous and non-indigenous heritage; and e) For on-airport works, the Sydney Metro Western Sydney Airport Aboriginal Cultural Heritage CEMP and the European and Other Heritage CEMP will detail all the heritage management objectives and will be consistent with the WSA Aboriginal Cultural Heritage CEMP and European and Other Heritage CEMP, including all appendices to these CEMP documents. 	<ul style="list-style-type: none"> a) Wards contact is construct only. Heritage values to be implemented by TfNSW / SM-WSA b) Works undertaken outside of exclusion zone and implementation of SM-WSA Unexpected Finds Protocol will be implemented for the duration of the Project (refer to APPENDIX M) c) Works undertaken outside of exclusion zone d) Heritage items to be included within Project environmental induction e) N/A works off airport 	Supervisor Environmental Manager
9.2a	On-airport management of Aboriginal cultural heritage and European heritage will be achieved through the implementation of the SMWSA Aboriginal Cultural Heritage and the European and Other Heritage CEMPs .Principal Contractors will develop and implement a Heritage Management Plan for all off-airport works	A HMP is not required in accordance with the Staging Report	NA
9.2 b	The Contractor's regular inspections will include checking of Aboriginal and non-Aboriginal heritage mitigation measures	Heritage to be included in regular inspection checklists	Environmental Manager
9.2 c	Compliance records will be retained by the Contractor. These will include: <ul style="list-style-type: none"> i. Inspections undertaken in relation to heritage management measures; ii. Archival recordings undertaken of any heritage item; 	The identified records will be kept on file.	Environmental Manager

CEMF Reference	CEMF Requirement	How Implemented	Responsibility
	iii. Unexpected finds and stop work orders; and iv. Records of any impacts avoided or minimised through design or construction methods		
9.3	The on-airport Aboriginal Cultural Heritage and European and Other Heritage CEMPs and the off-airport Heritage Management Plan will include the following mitigation measures as well as relevant Conditions	A HMP is not required in accordance with the Staging Report	NA

Table 27 summarises the mitigation measures to be implemented to minimise heritage impacts during the project.

Table 27 Heritage Mitigation Measures

No.	Mitigation Measures	Responsibility	Project Phase
HM1.	Heritage measures from this plan will be included within the Project induction and within relevant Environmental Control Maps (ECMs). Work crews are to be made aware of the ECM and heritage requirements.	PM / EMR	Prior to construction / Construction
HM2	The SM-WSA Unexpected Finds Procedure and Human skeletal remains procedure is to be implemented for the duration of the Project (APPENDIX M)	PM / EMR	Prior to construction / Construction
HM3	Prior to commencing works, a detailed assessment of vibration impacts is to be undertaken to determine the potential impacts and subsequent mitigation measures to prevent impacts through vibration. Refer to the DNVIS for the assessment of vibration impacts.	EMR	Prior to construction
HM4	Prior to commencing works in the vicinity of the Parcel Office building, a building condition survey is to be undertaken	PM / EMR	Prior to construction
HM5	Exclusion fencing with screening (shade clothe) to be erected between the active work area and the Parcel Office building to prevent direct impacts to the building. No work is to be undertaken within the identified exclusion zone.	Supervisor	Construction
HM6	Where identified in the DNVIS, vibration monitoring is to be undertaken during vibratory works.	Supervisor / EMR	Construction



9. FLORA AND FAUNA

The following are the minimum general control measures to be implemented on the project. These control measures are in accordance with the CoAs, REMMs, CEMF. In accordance with the Staging Report, no Flora and Fauna CoAs or REMMs are triggered for this scope of works. In addition, no relevant mitigation measures are triggered in the CEMF.

It is noted that vegetation removal is not required as part of the scope of works of the Project. Subsequently, impacts to fauna are not anticipated.

9.1. Biodiversity Risk Assessment

Table 28 Biodiversity Risk Assessment

Risk Area	Risk Statements	C	L	Initial Risk Rating	Controls	C	L	Residual Risk Rating
Biodiversity – construction	A lack of mitigation measures and management systems in relation to biodiversity management leads to unreasonable impacts to flora and fauna, spread of weeds and pathogens, and unintended vegetation clearance. Unauthorised works / removal of vegetation outside defined work area, possibility of removing threatened species, fines incurred No vegetation removal anticipated during this scope of works.	C5	L6	Low	<ul style="list-style-type: none"> Unexpected Threatened Species Finds to be implemented 	C6	L6	Low

Based on the risk assessment, biodiversity management measures are included within the following sections of this CEMP.

9.2. Flora and Fauna Mitigation Measures

Table 29 shows the relevant flora and fauna mitigation measures to be implemented during the Project.

Table 29 Flora and Fauna Mitigation Measures

No.	Mitigation Measures	Responsibility
FF-1	If any fauna is observed on site. Works are to cease until the animal has left the area. Workers are not to approach the animal. Should relocation of an animal be required, an appropriate location will be identified by a suitably experienced ecologist. Contact the ESR for further advice. Contact Wires: 1300 094 737	Project Manager Supervisor Environmental Manager

No.	Mitigation Measures	Responsibility
	Records of fauna captured and relocated are to be kept. Records will be saved on the Project server and provided to TfNSW on requires.	
FF-2	<p>If an unexpected threatened species, habitat or population is encountered implement the following unexpected finds process.</p> <pre> graph TD A[Threatened flora or fauna species, habitat or population unexpectedly encountered] --> B[STOP WORK Avoid direct contact with wildlife] B --> C[Notify the Environment Manager (Rowan Grace - 0402 822 116)] C --> D[Environmental Manager to arrange for an ecologist to conduct an assessment as to the significance of the likely impact, develop management options and notify OEH, DPIE, DAWE and the principal as appropriate.] D --> E{Is an impact likely to occur?} E -- Yes --> F[Consult with OEH, DPIE or DAWE as appropriate] E -- No --> G[Recommend work and maintain regular inspections] F --> H[Obtain approvals, licences or permits as required] H --> I[Recommend works once advice is sought and necessary approvals, licences and permits are obtained] I --> J[Include species, habitat or population in subsequent inductions, toolbox talks and update the CEMP] G --> J </pre>	Project Manager Supervisor Environmental Manager

10. VISUAL AMENITY

This landscape character area comprises a highly urban setting with a diverse mix of land uses and attracts a high concentration of people from across the region. Based on the risk assessment in Table 32 management measures are included within the following sections of this CEMP.

10.1. Visual Amenity Risk Assessment

Table 30 Visual Amenity Risk Assessment

Risk Area	Risk Statements	C	L	Initial Risk Rating	Controls	C	L	Residual Risk Rating
Landscape and Visual	A lack of mitigation measures and management systems in relation to visual amenity	C 4	L3	Med	<ul style="list-style-type: none"> Screening to be erected around long term work areas 	C 5	L4	Low

Impact - construction	management leads to unreasonable visual impacts on the surrounding community, landscape features and poor landscape design outcomes.				<ul style="list-style-type: none"> ▪ TfNSW branded shade clothe to be erected ▪ Work areas to be kept clean and tidy ▪ Lighting required during night works shall be directed towards the work area and are from adjacent sensitive receivers 			
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10.2. Visual Amenity Mitigation Measures

The Project will be implemented in accordance with the relevant CSSI 10051, (CoA A24), REMMs and CEMF. Table 31 shows relevant visual amenity controls.

Table 32 summarises the mitigation measures / controls required to satisfy the requirements of the CEMF, COAs and REMM.

Table 31 Relevant Visual Amenity Controls

Reference	Mitigation Measures	How Implemented	Responsibility
Condition of Approval CoA A24	Boundary screening required under Condition A23 must minimise visual impacts on adjacent sensitive land use(s)	Shade clothe is to be erected on site boundaries to screen sensitive receivers	Supervisor
CoA E61	Wayfinding information must be incorporated on temporary hoardings to guide pedestrians around the St Marys construction site and enhance their understanding and experience of the locality and space.	Wayfinding requirements included with the CTMP and erected in accordance with approved TCPS and ROLs. Commitments included with CTMP	Supervisor
CoA E62	The CSSI must be constructed in a manner that minimises visual impacts of construction sites including temporary landscaping and vegetative screening, minimising light spill, and incorporating architectural treatment and finishes within key elements of temporary structures that reflect the context within which the construction sites are located, wherever practicable.	Temporary screening to be implemented around work areas During out of hours works, lights to be directed to minimise light spill Design to be undertaken to incorporate visual amenity aspects. Note that Ward's scope of work is construct only. Design managed by TfNSW	Supervisor
CEMF 11.1a	The following visual and landscape management objectives will apply to the construction of the project: i. Minimise impacts on existing landscape features as far as feasible and reasonable; ii. Ensure the successful implementation of the Landscape Design; iii. Reduce visual impact of construction to surrounding community; and iv. For on-airport works, the Sydney Metro Western Sydney Airport Visual and Landscape CEMP will detail all the visual amenity and landscaping management objectives and will be consistent with the WSA Visual and	<ul style="list-style-type: none"> i. Works to be undertaken in accordance with the design provided. The design will be developed to minimise impacts on existing features. Note that design is managed by TfNSW ii. Works to be undertaken in accordance with the design provided iii. Works to be undertaken in accordance with COA A24 iv. NA 	Supervisor

Reference	Mitigation Measures	How Implemented	Responsibility
	Landscape CEMP, including all the appendices to the CEMP		
CEMF 11.2a	<p>An-airport management of visual and landscaping will be achieved through the implementation of the SMWSA Visual and Landscape CEMP and Principal Contractors will develop and implement a Visual Amenity Management Plan for all the off-airport temporary works which will include as a minimum:</p> <ul style="list-style-type: none"> i. The visual mitigation measures as detailed in the planning approval documentation for construction; ii. Input from an experienced Landscape or Urban Designer; iii. The maintenance of outward facing elements of site hoarding or noise barriers, including the removal of graffiti and weeds; iv. Apply the principles of Australian Standard 4282-1997 Control of the obtrusive effects of outdoor lighting and relevant safety design requirements and detail mitigation measures to minimise lighting impacts on sensitive receivers for all permanent, temporary and mobile light sources; v. Identify the processes and procedures that will be used for the incorporation of the principles of Crime Prevention Through Environmental Design (CPTED) in the design and construction of any temporary site facilities; and vi. Compliance record generation and management. 	<p>Management plan is not required in accordance with the Staging Report.</p> <ul style="list-style-type: none"> i. Visual amenity controls are included within this CEMP (refer to Table 32) ii. The TBI will be design with input from an experienced landscape or urban designer. It is noted that design of the TBI is managed by TfNSW iii. Graffiti will be cleaned from surfaces and weeds removed from outward facing facades (refer to Table 32) iv. The TBI lighting design will consider the principals of AS 4282-1997. It is noted that design of the TBI is managed by TfNSW v. The principles of CPTED will be incorporated into the design. It is noted that design of the TBI is managed by TfNSW vi. Compliance records related to visual amenity impacts will be retained on file in accordance with Section 3.16 	Supervisor
CEMF 11.2 b	Visual and landscape measures will be incorporated into the Principal Contractor's regular inspections including checking the health of retained vegetation around site boundaries, checking the condition of any site hoarding and acoustic sheds, and checking the position and direction of any sight lighting	<p>To be incorporated into regular inspections</p> <p>Template inspection checklist included in APPENDIX L</p>	Environmental manager
CEMF 11.2 c	The Contractor will retain compliance records of any inspections undertaken in relation to visual and landscape measures	Records of inspections are to be kept	Environmental Manager
CEMF 11.3 a	<p>The on-airport Visual and Landscape CEMP and the off-airport Visual Management Plan will include the following visual amenity mitigation measures as well as relevant Conditions:</p> <ul style="list-style-type: none"> i. Wherever feasible and reasonable, vegetation around the perimeter of the construction sites will be maintained; ii. Existing vegetation not affected by the construction works will be retained; 	<p>Not triggered as per Staging Report</p> <ul style="list-style-type: none"> i. Vegetation around the perimeter of construction areas to be retained where feasible ii. Vegetation not impacted will be protected to ensure damage to retained trees does not occur (refer to Table 32) iii. Construction will be designed to minimise visual amenity impacts. It 	Supervisor

Reference	Mitigation Measures	How Implemented	Responsibility
	iii. Temporary construction works will be designed with consideration of urban design and visual amenity as per Section 4.4; and the Sydney Metro Construction Environmental Management Framework iv. Temporary site lighting, for security purposes or night works will be installed and operated in accordance with AS4282:1997 Control of the Obtrusive Effect of Outdoor Lighting.	is noted that design of the TBI is managed by TfNSW iv. Temporary lighting will be positioned to avoid impacts on receivers (refer to Table 32)	

Table 32 summarises the visual amenity mitigation measures to be implemented on the Project.

Table 32 Visual Amenity Mitigation Measures

No.	Mitigation Measures	Responsibility
VA-1	Shade clothe is to be erected on site boundaries to screen sensitive receivers	Supervisor
VA-2	Graffiti will be cleaned from surfaces and weeds removed from outward facing facades	Supervisor
VA-3	Retained trees are to be protected during construction to prevent damage	Supervisor
VA-4	During out of hours works, light to be positioned to reduce visual impacts on nearby receivers	Supervisor
VA-5	Lighting at the compound / laydown areas is to be positioned to avoid light spill into nearby residents on Station Street	Supervisor

11.SOIL AND WATER MANAGEMENT

The following are the minimum general control measures to be implemented on the project. These control measures are in accordance with the CoAs, REMMs and CEMP. Based on the risk assessment in Table 33 management measures are included within the following sections of this CEMP.

11.1. Soil and Water Risk Assessment

Table 33 Soil and Water Risk Assessment

Risk Area	Risk Statements	C	L	Initial Risk Rating	Controls	C	L	Residual Risk Rating
Flooding, Hydrology and Water Quality – construction	A lack of mitigation measures and management systems in relation to soil and water management leads to unexpected pollution events, water quality impacts on adjacent water bodies, and soil erosion.	C5	L5	Low	<ul style="list-style-type: none"> Mitigation Measures as per CEMP and ESCP to be implemented. Install erosion and sediment controls within the project area. Ensure measures are inspected and maintained as the works progress and 	C5	L4	Low

Risk Area	Risk Statements	C	L	Initial Risk Rating	Controls	C	L	Residual Risk Rating
	<p>Degradation of local watercourses. Increased turbidity in local water ways resulting in impact on aquatic life.</p> <p>Fines for sediment escaping site.</p> <p>Wind and water erosion causing weed/seed dispersion offsite.</p> <p>Location of stockpiling next to waterways causing weeds/seeds to disperse from construction site</p> <p>Non-compliant water entering stormwater system waterways (i.e. polluting - not compliant with discharge criteria).</p>				<p>also prior to and post rainfall events.</p> <ul style="list-style-type: none"> ▪ Provide training and awareness on the need to prevent pollution. ▪ Relevant people to undertake Erosion and Sediment Control training ▪ Develop Environmental Control Maps to show stockpile areas. ▪ Utilise appropriate locations for stockpiling (away from waterways, watercourses, drains where feasible and reasonable). ▪ Designated vegetation stockpiling areas. ▪ Minimise stockpiling / Use temporary stockpiling ▪ Cover stockpiles if left for extended periods ▪ Environmental Manager to approve all water discharges from site. Note that prior to discharge a NSW EPA endorsed / approved Water Pollution Impact Assessment (in accordance with CoA E130) must be completed. ▪ No construction site water would be pumped/discharged from the site into the stormwater system ▪ Induction and toolbox talks ▪ Toolbox training on site procedures for water discharge Note that prior to discharge a NSW EPA endorsed / approved Water Pollution Impact Assessment. (in accordance with CoA E130) must be completed. ▪ Educate site staff on requirements and consequences of prosecution 			

11.2. Surface Water Monitoring

Ward is proposing not to implement a broad Surface Water Quality Monitoring program, in accordance with CoA C13 based on the following:

- The nearest surface water body is located approximately 1km to the west of the site (South Creek). Between the site and the nearest water body, there are commercial and industrial properties that also have surface water that flows into South Creek.
- There are developments throughout the catchment that also have overland flows that contribute to water to South Creek.
- The size of the respective work area in comparison to the overall catchment size is comparatively small and any run off would have a negligible impact on the water quality of south creek
- The Project consists primarily of improvements to road pavement and road infrastructure including drainage. The majority of the works will be below grade, therefore will collect rainfall and overland flow rather than allowing its release.
- Currently discharge of water into the stormwater system is not proposed. if, it is proposed to discharge/pump site water into the stormwater system, a water pollution impact assessment will be developed in consultation with EPA prior to this being permitted. This has not been completed to date. Should water be discharge from site,

Based on the scope of the Project it would be unlikely to have measurable impacts on South Creek. Furthermore, any measured changes within the Creek would be indistinguishable from other contributors to the catchment flow. Therefore, monitoring of surface water is not proposed as part of delivery of this Project.

11.2.1. Weather Events

Erosion and sediment controls will be monitored on a regular basis and after a rain event of 10mm or greater (80% chance with a 24hour period) (including clearing of sediment from behind barriers). Records of inspections will be retained.

In the event of forecast storm events, rainfall greater than 10mm (80% chance with a 24hour period) or flooding event the following will occur:

- Inspect the site to ensure that all erosion/sedimentation and stabilisation controls are in place and in effective working order.
- Cease all work in the vicinity of flood-prone areas and collect all loose materials and wastes, and
- If there is a possibility that work sites could be flooded, take action to prevent any environmental incidents such as potential pollution incidents and protecting disturbed ground from erosion, including relocating all materials that could cause harm onto higher ground and away from flood prone areas.

11.3. Water Quality Discharge

11.3.1. Requirements to Discharge Water

Currently discharge of water into the stormwater system is not proposed. If, it is proposed to discharge/pump site water into the stormwater system, a water pollution impact assessment (in accordance with CoA E130) will be developed in consultation with EPA prior to this being permitted. This has not been completed to date.

Additionally, prior to discharging collected surface water, water must be tested and, if required, treated to ensure that it meets water quality criteria and that pollution of the receiving waters does not occur.

Before water can be discharged to any receiving waters (whether on or off site), it must as a minimum meet the following criteria as presented in Section 11.3.2.

No site water would be discharged/pumped directly into the adjacent stormwater system. Any water discharged from the site would be discharged into a truck and legally disposed of off-site or utilised for dust suppression on site.

11.3.2. Discharge Criteria

Water quality monitoring for the project, will be undertaken through the monitoring of water, prior to discharge of stormwater from the site.

The following Water Quality Discharge Criteria is to be adopted for this scope of works. Criteria is based on the *TfNSW Technical Guideline (EMS-TG-011): Environmental Management of Construction Site Dewatering* (it is noted that the criteria in the CoAs are related to wastewater treatment plants. Treatment plants will not be used during this scope of works).

Table 34 Discharge Criteria

pH	6.5-8.5
Oil and Grease	None visible
Total suspended solids	<50 mg/L

Note that there is currently no guideline for discharge based on turbidity (NTU) of the pooled water.

Prior to using turbidity as a discharge guideline (instead of TSS), a relationship between TSS and turbidity is required to be established. This is a site specific relationship and is to be developed for the Project. A NATA accredited laboratory will be used to complete the analysis.

To use turbidity for discharge criteria, prior approval is required from the TfNSW Environmental Officer. Should a correlation be proposed a statistical correlation assessment methodology and results will be provided to the TfNSW Environmental Officer before using turbidity in place of TSS for approval.

The applicable NTU value has not been established to date.

11.3.3. Treating Water Prior to Discharge

Table 35 is to be considered prior to the discharge of waters. It is noted that if it is proposed to discharge/pump site water into the stormwater system, a water pollution impact assessment will be developed in consultation with the NSW EPA prior to discharge being permitted. Note that this has not been completed to date.

Table 35 Treating Water Prior to Discharge

Parameter	Method
Oil and grease	<ul style="list-style-type: none"> - Examine surface of water immediately prior to discharge for evidence of oil and grease (e.g. sheen, discolouration). - No action is required if there is no visual contamination. - If there is contamination, the contaminated water must either be disposed of at a licenced disposal facility, or treated using appropriate absorbent materials, which must be spread on the surface. - Any used absorbent materials are to be disposed of appropriately.

Parameter	Method
pH levels	<p>pH will be tested onsite using pH strips or a calibrated pH monitor. If pH is outside the range 6.5–8.5 the water will need to be neutralised. This may be achieved via three methods which are dependent on site and time constraints. The treatment methodology will be confirmed based on the conditions encountered in consultation with the Ward environmental coordinator and TfNSW environmental project officer:</p> <ul style="list-style-type: none"> - natural – allowing the water to sit for a period of time and naturally neutralise. - mixing – by mixing with other site water of a higher or lower pH (i.e. other water has also been tested), to achieve pH 6.5-8.5. - acid/base addition – if the water is above 8.5, acid is used to lower the pH; if the water is below 6.5 a base is used to raise the pH. To treat water with acid or base, safety requirements must be followed as outlined in relevant material safety data sheet (SDS). Based on the pH of the water the treatment chemical and treatment process will be confirmed in consultation with the Ward Environmental coordinator and TfNSW Environmental Project officer. - Re-test the water pH following treatment – repeat as necessary, until the acceptable pH 6.5 – 8.5 range is reached.
Total suspended solids	<ul style="list-style-type: none"> - A sample of water will be submitted to a NATA accredited laboratory for analysis. If TSS are greater than 50mg/L, the sediments need to settle to the bottom or be removed. This will be achieved via the following methods: - natural settlement – this could take a long time or not occur at all (e.g. with dispersible clay soils). Dependent on soil type and other characteristics, (refer to Blue Book Chapter 3 for further information) or - flocculation – chemical treatment with a flocculent. Flocculants will be gypsum based, unless approved by TfNSW. If the flocculant is being applied manually, an even application over the surface of the water is essential. <p>Re-testing of water is required once treatment has been undertaken to ensure criterion for TSS is met.</p> <p>Ward will undertake low volume trials to determine the appropriate flocculant dosage rates. To note, addition of a flocculant (other than gypsum) may adjust the pH in the water to unacceptable levels. Special care must be taken when adding a flocculant to sediment laden water.</p> <p>TSS analysis is to be undertaken by a NATA accredited laboratory.</p>

11.4. Progressive Erosion and Sediment Control Plans

Site-specific Progressive Erosion and Sediment Controls Plans (PESCPs) are required to be developed prior to commencing intrusive works. PESCPs are live documents and will be developed and updated as the Project progresses. PESCPs are to be developed in accordance with Managing Urban Stormwater: Soils and Construction Vol 1 4th ed (the Blue Book). PESCPs will be incorporated into the area specific ECMs.

PESCPs are to be developed by personnel who has completed a training in BLUE BOOKS Vol 1 & 2D and Erosion and Sedimentation Control (with a certificate as proof of training) and who have suitable experience in preparing such plans. Erosion and Sediment Control Plans (including Stabilisation Plans and Stockpile Management Plans) are to be developed by the Project Environmental Management Representative (EMR).

PESCP will be implemented before construction starts and inspected regularly, particularly prior to and after a rainfall event of 10mm or greater. All disturbed areas and revegetated/stabilised areas together with all permanent and temporary erosion and sediment control works will be examined during environmental inspections as soon as practicable but within 3 hours (during normal work days) or within 24 hours (outside normal work hours and days, including public holidays) after the start of rainfall events exceeding 10mm or greater.

11.5. **Soil and Water Mitigation Measures**

Relevant soil and water management measures as outlined in the CoA, REMMs and CEMF are presented in Table 36, Table 37 and Table 38.

Table 39 summarises Wards management measures to be implemented as evidence of the commitment.

Table 36 Relevant Soil and Water COAs

COA Reference	COA	Responsibility	How Addressed
E126	The CSSI must be designed and constructed so as to maintain the NSW Water Quality Objectives (NSW WQO) where they are being achieved as at the date of this approval, and contribute towards achievement of the NSW WQO over time where they are not being achieved as at the date of this approval, unless an EPL in force in respect of the CSSI contains different requirements in relation to the NSW WQO, in which case those requirements must be complied with	Design: TfNSW / Metro Construction: Ward Supervisor Ward Environmental Manager	Water quality will be managed through the PESCPs which are included with area specific Environmental Control Maps (Refer Table 39) Water Quality Discharge Criteria
E127	Construction Requirements The Proponent must consider the Guidelines for controlled activities on waterfront land riparian corridors (Department of Industry 2018) when carrying out work within 40 metres of a watercourse, including its bed	NA	Not Triggered – No works within 40m of a watercourse
E128	Before undertaking any work and during maintenance or construction activities, erosion and sediment controls must be implemented and maintained to prevent water pollution consistent with Managing Urban Stormwater: Soils and Construction Vol 1 4th ed. by Landcom, 2004 (The Blue Book)	Environmental Manager Supervisor	PESCPs are included with area specific Environmental Control Maps (Section 11.4)
E129	Unless an EPL is in force in respect to the CSSI and that licence specifies alternative criteria, discharges from construction wastewater treatment plants to surface waters must not exceed: (a) the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2018 (ANZG (2018)) default guideline values for toxicants at the 95 per cent species protection level; (b) for physical and chemical stressors, the guideline values set out in Tables 3.3.2 and 3.3.3 of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 (ANZECC/ARMCANZ); and (c) for bioaccumulative and persistent toxicants, the ANZG (2018) guidelines values at a minimum of 99 per cent species protection level. Where the ANZG (2018) does not provide a default guideline value for a particular pollutant, the approaches set out in the ANZG (2018) for deriving guideline values, using interim guideline	NA	NA - Not triggered for this scope of works. No wastewater treatment plants required for this Scope of Works

COA Reference	COA	Responsibility	How Addressed
	values and/or using other lines of evidence such as international scientific literature or water quality guidelines from other countries, must be used		
E130	<p>If construction stage stormwater discharges are proposed, a Water Pollution Impact Assessment will be required. Any such assessment must be prepared in consultation with the EPA and be consistent with the National Water Quality Guidelines, with a level of detail commensurate with the potential water pollution risk</p> <p>Note: If an EPL is required the Water Pollution Impact Assessment will be required to inform licensing consistent with section 45 of the POEO Act</p>	<p>Project Manager Environmental Manager</p>	<p>No site water would be discharged/pumped into the adjacent stormwater system.</p> <p>Run-off water leaving the site would be managed in accordance with the PESCP.</p> <p>If, it is proposed to discharge/pump site water into the stormwater system, a water pollution impact assessment will be developed in consultation with EPA prior to this being permitted.</p>
E131	Drainage feature crossings (permanent and temporary watercourse crossings and stream diversions) and drainage swales and depressions must be carried out in accordance with relevant guidelines and designed by a suitably qualified and experienced person	NA	NA - Not triggered by this scope of works. No drainage features will be impacted by these works

Table 37 Relevant Soil and Water REMMs

REMM Reference	REMM	Responsibility	How Addressed
SC1	<p>The Soil and Water Management Plan would incorporate the following measures:</p> <ul style="list-style-type: none"> for low risk areas of environmental concern, worker health and safety measures, waste management and tracking for contamination would be outlined for medium and high risk areas of environmental concern, detailed site investigations and review of further available information would be undertaken prior to the start of construction 	NA	NA - Not triggered for this Scope of Works in accordance with the Staging Report

REMM Reference	REMM	Responsibility	How Addressed
SC2	<p>Based on outcomes of SC1:</p> <ul style="list-style-type: none"> • if a medium or high risk area of environmental concern is reassessed as low risk, the site would be managed in accordance with the Soil and Water Management Plan. This would typically occur where there is minor, isolated contamination that can be readily remediated through standard construction practices such as excavation and off-site disposal • for areas of environmental concern that remain or change to medium risk, visual inspections and monitoring would be performed during earthworks. If suspected contamination is encountered, the materials would be subject to sampling and analysis to assess management requirements in accordance with statutory guidelines made or endorsed by the NSW Environment Protection Authority • for areas of environmental concern that remain or change to high risk, a Sampling, Analysis and Quality Plan would be prepared for Detailed Site Investigations or data gap investigations. The results from the site investigations would be assessed against criteria contained within the National Environment Protection (Assessment of Site Contamination) Measure (2013) and other applicable NSW statutory guidelines to assess whether remediation is required. Remediation works would be performed in accordance with the hierarchy of preferred strategies in the Guidelines for the NSW Site Auditor Scheme (NSW Environment Protection Authority, 2017) and other guidelines made or endorsed by the NSW Environment Protection Authority <p>Where practical, remediation works would be integrated with excavation and development works performed during construction</p>	NA	<p>NA - Not triggered to date for this Scope of Works</p> <p>Based on previous assessments and the outcomes of the Risk assessment contaminated soils are not expected. Soils found to be potentially contaminated will be managed initially in accordance with the Unexpected Finds Protocol</p>

REMM Reference	REMM	Responsibility	How Addressed
SC3	Where information gathered from investigations for medium and high risk areas of environmental concern (as per mitigation measure SC1) is insufficient to determine the risk of contamination, a detailed site investigation would be carried out in accordance with the National Environment Protection Measure (2013) and other guidelines made or endorsed by the NSW Environment Protection Authority Where data from the additional data review (mitigation measure SC1) or the detailed site investigation (mitigation measure SC2) confirms that contamination would require remediation, a Remediation Action Plan would be developed for the area of the construction footprint If a Remediation Action Plan is required, it would be developed in accordance with NSW Environment Protection Authority statutory guidelines and a Site Auditor would be engaged. Remediation methodologies would be undertaken in accordance with Australian Standards and other relevant government guidelines and codes of practice Remediation would be performed as an integrated component of construction and to a standard commensurate with the proposed end use of the land	NA	<p>NA - Not triggered to date for this Scope of Works</p> <p>Based on previous assessments and the outcomes of the Risk assessment contaminated soils are not expected. Soils found to be potentially contaminated will be managed initially in accordance with the Unexpected Finds Protocol</p>
SC4	If a duty to report to the NSW Environment Protection Authority under Section 60 of the Contaminated Lands Management Act 1997 is triggered, or where a medium to high risk of contamination is identified, an accredited Site Auditor would review and approve the Remediation Action Plan (including issue of interim audit advice), and would develop a Site Audit Statement and Site Audit Report upon completion of remediation	NA	<p>NA - Not triggered to date for this Scope of Works</p> <p>Based on previous assessments and the outcomes of the Risk assessment contaminated soils are not expected. Soils found to be potentially contaminated will be managed initially in accordance with the Unexpected Finds Protocol</p>
SC5	An unexpected finds procedure would be developed and implemented as part of the project Soil and Water Management Plan, outlining a set of potential contamination issues which could be encountered, and detailing the management actions to be implemented. The unexpected finds procedure would include a process for chemical and asbestos contamination and would generally include:	Supervisor Environmental Manager	An unexpected finds protocol is included within APPENDIX M

REMM Reference	REMM	Responsibility	How Addressed
	<ul style="list-style-type: none"> • cessation of works within the affected area until inspection of the suspected contamination by a qualified contaminated lands consultant • collection of soil samples for chemical or asbestos analysis, where required, based on observations • assessment of results against applicable land use or waste classification criteria in accordance with statutory guidelines made or endorsed by the NSW Environment Protection Authority • management of the contamination in accordance with statutory guidelines made or endorsed by the NSW Environment Protection Authority statutory guidelines • the unexpected finds procedure for on-airport construction would be consistent with the Western Sydney Airport unexpected finds procedure detailed in the Western Sydney Airport Soil and Water Construction Environmental Management Plan 		
SC6	<p>Post construction, an inspection of construction, stockpiling and laydown sites and soil validation of redundant sedimentation/water quality basins would be undertaken to assess if further investigation and remediation is required. Investigation and remediation (if required) would be undertaken in accordance with the Soil and Water Management Plan (off-airport) and a project specific Remediation Action Plan that would be prepared in a manner consistent with the Western Sydney Airport Remediation Action Plan (on-airport). All inspections, investigations and remediation would be undertaken by a qualified contaminated lands consultant with reports prepared or reviewed by a Certified Contaminated Land Consultant</p>	Environmental Manager	If contamination is encountered, implement the unexpected finds protocol is included within APPENDIX M
SC7	<p>Prior to ground disturbance in areas of potential acid sulfate soil occurrence, testing would be carried out to determine the actual</p>	NA	

REMM Reference	REMM	Responsibility	How Addressed
	presence of acid sulfate soils. If acid sulfate soils are encountered, they would be managed in accordance with the Acid Sulfate Soil Manual (Acid Sulfate Soil Management Advisory Committee, 1998)		Not triggered - Previous assessment have indicated that PASS/ASS is not anticipated in the works area
SC8	Prior to ground disturbance in high probability salinity areas testing would be carried out to determine the presence of saline soils. If salinity is encountered, excavated soils would not be reused or would be managed in accordance with Book 4 Dryland Salinity: Productive Use of Saline Land and Water (NSW DECC 2008). Erosion controls would be implemented in accordance with the Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom, 2004)	NA	NA - Not triggered based on the Scope of Works Based on previous assessments reported in the EIS, intrusive works are undertaken outside of previously identified Dryland Salinity areas,
SC9	Targeted groundwater investigations would be undertaken prior to construction to identify high salinity areas at risk from rising groundwater. Where high saline areas (>1000 $\mu\text{S}/\text{cm}$) are identified, measures such as planting, regenerating and maintaining native vegetation and good ground cover in recharge, transmission and discharge zones would be implemented where possible	NA	NA – Based on previous assessments groundwater is not anticipated to be encountered nor impacted. As such further groundwater investigation is not required.
SC10	Where the construction footprint is not used as part of the operational footprint (residual land), an assessment of the suitability of the site for the proposed land use would be undertaken in accordance with statutory guidelines made or endorsed by the NSW Environment Protection Authority	NA	NA – The REMM is not triggered for the Scope of Works. Following the Project future construction activities will be undertaken within the footprint
HYD1	<p>Construction planning would consider flood related mitigation, including:</p> <ul style="list-style-type: none"> ▪ staging construction works to reduce the duration of works within the floodplain ▪ daily and continuous monitoring of weather forecasts and storm events, rainfall levels and water levels in key watercourses to identify potential flooding events and related flood emergency response ▪ consultation with NSW State Emergency Services and relevant local councils to ensure consistent approaches to the management of flood events (off-airport only) ▪ provide flood-proofing to excavations at risk of flooding during construction, where reasonable and feasible, such as raised entry into shafts and/or pump-out facilities to minimise ingress of floodwaters into shafts and the dive structure 	Supervisor	<ul style="list-style-type: none"> ▪ Works are located outside of identified flood prone areas ▪ Daily weather monitoring will be undertaken to monitor for potential flooding events ▪ Consultation with Emergency Services will be managed by SM-WSA. Ward will participate with SM-WSA as requested ▪ Water diversions to be constructed around work areas to divert surface water from un-stabilised areas ▪ PESCPs will be developed and reviewed to minimise impacts to overland flows

REMM Reference	REMM	Responsibility	How Addressed
	<ul style="list-style-type: none"> review of site layout and staging of construction works to avoid or minimise obstruction of overland flow paths and limit the extent of flow diversion required 		

Table 38 Relevant CEMF Control Measures

CEMF Reference	Control Measure	Responsibility (Ward / TfNSW / Metro)	How Addressed
12.1 a	<p>The following soil and water management objectives will apply to construction:</p> <ul style="list-style-type: none"> i. Minimise pollution of surface water through appropriate erosion and sediment control; ii. Minimise leaks and spills from construction activities; iii. Maintain existing water quality of surrounding surface watercourses; iv. Source construction water from non-potable sources, where feasible and reasonable; and v. For on-airport works, the Sydney Metro Western Sydney Airport Soil and Water CEMP will detail all the soil and water management objectives and will be consistent with the WSA Soil and Water CEMP, including all appendices to the CEMP 	<p>Supervisor Environmental Manager</p>	<p>Soil and water controls will be managed through ECMs which include sediment and erosion controls</p> <ul style="list-style-type: none"> i. PESCP to be developed to minimise pollution of surface water through construction ii. Spill kits to be located within the works area iii. Prior to discharge of waters from site, water quality tested is required to maintain existing water quality in surrounding water courses iv. Where possible, water will be sourced from non-potable sources v. NA
12.2 a	<p>On-airport management of soil and water will be achieved through the implementation of the SMWSA Soil and Water CEMP and Principal Contractors will develop and implement a Soil and Water Management Plan for all off-airport works. Both plans will include as a minimum:</p> <ul style="list-style-type: none"> i. The soil and water mitigation measures as detailed in the planning approval documentation and sustainability requirements; ii. Details of construction activities and their locations, which have the potential to impact on water courses, storage facilities, stormwater flows, and groundwater; 	NA	<p>Applicable minimum requirements listed have been included in the CEMP as assessed in the aspect specific risk assessment</p>

CEMF Reference	Control Measure	Responsibility (Ward / TfNSW / Metro)	How Addressed
	<p>iii. Surface water and ground water impact assessment criteria consistent with the principles of the Australian and New Zealand Environment Conservation Council (ANZECC) guidelines for off-airport works and the Airports (Environment Protection) Regulations 1997 for on-airport works (with due consideration of the ANZECC guidelines);</p> <p>iv. Management measures to be used to minimise surface and groundwater impacts, including identification of water treatment measures and discharge points, details of how spoil and fill material required by the project will be sourced, handled, stockpiled, reused and managed; erosion and sediment control measures; salinity control measures and the consideration of flood events;</p> <p>v. A contingency plan, consistent with the NSW Acid Sulphate Soils Manual (EPA 1998), to deal with the unexpected discovery of actual or potential acid sulphate soils both on and off-airport lands. The plan must including procedures for the investigation, handling, treatment and management of such soils and water seepage;</p> <p>vi. Management measures for contaminated material (soils, water and building materials) and a contingency plan to be implemented in the case of unanticipated discovery of contaminated material, including asbestos, during construction;</p> <p>vii. A description of how the effectiveness of these actions and measures would be monitored during the proposed works, clearly indicating how often this monitoring would be undertaken, the locations where monitoring would take place, how the results of the monitoring would be recorded and reported, and, if any exceedance of the criteria is detected how any non-compliance can be rectified;</p> <p>viii. The requirements of any applicable licence conditions;</p> <p>ix. The responsibilities of key project personnel with respect to the implementation of the plan;</p> <p>x. Procedures for the development and implementation of Progressive Erosion and Sediment Control Plans;</p> <p>xi. Identification of locations where site specific Stormwater and Flooding Management Plans are required; and</p>		

CEMF Reference	Control Measure	Responsibility (Ward / TfNSW / Metro)	How Addressed
	xii. Compliance record generation and management		
12.2 b	Principal Contractors will develop and implement Progressive Erosion and Sediment Control Plans (ESCPs) for all active worksites in accordance with Managing Urban Stormwater: Soils & Construction Volume 1 (Landcom, 2004) (known as the “Blue Book”). The ESCPs will be approved by the Contractor’s Environmental Manager (or delegate) prior to any works commencing (including vegetation clearing) on a particular site. Copies of the approved ESCP will be held by the relevant Contractor personnel including the Engineer and the Site Foreman	Environmental Manager Supervisor	Progressive Erosion and Sediment Controls will be developed for intrusive works. Controls will be incorporated into the ECMs for respective work areas.
12.2 c	ESCPs will detail all required erosion and sediment control measures for the particular site at the particular point in time and be progressively updated to reflect the current site conditions. Any amendments to the ESCP will be approved by the Contractor’s Environmental Manager (or delegate)	TfNSW Environmental Officer Environmental Manager	Progressive Erosion and Sediment Controls will be developed for intrusive works. Controls will be incorporated into the ECMs for respective work areas.
12.2 d	Principal Contractors will develop and implement Stormwater and Flooding Management Plans for the relevant construction sites. These plans will identify the appropriate design standard for flood mitigation based on the duration of construction, proposed activities and flood risks. The plan will develop procedures to ensure that threats to human safety and damage to infrastructure are not exacerbated during the construction period	NA	As report in the EIS (Chapter 14), the site is located outside of the 1% and 5% AEP peak flood area
12.2 e	Contractors will undertake the following soil and water monitoring as a minimum: i. Weekly inspections of the erosion and sediment control measures. Issues identified would be rectified as soon as practicable; ii. Additional inspections will be undertaken following significant rainfall events (greater than 20 mm in 24 hours); and iii. All water will be tested (and treated if required) prior to discharge from the site in order to determine compliance with the	Environmental Manager	i. Refer to Section 3.14.3 ii. Refer to Section 11.2.1 iii. Refer to Section 11.3

CEMF Reference	Control Measure	Responsibility (Ward / TfNSW / Metro)	How Addressed
	appropriate approvals and licencing. No water will be discharged from the site without written approval of the Contractor's Environmental Manager (or delegate). This is to form a HOLD POINT		
12.2 f	The following compliance records will be kept by Contractors: i. Copies of current ESCPs for all active construction sites; ii. Records of soil and water inspections undertaken; iii. Records of testing of any water prior to discharge; and iv. Records of the release of the hold point to discharge water from the construction site to the receiving environment.	Environmental Manager	Records will be kept in accordance with Section 3.16.
12.2 g	The following water resources management objectives will apply to the construction of the project: i. Minimise demand for, and use of potable water; ii. Maximise opportunities for water re-use from captured stormwater, wastewater and groundwater; iii. Examples of measures to minimise potable water consumption include: <ul style="list-style-type: none"> ▪ Water efficient controls, fixtures and fittings in temporary facilities; ▪ Collecting, treating and reusing water generated in tunnelling operations, concrete batching and casting facility processes; ▪ Using recycled water or treated water from onsite sources in the formulation of concrete; ▪ Harvesting and reusing rainwater from roofs of temporary facilities; ▪ Using water from recycled water networks; ▪ Collecting, treating and reusing groundwater and stormwater; ▪ Using water efficient construction methods and equipment; and ▪ Providing designated sealed areas for equipment wash down. 	Environmental Manager Supervisor	The identified strategies will be implemented where reasonable and practical and incorporated into work area ECMs. Commitments are included in Table 39
12.3a	The on-airport Soil and Water CEMP and the off-airport Soil and Water Management Plan will include the following surface water and flooding mitigation measures as well as any relevant Conditions:	Environmental Manager Supervisor	Soil and Water Management plan not required in accordance with the Staging Report.

CEMF Reference	Control Measure	Responsibility (Ward / TfNSW / Metro)	How Addressed
	<p>i. Clean water will be diverted around disturbed site areas, stockpiles and contaminated areas;</p> <p>ii. Control measures will be installed downstream of works, stockpiles and other disturbed areas;</p> <p>iii. Exposed surfaces will be minimised, and stabilised / revegetated as soon feasible and reasonable upon completion of construction;</p> <p>iv. Dangerous good and hazardous materials storage will be within bunded areas with a capacity of 110 per cent of the maximum single stored volume;</p> <p>v. Chemicals will be stored and handled in accordance with relevant Australian standards such as:</p> <ul style="list-style-type: none"> ▪ AS 1940-2004 The storage and handling of flammable and combustible liquids ▪ AS/NZS 4452:1997 The storage and handling of toxic substances ▪ AS/NZS 5026:2012 The storage and handling of Class 4 dangerous goods ▪ AS/NZS 1547:2012 On-site domestic wastewater management ▪ Spill kits will be provided at the batch plants, storage areas and main work sites; ▪ A protocol will be developed and implemented to respond to and remedy leaks or spills. ▪ A remedial action plan and unexpected finds protocol would be established to facilitate the ▪ quarantining, isolation and remediation of contamination identified throughout the construction ▪ programme. Any asbestos identified on site would be managed in accordance with applicable ▪ regulatory requirements. 		<p>Identified mitigation measures will be incorporated into work area PESCPs</p> <p>Measures to be implemented where feasible include:</p> <ul style="list-style-type: none"> i. Water diversions to be utilised during works ii. Downgradient controls will be installed around stockpiles and disturbed areas iii. Disturbed areas are to be minimised and stabilised as soon as feasible iv. Dangerous goods and hazardous materials will be stored within bunded areas and in accordance with relevant standards <p>Measures are included within Table 39</p>

Table 39 summarises the mitigation measures to be implemented on the Project

Table 39 Soil and Water Mitigation Measures

Mitigation Measure	Control	Accountability
SW-1	Prior to the start of work, a Progressive Erosion and Sediment Control Plan (PESCP) is to be prepared in accordance with the requirements of the Blue Book. Refer to Section 11.4 The PESCP will be reviewed by a suitably qualified professional prior to being implemented.	Project manager Environmental Manager
SW-2	Erosion and sediment control measures are to be implemented and maintained to: <ul style="list-style-type: none"> ▪ Prevent sediment moving off-site and sediment laden water entering any water course, drainage lines, or drain inlets. ▪ Reduce water velocity and capture sediment on site. ▪ Minimise the amount of material transported from site to surrounding pavement surfaces. ▪ Divert clean water around the site 	Project manager Environmental Manager
SW-4	<ol style="list-style-type: none"> a) Stockpiles are to be managed in accordance with the following: Locate stockpiles outside of the tree protection zone of trees or native vegetation identified for retention. Delineate the tree protection zone in accordance with AS 4970. b) Locate stockpiles at least 5 m from likely areas of concentrated water flows and at least 10 m from waterways that are classified as Class 1 and Class 2 from the DPI Fisheries guideline “Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings”. c) Keep stockpile heights to no greater than 2 m, unless otherwise approved by the Principal, and slopes to no steeper than 2:1. d) Cover, or otherwise protect from erosion, stockpiles that will be in place for more than 20 days as well as any stockpiles that are susceptible to wind or water erosion, within 10 days of forming each stockpile. e) Keep topsoil that is not contaminated by noxious weeds in stockpiles for later spreading on fill batters and other areas. Other material may also be stockpiled but kept separated from the topsoil stockpiles. f) Implement measures to prevent the growth of weeds in topsoil stockpiles. g) Stockpiles will be kept moist with water as required. h) Water carts will be utilised to keep surfaces moist. 	Supervisor
SW-5	If water is proposed to discharge/pump site water into the stormwater system, a water pollution impact assessment will be developed in consultation with EPA prior to this being permitted.	Environmental Manager

Mitigation Measure	Control	Accountability
	Additionally, prior to discharge of stormwater, water is to be sampled and meet the criteria presented in Table 34.	
SW-7	Wherever possible stormwater, recycled water or other water sources will be used for dust control in preference to potable water dewatering – refer to Section 11.3)	Supervisor
SW-8	Sedimentation controls are maintained and cleaned by the following measures: <ul style="list-style-type: none"> ▪ Sediment fences are cleaned when 60% full. Removed sediment is disposed of by stockpiling. If sediment is topsoil, then it will be reused in landscaping, otherwise sediment is disposed of to a licensed landfill on completion of the project ▪ Soil stabilisers will be reapplied when coverage is <70% ▪ A daily record of rainfall will be kept in the foreman’s report 	Project manager Environmental Manager Supervisor
SW-9	Dangerous good and hazardous materials storage will be within bunded areas with a capacity of 110 per cent of the maximum single stored volume	Supervisor
SW-10	Spill kits will be provided at all work areas	Supervisor
SW-11	Concrete washouts are to be provided in the work area during concrete shifts. The location of the washouts is to be communicated to concrete delivery drivers on arrival to site.	Supervisor
SW-12	The following strategies to be implemented where possible: <ul style="list-style-type: none"> ▪ Water efficient controls, fixtures and fittings in temporary facilities; ▪ Collecting, treating and reusing water generated in tunnelling operations, concrete batching and casting facility processes; ▪ Using recycled water or treated water from onsite sources in the formulation of concrete; ▪ Harvesting and reusing rainwater from roofs of temporary facilities; ▪ Using water from recycled water networks; ▪ Collecting, treating and reusing groundwater and stormwater; ▪ Using water efficient construction methods and equipment; and ▪ Providing designated sealed areas for equipment wash down. 	Supervisor
SW-13	PESCPs to include the following considerations: <ol style="list-style-type: none"> i. Water diversions to be utilised during works 	Supervisor

Mitigation Measure	Control	Accountability
	<ul style="list-style-type: none"> ii. Downgradient controls will be installed around stockpiles and disturbed areas iii. Disturbed areas are to be minimised and stabilised as soon as feasible iv. Dangerous goods and hazardous materials will be stored within bunded areas and in accordance with relevant standards 	
SW-14	A street sweeper is to be used during haulage activities or as required	Supervisor

12. AIR QUALITY MANAGEMENT

The following are the minimum general control measures to be implemented on the project. These control measures are in accordance with the CoAs, REMMs and CEMF. Based on the risk assessment in Table 40Table 33 management measures are included within the following sections of this CEMP.

12.1. Air Quality Risk Assessment

Table 40 Air Quality Risk Assessment

Risk Area	Risk Statements	C	L	Initial Risk Rating	Controls	C	L	Residual Risk Rating
Air Quality - construction	A lack of mitigation measures and management systems in relation to air quality management leads to unreasonable particulate pollutant emissions from construction activities. Dust activity in close proximity to residential and commercial premises, complaints received.	C5	L3	Med	<ul style="list-style-type: none"> Provide dust mitigation measures through water sprays/misting as required. Cover stockpiles that are not to be worked on for a period of greater than 10 days. Erosion and Sediment Control Plans approved before works commence. 	C5	L4	Low

12.2. Potential Dust Receivers

Based on the Scope of Works, it was assessed that the main dust generation activities include:

- Concrete and road sawing
- Hammering of concrete surfaces
- Excavation and loading of materials at work areas and compound
- Dust generated from exposed/disturbed areas, stockpiles and the haulage of materials

The activities are considered to generate localised dust only, additionally, surfaces will be covered at the conclusion of each shift.

Likely receivers from dust are properties that:

- Front the works area; and
- Areas not behind physical barriers, i.e. dust screens or trees

Figure 7 and Figure 8 identifies the properties likely to be affected during the works. Properties within the yellow outline are considered to be potential air quality receivers.



Figure 7 Potential impacted air quality properties (shown in yellow) Work areas shown in blue



Figure 8 Potential impacted air quality properties - Phillip and Lethbridge Street (properties shown in yellow, work areas in blue)

12.3. Air Quality Control Measures

Relevant CoA, REMMs and CEMF control measures are shown in the following tables.

Table 41 Relevant Air Quality CoAs

COA Reference	COA	Responsibility	How Addressed															
C13	<p>The following Construction Monitoring Programs must be prepared in consultation with the relevant government agencies (as required by Condition A6) identified for each to compare actual performance of construction of the CSSI against the performance predicted in the documents listed in Condition A1 or in the CEMP. Where a government agency(ies) request(s) is not included, the Proponent must provide the Planning Secretary / ER (whichever is applicable) justification as to why</p> <table border="1"> <thead> <tr> <th></th> <th>Required Construction Monitoring Programs</th> <th>Relevant government agencies to be consulted for each Construction Monitoring Program</th> </tr> </thead> <tbody> <tr> <td>(a)</td> <td>Noise and vibration</td> <td>Relevant Councils and WaterNSW (in relation to its assets)</td> </tr> <tr> <td>(b)</td> <td>Surface water quality</td> <td>DPIE Water, DPI Fisheries, and Relevant Councils</td> </tr> <tr> <td>(c)</td> <td>Groundwater</td> <td>DPIE Water</td> </tr> <tr> <td>(d)</td> <td>Air Quality</td> <td>Relevant Councils</td> </tr> </tbody> </table>		Required Construction Monitoring Programs	Relevant government agencies to be consulted for each Construction Monitoring Program	(a)	Noise and vibration	Relevant Councils and WaterNSW (in relation to its assets)	(b)	Surface water quality	DPIE Water, DPI Fisheries, and Relevant Councils	(c)	Groundwater	DPIE Water	(d)	Air Quality	Relevant Councils	Environmental Manager	Air Quality Monitoring Program included within Section 12.4
	Required Construction Monitoring Programs	Relevant government agencies to be consulted for each Construction Monitoring Program																
(a)	Noise and vibration	Relevant Councils and WaterNSW (in relation to its assets)																
(b)	Surface water quality	DPIE Water, DPI Fisheries, and Relevant Councils																
(c)	Groundwater	DPIE Water																
(d)	Air Quality	Relevant Councils																
C14	Each Construction Monitoring Program must provide:	Environmental Manager Supervisor	Air Quality Monitoring Program included within Section 12.4															
	(a) details of baseline data available including the period of baseline monitoring;																	
	(b) details of baseline data to be obtained and when;																	
	(c) details of all monitoring of the project to be undertaken;																	
	(d) the parameters of the project to be monitored;																	
	(e) the frequency of monitoring to be undertaken;																	
	(f) the location of monitoring;																	
	(g) the reporting of monitoring results and analysis results against relevant criteria;																	
	(h) details of the methods that will be used to analyse the monitoring data;																	
	(i) procedures to identify and implement additional mitigation measures where the results of the monitoring indicated unacceptable project impacts;																	
	(j) a consideration of SMART principles;																	
	(k) any consultation to be undertaken in relation to the monitoring programs; and																	
	(l) any specific requirements as required by Conditions C15 to C16 .																	
E1	All reasonably practicable measures must be implemented to minimise the emission of dust and other air pollutants during construction	Environmental Manager Supervisor	Air quality mitigation measures are provided in Table 35 and will be included within the work area ECMs.															

Table 42 Relevant Air Quality REMMs

REMM Reference	REMM Description	Responsibility	How Addressed
AQ1	The Air Quality Management Plan for the project would incorporate the following best-practice odour management measures which would be implemented as appropriate during relevant construction works:	NA	NA - Not triggered for this scope of works. Refer to Staging Plan
	the extent of opened and disturbed contaminated soil at any given time would be minimized		
	temporary coverings or odour suppressing agents would be applied to excavated areas where appropriate		
	regular odour monitoring would be conducted during excavation to verify that no offensive odours are being generated		
AQ3	Air quality monitoring, consistent with the Western Sydney Airport Air Quality Construction Environmental Management Plan would be carried out during construction to ensure that works meet the requirements under Schedule 1 of the Airports (Environment Protection) Regulations 1997	Environmental Manager	Applicable to On-airport works only as noted in the REMM. However, Air Quality Monitoring included within Section 12.4 for TBI (off-airport) works

Table 43 Relevant CEMF Air Quality Control Measures

CEMF Reference	COA	How Implemented	Responsibility
13.1a	The following air quality management objectives will apply to construction: i. Minimise gaseous and particulate pollutant emissions from construction activities as far as feasible and reasonable; ii. Identify and control potential dust and air pollutant sources; and iii. For on-airport works, the Sydney Metro Western Sydney Airport Air Quality CEMP will detail all the air quality management objectives and will be consistent with the WSA Air Quality CEMP including all appendices to the CEMP	The identified management objectives will be applied to the Project. Reasonable and feasible mitigation measures are listed in Table 35, which will be incorporated into work area ECMs	Environmental Manager Supervisor
13.2 a	On-airport management of soil and water will be achieved through the implementation of the SMWSA Soil and Water CEMP and Principal Contractors will develop and implement an Air Quality Management Plan for all off-airport works. Both plans will include, as a minimum: i. The air quality mitigation measures as detailed in the planning approval documentation; ii. The requirements of any approval and applicable licence conditions; iii. Site plans or maps indicating locations of sensitive receivers and key air quality / dust controls; iv. The responsibilities of key project personnel with respect to the implementation of the plan; v. Air quality and dust monitoring requirements; and vi. Compliance record generation and management.	Not required in accordance with the staging report Applicable minimum requirements listed have been included in the CEMP as assessed in the aspect specific risk assessment.	NA
13.2 b	Air quality and dust monitoring will involve the following as a minimum:	Air quality monitoring will be implemented for the duration of the Project. In accordance with the monitoring program described in Section 12.4	Environmental Manager Supervisor

CEMF Reference	COA	How Implemented	Responsibility
	<ul style="list-style-type: none"> i. Meteorological conditions will be monitored, and appropriate responses will be organised and undertaken periodically by the Principal Contractor; ii. Regular visual monitoring of dust generation from work zones; and iii. Monitoring emissions from plant and construction vehicles to ensure they have appropriate emission controls and are being maintained correctly 		
13.2 c	<p>The following compliance records will be kept by the Principal Contractor:</p> <ul style="list-style-type: none"> i. Records of any meteorological condition monitoring; ii. Records of any management measures implemented as a result of adverse, windy weather conditions; and iii. Records of air quality and dust inspections undertaken 	Air quality monitoring results will be recorded and retained on file.	Environmental Manager
13.3	<p>The on-airport Air Quality CEMP and the off-airport Air Quality Management Plan will include the following air quality mitigation measures as well as any relevant Conditions:</p> <ul style="list-style-type: none"> i. Plant and equipment will be serviced and maintained in good working order to reduce unnecessary emissions from exhaust fumes; ii. Plant and equipment to be switched off engines when not in use; iii. The avoidance the use of diesel or petrol powered generators and instead using mains electricity or battery powered equipment, where practicable; iv. Appropriate vehicle speeds on sealed and unsealed roads; v. Development and implementation of a construction logistics plan to manage the sustainable delivery of goods and materials; vi. Implementing measures to support and encourage sustainable travel for construction workers to and from the construction sites; vii. Water suppression will be used for active earthwork areas, stockpiles, unsurfaced haul roads and loads of soil being transported to reduce wind-blown dust emissions; viii. Wheel-wash facilities or rumble grids will be provided and used near the site exit points, as appropriate; and ix. Dust extraction and filtration systems will be installed for tunnel excavation works and deep excavation with limited surface exposure. 	<p>An air quality management plan is not required in accordance with the Staging Report</p> <p>The identified mitigation measures will be implemented on the project. Refer to Table 45 for the mitigation measures.</p> <ul style="list-style-type: none"> i. Plant and equipment to be maintained and in good working condition ii. Plant and equipment to be switched off engines when not in use iii. Use mains in place of generators where feasible iv. Speed limits to be set and enforced v. Deliveries to be coordinated to manage the sustainable delivery of materials vi. Sustainable travel (use of public transport) to be encouraged vii. Dust suppression will be used to minimise wind blown dust emissions viii. Wheel wash / rumble grid / stabilised entry to be established at the site entry ix. NA 	NA

12.4. Air Quality Monitoring Program

12.4.1. Available Baseline Data

Background data has been sourced from the Sydney Metro – Western Sydney Airport, EIS, Chapter 22.

The existing air quality environment is described below, based on existing publicly available information. Ambient air quality monitoring stations in proximity to the study area include one station at St Marys (around 700 metres east of the study area). The monitoring stations are maintained by NSW Department of Planning, Industry and Environment (DPIE).

Annual air quality data for the period 2014-2019 (Office of Environment and Heritage, 2014-2019) indicates that annual average PM10 concentration around St Marys ranges between 15.1 and 21.2 micrograms per cubic metre (see Table 22-1). There are a number of recorded exceedances of the 50 micrograms per cubic metre maximum

24-hour concentration criterion, however the exceedances are generally due to exceptional events related to bushfires, hazard reduction burns and dust storms.

Table 22-1 St Marys monitoring location ambient PM₁₀ concentrations (2014-2019)

Statistic	24-hour average PM ₁₀ concentration - µg/m ³						
	Criteria	2014	2015	2016	2017	2018	2019
Maximum 24-hour concentration	50	45.0	53.0	100.2	49.8	100.5	159.8
24-hour exceedance count	-	0	1	3	0	2	26
Statistic	Annual average PM ₁₀ concentration - µg/m ³						
	Criteria	2014	2015	2016	2017	2018	2019
Annual average	25	16.7	15.1	16.0	16.2	19.3	24.7

Annual air quality data for the period 2016-2019 (Office of Environment and Heritage, 2016-2019) indicates that annual average PM_{2.5} concentration around St Marys is around 8 micrograms per cubic metre (see Table 22-3). There are a number of recorded PM_{2.5} exceedances of the 25 micrograms per cubic metre maximum 24-hour concentration criterion. As with PM₁₀ concentrations however, the PM_{2.5} exceedances were generally due to exceptional events related to bushfires, hazard reduction burns and dust storms.

Particulate data from 2019 is heavily skewed by the bushfires that occurred across NSW in November and December 2019. Data from 2019 does not represent normal long-term air quality conditions in the Sydney basin.

Table 22-3 St Marys monitoring location ambient PM_{2.5} concentrations (2016-2019)

Statistic	24-hour average PM _{2.5} concentration - µg/m ³				
	Criteria	2016	2017	2018	2019
Maximum 24-hour concentration	25	93.2	38.2	80.5	88.3
24-hour exceedance count	-	5	3	2	21
Statistic	Annual average PM _{2.5} concentration - µg/m ³				
	Criteria	2016	2017	2018	2019
Annual average	8	7.8	8	7.8	9.8

12.4.2. Baseline Data to be Collected

The scope works includes the relocation and installation of utilities and services and the construction of the temporary bus interchange. The nature of the majority of the works, is transient with work areas moving progressively as the scope of works is completed with the duration of the Project anticipated to be completed within 22 weeks.

The project location and the identified potentially impacted receivers is depicted within Figure 7.

Subsequently, additional baseline data is not proposed to be collected.

12.4.3. Monitoring to be Undertaken

Regular monitoring and inspections will be undertaken during construction. Monitoring and inspections will include:

- a. Visual observations of air quality in active work areas will be undertaken on a daily basis by the site supervisor to identify construction activities, vehicles or equipment that are generating excessive air emissions
- b. Environment-specific inspections will be carried out by the Environmental Manager on a weekly basis.

- c. Weather will be reviewed on a daily basis using the Australian Government Bureau of Meteorology and local observations. Windy weather (>30kmh) would trigger the implementation of mitigation strategies to prevent dust aerosolization issues
- d. Attended dust monitoring using a handheld monitor should visual dust be observed, or a complaint received

12.4.4. Parameters and Frequency of Monitoring

The following parameters will be monitored during construction.

Table 44 – Air Quality Monitoring

Parameter	Screening Level (as referenced in Chapter 22 if the EIS)	Frequency
Weather conditions and forecast	NA	Daily
Visual	Visual dust leaving work area	Daily
PM ₁₀	25 ug/m ³	Real-time as required following visual dust leaving work area or a complaint received
PM _{2.5}	8 ug/m ³	Real-time as required following visual dust leaving work area or a complaint received

12.4.5. Reporting of Monitoring Results

The following reporting will be undertaken:

- a. Weather conditions and forecast included within the supervisor daily site diary
- b. Daily air quality will be reported in the supervisor site diary
- c. Attended monitoring will be recorded in an Air Quality Monitoring Form, and the following will be recorded:
 - Weather conditions
 - Location of monitoring
 - Screening criteria
 - Description of works
 - Air quality concentrations (PM_{2.5} and PM₁₀)
 - Visual observations

12.4.6. Analysis of Monitoring Results

Real-time monitoring results will be compared to the Screening Levels used identified in Table 44.

12.4.7. Mitigation Measures

Table 45 identifies the Air Quality mitigation measures that will be employed during construction. The following process will be following should air quality impacts be identified above the

During construction, if an exceedance of the air quality screening criteria is identified the following will occur:

- Works will cease immediately, and the Supervisor and environmental officer is to be notified.
- If visual dust is observed, attended monitoring at identified receivers will be undertaken.
- The Ward environmental officer will notify the TfNSW Environmental officer. If works are outside of standard hours, the TfNSW Surveillance Officer will be notified by the supervisor.
- The DPIE Hour Air Quality Concentration Data (website) will be reviewed to determine if background levels are elevated due to external factors (<https://www.dpie.nsw.gov.au/air-quality/air-quality-concentration-data-updated-hourly>)
- If the air quality screening criteria is still exceeded. Works will cease and the methodology will be reviewed and adjusted as required. Alternatives may include:
 - Substitute plant / equipment
 - Review the activity and determine if the activity can be relocated
 - Increase the volume / frequency of dust controls
 - Undertake works when more favourable weather conditions are present
- Monitoring will be undertaken to confirm the adequacy of the revised methodology

TfNSW will be notified via email of the exceedance of the screening criteria and resultant actions. A summary of the vibration screening limits will be included within the monthly report.

12.4.8. Review of Data

TfNSW will be notified via email of the exceedance of the screening criteria and resultant actions. A summary of the vibration screening limits will be included within the monthly report provided to TfNSW.

12.4.9. Consultation

In accordance with CoA C13, this monitoring program will be Provided to Penrith City Council for review. To date this has not commenced. Following review by Penrith City Council, this monitoring program will be updated as required.

12.5. Air Quality Mitigation Measures

Table 45 summarises the air quality mitigation measures to be implemented on the Project.

Table 45 Air Quality Mitigation Measures

No.	Mitigation Measures	Responsibility	Project Phase
AQ1.	Air quality measures from this plan will be included with Environmental Control Maps (ECMs)	Project Manager Environmental Manager	Prior to construction / Construction
AQ2	Worker amenities at the site compound are to be located to reduce exposure to local residential properties or commercial premises to bad odour, minimising omission of smoke and odours from worker amenities	Project Manager	Construction
AQ3	No burning off of waste materials.	Supervisor	Construction
AQ5	Construction activities will be modified or stopped if dust is being generated or during high or unfavourable wind conditions if they have a potential to increase the generation or emission of dust.	Supervisor	Construction

No.	Mitigation Measures	Responsibility	Project Phase
AQ6.	Control measures including water carts, sprinklers, sprays, dust screens or the application geo-binding agents will be utilised where applicable to control dust emissions on surfaces including earthwork formations, roads and stockpiles. The frequency of use will be modified to accommodate prevailing conditions. In addition, shade cloth will be provided to temporary barriers and compound fencing where there is a high risk of dust being generated and dispersed to potentially sensitive receivers located to the work sites or compound areas.	Supervisor	Construction
AQ8.	Should inspections or monitoring identify air quality issues, mitigation measures being implemented are to be reviewed and revised to ensure that the most appropriate measure or combination of measures is employed.	Environmental Manager Supervisor	Construction
AQ9.	Stockpiles or areas that may generate dust will be managed to suppress dust emissions including establishment of suitable cover crop or provision of other covering over topsoil stockpiles that will be in place for longer than 20 days	Supervisor	Construction
AQ10.	Haul trucks, plant and equipment would be switched off when not in operation for periods of greater than 15 minutes.	Supervisor	Construction
AQ11.	Construction plant, vehicles, and machinery (including sub-contractors) will be maintained in good working order and in accordance with manufacturer's specifications. Periodic inspections are to be undertaken on plant / vehicle emissions.	Supervisor	Construction
AQ12.	Weather forecasts, site activities & conditions will be reviewed on a daily basis and appropriate measures implemented where unfavourable weather conditions (dry weather, strong winds) are anticipated. The Ward environmental officer will send out alerts to the site teams advising them if unfavourable weather is imminent.	Supervisor	Construction
AQ13	Water carts / street sweepers used to minimise wind blown emissions	Supervisor	Construction
AQ14	Mains power to be used in lieu of generators where feasible	Supervisor	Construction
AQ15	Speed limits to be set / enforced within the work area	Supervisor	Construction

13. WASTE MANAGEMENT

The following are the minimum general control measures to be implemented on the project. These control measures are in accordance with the CoAs, REMMs and CEMF. Based on the risk assessment in Table 46 management measures are included within the following sections of this CEMP.

13.1. Waste Management Risk Assessment

Table 46 Waste Management Risk Assessment

Risk Area	Risk Statements	C	L	Initial Risk Rating	Controls	C	L	Residual Risk Rating
Resource management - construction	A lack of mitigation measures and management systems in relation to waste management leads to excessive waste generation, and inappropriate waste classification and disposal. Incorrect disposal of waste, further costs incurred for classifications and disposal, fines may be issued. Incorrect classification of waste (spoil) resulting in incorrect / illegal disposal/reuse.	C5	L4	Low	<ul style="list-style-type: none"> Identify opportunities to incorporate recovered materials into the permanent works. Provide facilities on site for source separation and recycling. Ensure accurate waste records are retained. Removal of wastes from the site would only be undertaken by a licensed contractor as required by the POEO Act and with appropriate approvals, if required, for contaminated materials, etc. All material that requires off-site disposal to be appropriately tested and classified against the Waste Classification Guidelines (NSW EPA, 2014) 	C6	L5	Low

The purpose of the section of the CEMP is to:

- Provide guidance and outline waste management practices to be followed;
- Encourage efficient use of resources through reuse, reprocessing, recycling;
- Provide for the lawful disposal of wastes generated by the Project; and
- Prevent or minimise adverse environmental impacts.

13.2. Waste Management Control Measures

The following tables present the relevant CoAs, REMMs and CEMF control measures to be implemented throughout the Project.

Table 47 Relevant Waste Management CoAs

COA Reference	COA	How Addressed	Responsibility
E122	WASTE	The identified controls will be implemented through the Project	Project Manager Environmental Manager Supervisor
	Waste generated during construction and operation must be dealt with in accordance with the following priorities:		
	(a) waste generation must be avoided and where avoidance is not reasonably practicable, waste generation must be reduced;		
	(b) where avoiding or reducing waste is not possible, waste must be re-used, recycled, or recovered; and		

COA Reference	COA	How Addressed	Responsibility
	(c) where re-using, recycling or recovering waste is not possible, waste must be treated or disposed of		
E123	The importation of waste and the storage, treatment, processing, reprocessing or disposal of such waste must comply with the conditions of the current EPL for the CSSI, or be done in accordance with a Resource Recovery Exemption or Order issued under the Protection of the Environment Operations (Waste) Regulation 2014, as the case may be	No waste materials will be brought to site as part of the Scope of Works	Project Manager Environmental Manager Supervisor
E124	Waste must only be exported to a site licensed by the EPA for the storage, treatment, processing, reprocessing or disposal of the subject waste, or in accordance with a Resource Recovery Exemption or Order issued under the Protection of the Environment Operations (Waste) Regulation 2014, or to any other place that can lawfully accept such waste	Waste exported offsite will be managed in accordance with the identified controls	Project Manager Environmental Manager Supervisor
E125	All waste must be classified in accordance with the EPA's Waste Classification Guidelines, with appropriate records and disposal dockets retained for audit purposes	Commitment included within Table 50	Project Manager

Table 48 Relevant Waste REMMs

REMM Reference	REMM	How Addressed	Responsibility
WR1	Construction waste would be minimised by accurately calculating materials brought to the site and limiting materials packaging	Imported materials will be measured prior to ordering in accordance with the control measure	Project Manager
WR2	Waste streams would be segregated to avoid cross-contamination of materials and maximise reuse and recycling opportunities	Waste materials will be separated in accordance with the identified controls	Supervisor Project Manager
WR3	A material tracking system would be implemented for material transferred between construction sites	Material tracking will be implemented throughout the duration of the Project	Environmental Manager
HR3	A hazardous materials analysis would be carried out prior to stripping and demolition of structures and buildings which are suspected of containing hazardous materials (particularly asbestos) Hazardous materials and special waste (such as asbestos) would be removed and disposed of in accordance with the relevant legislation, codes of practice and Australian Standards (including the Work Health and Safety and Regulation 2011 (NSW))	Prior to demolition / removal of materials, materials are to be inspected for hazardous materials	Supervisor

Table 49 Relevant Waste CEMF Control Measures

CEMF Reference	CEMF Control Measure Description	How Addressed	Responsibility
14.1 a	<p>The following waste objectives will apply to construction:</p> <ul style="list-style-type: none"> i. Minimise waste throughout the project life-cycle; ii. Waste management strategies for off-airport works will be implemented in accordance with the Waste Avoidance and Resource Recovery Act 2001 management hierarchy as follows: <ul style="list-style-type: none"> ▪ Avoidance of unnecessary resource consumption; ▪ Resource recovery (including reuse, reprocessing, recycling and energy recovery); and ▪ Disposal. iii. Consistent with the Western Sydney Airport Waste and Resource Construction Environmental Management Plan, waste management strategies for on-airport works will also be aligned with the NSW Waste Avoidance and Resource Recovery Strategy under the NSW Waste Avoidance and Resource Recovery Act 2001; and iv. For on-airport works, the Sydney Metro Western Sydney Airport Waste and Resources CEMP will detail all the waste management objectives and will be consistent with the WSA Waste and Resources CEMP including all appendices to the CEMP 	<p>Feasible and practical waste measures will be implemented as per the Control Measures. Relevant measures will be included within area specific ECMs</p>	<p>Environmental manager Project Manager</p>
14.1 b	<p>Targets for the recovery, recycling or reuse of construction waste, and beneficial reuse of spoil will be provided by the Contractor</p>	<p>A minimum 95 per cent recycling target is achieved for construction and demolition waste</p>	<p>Project Manager</p>
14.2 a	<p>On-airport management of waste and resources will be achieved through the implementation of the SMWSA Waste and Resources CEMP and Principal Contractors will develop and implement a Waste Management Plan for all off-airport works. Both plans will include as a minimum:</p> <ul style="list-style-type: none"> i. The waste management mitigation measures as detailed in the planning approval documentation; ii. The responsibilities of key project personnel with respect to the implementation of the plan; iii. Waste management monitoring requirements; iv. A procedure for the assessment, classification, management and disposal of waste in accordance with Waste Classification Guidelines; and v. Compliance record generation and management 	<p>NA – not required as per the staging report</p>	<p>NA</p>
14.2 b	<p>Contractors will undertake the following waste monitoring as a minimum:</p> <ul style="list-style-type: none"> i. Weekly inspections will include checking on the waste storage facilities on site; and ii. All waste removed from the site will be appropriately tracked from 'cradle to grave' using waste tracking docketts. 	<p>Tracking will be included within inspection reports</p>	<p>Environmental Manager</p>
14.2 c	<p>Principal Contractors will report all necessary waste and purchasing information to SM - WSA as required for SM-WSA to fulfil their WRAPP reporting requirements</p>	<p>Ward will comply with any requests from SM-WSA</p>	<p>Environmental Manager</p>
14.2 d	<p>Compliance records will be retained by the Principal Contractors in relation to waste management including records of inspections and waste docketts for all waste removed from the site.</p>	<p>Waste records will be retained on file</p>	<p>Environmental Manager</p>
14.3 a	<p>The on-airport Waste and Resources CEMP and the off-airport Waste Management Plan will include the following waste management mitigation measures as well as relevant Conditions:</p> <ul style="list-style-type: none"> i. A central waste area (or areas) would be established, at which waste (including recyclables) would 	<p>Waste Management Plan not required as per the staging report.</p> <p>Mitigation measure are included within Table 50</p>	<p>Supervisor Environmental Manager</p>

CEMF Reference	CEMF Control Measure Description	How Addressed	Responsibility
	<p>be stored or stockpiled. Stockpiles and bins would be appropriately labelled, managed and monitored till being removed from site;</p> <p>ii. All waste materials removed from the sites will be directed to an appropriately licensed waste management facility;</p> <p>iii. The use of raw materials (noise hoarding, site fencing, etc...) will be reused or shared, between sites and between construction contractors where feasible and reasonable; and</p> <p>iv. Recyclable wastes, including paper at site offices, will be stored separately from other wastes.</p>		

13.3. Waste Mitigation Measures

Table 50 summarises the mitigation measures to be implemented on the Project.

Table 50 Waste Mitigation Measures

No.	Mitigation Measures	Responsibility	Project Phase
WR-1	Ward will sample waste in accordance with TfNSW Waste Environmental Procedure – Management of Wastes on Roads and Maritime Services Land (Roads and Maritime 2014) and Roads and relevant roads and maritime waste fact sheets	Project Manager Environmental Manager	Prior to Construction
WR-2	The NSW Governments Waste Management Hierarchy of “avoid-reduce-reuse recycle- dispose” will be followed as the framework of waste and resource management throughout the Project. Separation of general wastes, recyclable/reusable materials, and hazardous wastes to avoid mixing with other materials/ wastes	Project Manager Environmental Manager	Construction
WR-3	All liquid and/or non-liquid waste generated on site shall be assessed and classified in accordance with NSW EPA Waste Classification Guidelines 2014	Project Manager Environmental Manager	Construction
WR-4	<p>Materials will be separated and stockpiled based on their classification type. To prevent mixing and cross contamination the following techniques will be employed:</p> <ul style="list-style-type: none"> ▪ Stockpiles are to be labelled according to their classification / material type. i.e., topsoil, capping, GSW etc ▪ Stockpile locations will be shown on the Ward notice board and discussed during prestart ▪ Stockpiles (material types) will be separated using the following techniques <ul style="list-style-type: none"> - Hard barrier such as jersey kerbs - Markers including flagging and bunting ▪ Contaminated stockpiles will be stored on plastic and covered prior to rain or high winds to prevent mixing <p>Waste materials bins, ie steel bin, paper/cardboard will be provided onsite to promote recycling.</p> <p>A central waste area (or areas) would be established, at which waste (including recyclables) would be stored or stockpiled. Stockpiles and bins</p>	Supervisor	Construction

No.	Mitigation Measures	Responsibility	Project Phase
	would be appropriately labelled, managed and monitored till being removed from site		
WR-5	Imported materials will be measured to design to minimise wastage	Project Manager	Construction
WR-6	All waste materials removed from site shall only be directed to a waste management facility or premises lawfully permitted to accept the materials. The recycling, reuse and disposal of all surplus materials (including surplus concrete, excavated earthworks and pavement materials plus milled asphalt) is to be conducted in accordance with statutory requirements, and records maintained to demonstrate this. Applicable subcontractors are also required to uphold the above requirement.	Project Manager	Construction
WR-7	Waste generated outside the site must not be received at the site for storage, treatment, processing, reprocessing, or disposal on the site, except as expressly permitted by a licence or waste exemption under the POEO Act, if such a licence is required in relation to that waste.	Project Manager Supervisor	Construction
WR-8	A waste management register will be maintained until the completion date. The register is to record the type, amount and location and date when waste is reused, recycled, stockpiled and disposed of.	Project Manager Environmental Manager	Construction
WR-9	Receipts for waste transfer and disposal must be retained and checked to ensure all details are correct.	Project Manager Environmental Manager	Construction
WR-10	Prior to demolition / removal of materials, materials are to be inspected for hazardous materials	Supervisor	Construction
WR-11	The use of raw materials (noise hoarding, site fencing, etc...) will be reused or shared, between sites and between construction contractors where feasible and reasonable	Project Manager	Construction
WR-12	Recyclable wastes, including paper at site offices, will be stored separately from other wastes	Supervisor	Construction

APPENDIX A. ENVIRONMENTAL SYSTEMS CERTIFICATES



Registered by:
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SAI GLOBAL

APPENDIX B. ENVIRONMENTAL AND SUSTAINABILITY POLICY



ENVIRONMENTAL POLICY

The directors, management, and staff of Ward recognise that the civil construction industry has a significant impact on the environment. Ward has implemented an Environmental Management System (EMS) to minimise such impacts.

Our corporate EMS is designed to meet the requirements of AS/NZS ISO 14001 (the Standard) and incorporates documentation, implementation, maintenance, and communication through our corporate business management system, the Ward Management System (WMS).

All directors, managers, supervisors, employees, and subcontractors are responsible and accountable for the environmental controls in their workplace.

In documenting this Environmental Policy, we commit Ward to the following goals:

- A documented EMS identifying environmental aspects that can be specifically tailored to each project to prevent pollution and to protect the environment
- Identification and compliance with relevant legal and other requirements
- Establishment of a culture to continually improve the effectiveness of its EMS
- Establishment of a framework within the WMS for setting, reviewing, and communication of measurable environmental objectives and targets
- Provision of resources, role descriptions, responsibility statements, and delegations of authority for the implementation of the EMS and its controls
- Provision of training for, and ensuring awareness and competence of our employees and subcontractors in the requirements and usage of this EMS
- Communication of company and industry-wide information
- Implementation of emergency preparedness and response mechanisms
- A system for monitoring and measuring environmental controls
- That appropriate investigative, preventative, and corrective actions are taken in response to incidents with the aim of preventing re-occurrence
- That all processes are subject to regular and systematic management review

Our commitment to the environment will be evident through continual improvement via training, communication, consultation, monitoring and review with full support from the directors and senior management.

Authorised by:

Julia Ward
Chief Executive Officer


Signature

20 December 2019
Date

SUSTAINABILITY POLICY

Ward Civil and Environmental Engineering Pty Ltd ("Ward") is a multi-disciplined and full service civil and environmental engineering contractor. Ward emphasizes the importance of the environment and the safety of all people on our sites. We understand that what we do today can affect the lives of both current and future generations. We are committed to acting in a sustainable manner with respect to the environment and the wider community. We acknowledge that we need to do this in partnership with our clients, suppliers and subcontractors, with the goal of maintaining and improving the sustainability of our projects and communities in which we live and work.

Ward recognises that we need to approach the issue of sustainability from a variety of angles, including environmental, social and economic. We intend to achieve our long-term goal of working in a sustainable manner by defining clear objectives, monitoring our performance with respect to these objectives and then setting improvement targets to measure our progress.

Our sustainability objectives include:

- minimising impacts on the natural environment (including plant and animal life as well as air and water);
- complying with all applicable legislation and regulations associated with the environment;
- minimising impacts on all forms of heritage (including Aboriginal and European cultural heritage);
- respecting the link between Indigenous Australians and the land on which we work by improving participation of Indigenous Australians in our workforce;
- managing noise associated with construction works, and to develop systems to reduce or mitigate noise impacts;
- minimising energy use associated with construction; and
- maintaining and improving the visual amenities of the communities that we work in.


To assist in achieving our sustainability objectives we will undertake the following tasks:

- integrate sustainability considerations throughout our Health, Safety, Environmental and Quality ("HSEQ") management systems which will drive sustainable behavior with respect to the design, construction and operation of our projects;
- set targets, which will then be measured, to minimise emissions (both environmental and noise-related);
- reduce, reuse and recycle materials where practicable;
- promote efficient water and energy usage through the introduction of water and energy saving technologies and initiatives;
- engage with all stakeholders, including our supply chain, to drive efficiency and sustainability;
- provide our workforce with the information, training and support they require to meet our sustainability objectives;
- provide our staff with volunteer opportunities in the local communities in which they work;
- identify and engage suppliers and subcontractors that promote the participation of Indigenous Australians; and
- assess and reduce any undesirable impacts that our business activities may have on the community and environment.

Our commitment to sustainability will be evident through continual improvement via training, communication, consultation, monitoring, and review with full support from the directors and senior management.

Authorised by:

Julia Ward
Chief Executive Officer


Signature

20 December 2019
Date

APPENDIX C. COA, REMM MATRIX

The following Table identifies the relevant Conditions of Approval as identified in the Staging Report.

Applicable CoA	Condition of Approval
A1	<p>The Proponent must carry out the CSSI in accordance with the terms of this approval and generally in accordance with the:</p> <ul style="list-style-type: none"> (a) <i>Sydney Metro – Western Sydney Airport Environmental Impact Statement</i> dated 21 October 2020; and (b) <i>Sydney Metro – Western Sydney Airport Submissions Report</i> submitted April 2021.
A2	<p>The CSSI must only be carried out in accordance with all procedures, commitments, preventative actions, performance criteria and mitigation measures set out in the documents listed in Condition A1 unless otherwise specified in, or required under, this approval.</p>
A3	<p>In the event of an inconsistency between:</p> <ul style="list-style-type: none"> (a) the conditions of this approval and any document listed in Condition A1, the conditions of this approval will prevail to the extent of the inconsistency; and (b) any document listed in Condition A1, the most recent document will prevail to the extent of the inconsistency. <p><i>Note: For the purpose of this condition, there is an inconsistency between a term of this approval and any document if it is not possible to comply with both the term and the document.</i></p>
A4	<p>In the event that there are differing interpretations of the conditions of this approval, including in relation to a condition of this approval, the Planning Secretary's interpretation is final</p>
A5	<p>The Proponent must comply with all written requirements or directions of the Planning Secretary, including in relation to:</p> <ul style="list-style-type: none"> (a) the environmental performance of the CSSI; (b) any document or correspondence in relation to the CSSI; (c) any notification given to the Planning Secretary under the terms of this approval; (d) any audit of the construction or operation of the CSSI; (e) the terms of this approval and compliance with the terms of this approval (including anything required to be done under this approval); (f) the carrying out of any additional monitoring or mitigation measures; and (g) in respect of ongoing monitoring and management obligations, compliance with an updated or revised version of a guideline, protocol, Australian Standard or policy required to be complied with under the terms of this approval
A6	<p>Where the terms of this approval require a document or monitoring program to be prepared, or a review to be undertaken, in consultation with identified parties, evidence of the consultation undertaken must be submitted to the Planning Secretary with the document. The evidence must include:</p> <ul style="list-style-type: none"> (a) documentation of the engagement with the party identified in the condition of approval that has occurred before submitting the document for approval; (b) a log of the dates of engagement or attempted engagement with the identified party and a summary of the issues raised by them; (c) documentation of the follow-up with the identified party(s) where feedback has not been provided to confirm that the party(s) has none or has failed to provide feedback after repeated requests; (d) outline of the issues raised by the identified party(s) and how they have been addressed; and (e) a description of the outstanding issues raised by the identified party(s) and the reasons why they have not been addressed.
A7	<p>This approval lapses five (5) years after the date on which it is granted, unless work has physically commenced on or before that date</p>
A8	<p>References in the terms of this approval to any guideline, protocol, Australian Standard or policy are to such guidelines, protocols, standards or policies in the form they are in as at the date of this approval.</p>

Applicable CoA	Condition of Approval
A9	Any document that must be submitted or action taken within a timeframe specified in or under the conditions of this approval may be submitted or undertaken within a later timeframe agreed with the Planning Secretary. This condition does not apply to the written notification required in respect of an incident under Condition A41
A12	The CSSI must be staged in accordance with the Staging Report , as submitted to the Planning Secretary for information
A13	<i>Where staging is proposed, the terms of this approval that apply or are relevant to the work or activities to be carried out in a specific stage must be complied with at the relevant time for that stage</i>
A14	Where changes are proposed to the staging of construction or operation, a revised Staging Report must be prepared and submitted to the Planning Secretary for information before the commencement of changes to the stage of construction or the stage of operation
A15	Where changes are proposed to the risk assessment related to the staging of construction or operation, a revised Staging Report must be submitted to the Planning Secretary for information one (1) month before the lodgement of any CEMP or CEMP sub plan associated with the stage where change in risk assessment is proposed.
A16	<p>The Proponent may submit any strategies, plans or programs required by this approval on a progressive basis, within each stage of the CSSI.</p> <p>Notes:</p> <ol style="list-style-type: none"> 1. <i>While any strategy, plan or program may be submitted on a progressive basis, the Proponent will need to ensure that the existing activities on site are covered by suitable strategies, plans or programs at all times; and</i> 2. <i>If the submission of any strategy, plan or program is to be submitted on a progressive basis, then the relevant strategy, plan or program must clearly describe the activities to which the strategy, plan or program applies, the relationship of this activity to any future activities within the stage, and the trigger for updating the strategy, plan or program.</i> 3. <i>The staged submission of strategies, plans or programs may reflect the construction and operation of the project through geographical activities, temporal activities or activity-based staging.</i>
A17	<p>Ancillary facilities that are not identified by description and location in the documents listed in Condition A1 can only be established and used in each case if:</p> <ol style="list-style-type: none"> (a) they are located within or immediately adjacent to the Construction Boundary of the CSSI; and (b) they are not located next to sensitive land use(s) (including where an access road is between the facility and the receiver), unless the landowner and occupier have given written acceptance to the carrying out of the relevant facility in the proposed location; and (c) they have no impacts on Heritage items (including areas of archaeological sensitivity), threatened species, populations or ecological communities beyond the impacts approved under the terms of this approval; and (d) the establishment and use of the facility can be carried out and managed within the outcomes set out in the terms of this approval, including in relation to environmental, social and economic impacts. <p>Note: <i>This condition does not apply to any ancillary facilities or work that are exempt or complying development, established before the commencement of construction under this approval or minor ancillary facilities established under Condition A22</i></p>
A18	<p>Before establishment of any ancillary facility (excluding exempt or complying development, minor ancillary facilities determined by the ER to have minimal environmental impact and those established under Condition A22 and those considered in an approved CEMP), the Proponent must prepare a Site Establishment Management Plan which outlines the environmental management practices and procedures to be implemented for the establishment of the ancillary facilities. The Site Establishment Management Plan must be prepared in consultation with the Relevant Council(s) and relevant government agencies. The Site Establishment Management Plan must include:</p> <ol style="list-style-type: none"> (a) a description of activities to be undertaken during establishment of the ancillary facility (including scheduling and duration of work to be undertaken at the site); (b) figures illustrating the proposed operational site layout and the location of the closest sensitive land use(s); (c) a program for ongoing analysis of the key environmental risks arising from the site establishment activities described in subsection (a) of this condition,

Applicable CoA	Condition of Approval
	<p>including an initial risk assessment undertaken before the commencement of site establishment work; (d) details of how the site establishment activities described in subsection (a) of this condition will be carried out to: (i) meet the performance outcomes stated in the documents listed in Condition A1; and (ii) manage the risks identified in the risk analysis undertaken in subsection (c) of this condition; and (e) a program for monitoring the performance outcomes, including a program for construction noise monitoring, where appropriate or required.</p> <p>Nothing in this condition prevents the Proponent from preparing individual Site Establishment Management Plans for each ancillary facility.</p>
A19	<p>With the exception of a Site Establishment Management Plan expressly nominated by the Planning Secretary to be endorsed by the ER, all Site Establishment Management Plans must be submitted to the Planning Secretary for approval one (1) month before the establishment of any ancillary facilities.</p>
A20	<p>A Site Establishment Management Plan expressly nominated by the Planning Secretary to be endorsed by the ER must be submitted to the ER for endorsement one (1) month before the establishment of that ancillary facility or as otherwise agreed with the ER.</p>
A21	<p>The use of ancillary facility for construction must not commence until the CEMP required by Condition C1 relevant CEMP Sub-plans required by Condition C5 and relevant Construction Monitoring Programs required by Condition C13 have been approved by the Planning Secretary or endorsed by the ER (whichever is applicable). <i>Note: This condition does not apply to Condition A22 or where the use of an ancillary facility is Low Impact Work or for Low Impact Work.</i></p>
A22	<p>Lunch sheds, office sheds, portable toilet facilities and the like, can be established and used where they have been assessed in the documents listed in Condition A1 or satisfy the following criteria: (a) are located within or adjacent to the Construction Boundary; and (b) have been assessed by the ER to have - (i) minimal amenity impacts to surrounding residences and businesses, after consideration of matters such as compliance with the ICNG, traffic and access impacts, dust and odour impacts, and visual (including light spill) impacts, and (ii) minimal environmental impact with respect to waste management and flooding, and (iii) no impacts on biodiversity, soil and water, and Heritage items beyond those already approved under other terms of this approval.</p>
A23	<p>Boundary screening must be erected around ancillary facilities that are adjacent to sensitive land use(s) for the duration that the ancillary facility is in use unless otherwise agreed with relevant affected residents, business operators or landowners.</p>
A24	<p>Boundary screening required under Condition A23 must minimise visual impacts on adjacent sensitive land use(s).</p>
A25	<p>All Independent Appointments required by the terms of this approval must have regard to the Department's guideline <i>Seeking approval from the Department for the appointment of independent experts</i> (DPIE, 2020) and hold current membership of a relevant professional body, unless otherwise agreed by the Planning Secretary</p>
A26	<p>The Planning Secretary may at any time commission an audit of how an Independent Appointment has exercised their functions. The Proponent must: (a) facilitate and assist the Planning Secretary in any such audit; and (b) make it a term of their engagement of an Independent Appointment that the Independent Appointment facilitate and assist the Planning Secretary in any such audit.</p>
A27	<p>Upon completion of an audit under Conditions A26 above, the Planning Secretary may withdraw its approval of an Independent Appointment should they consider the Independent Appointment has not exercised their functions in accordance with this approval. <i>Note: Conditions A26 and A27 apply to all Independent Appointments including the ER and Independent Auditor.</i></p>

Applicable CoA	Condition of Approval
A28	Work must not commence until an Environmental Representative (ER) has been nominated by the Proponent and approved by the Planning Secretary.
A29	The proposed ER must be a suitably qualified and experienced person(s) who was not involved in the preparation of the documents listed in Condition A1 and is independent from the design and construction personnel for the CSSI and those involved in the delivery of it.
A30	The Proponent may engage more than one ER for the CSSI, in which case the functions to be exercised by an ER under the terms of this approval may be carried out by any ER that is approved by the Planning Secretary for the purposes of the SSI
A31	The ER must meet the requirements of the Department's <i>Environmental Representative Protocol</i> (DPE, 2018).
A32	<p>For the duration of the work until the commencement of operation, or as agreed with the Planning Secretary, the approved ER must:</p> <ul style="list-style-type: none"> (a) receive and respond to communication from the Planning Secretary in relation to the environmental performance of the CSSI; (b) consider and inform the Planning Secretary on matters specified in the terms of this approval; (c) consider and recommend to the Proponent any improvements that may be made to work practices to avoid or minimise adverse impact to the environment and to the community; (d) review documents identified in Conditions A10, A18, A20, C1, C5 and C13 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: <ul style="list-style-type: none"> (i) endorse the documents before submission of such documents to the Planning Secretary (if those documents are required to be approved by the Planning Secretary); or (ii) endorse the documents before the implementation of such documents (if those documents are only required to be submitted to the Planning Secretary / Department for information or are not required to be submitted to the Planning Secretary / Department); (iii) provide a written statement to the Planning Secretary advising the documents have been endorsed. (e) for documents that are required to be submitted to the Planning Secretary / Department for information under (d)(i) above, the documents must be submitted as soon as practicable to the Planning Secretary / Department after endorsement by the ER, unless otherwise agreed by the Planning Secretary; (f) regularly monitor the implementation of the documents listed in Conditions A10, A18, A20, C1, C5 and C13 to ensure implementation is being carried out in accordance with the document and the terms of this approval; (g) as may be requested by the Planning Secretary, help plan or attend 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 A36; (h) as may be requested by the Planning Secretary, assist the Department in the resolution of community complaints received directly by the Department; (i) consider or assess the impacts of minor ancillary facilities as required by Condition A22; and (j) consider any minor amendments to be made to the Site Establishment Management Plan, CEMP, CEMP Sub-plans and construction monitoring programs without increasing impacts to nearby sensitive land use(s), and are consistent with the terms of this approval and the Site Establishment Management Plan, CEMP, CEMP Sub-plans and construction monitoring programs 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; (k) prepare and submit to the Planning Secretary and other relevant regulatory agencies, for information, an Environmental Representative Monthly Report providing the information set out in the Environmental Representative Protocol under the heading "Environmental Representative Monthly Reports". 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 or as otherwise agreed by the Planning Secretary; and (l) assess the impacts of activities as required by the Low Impact Work definition. With respect to (d) above, the ER is not required to endorse the specialist content in documents requiring specialist review and / or endorsement
A33	<p>The Proponent must provide the ER with all documentation requested by the ER in order for the ER to perform their functions specified in Condition A32 (including preparation of the ER monthly report), as well as:</p> <ul style="list-style-type: none"> (a) the Complaints Register (to be provided on a weekly basis or as requested); and (b) a copy of any assessment carried out by the Proponent of whether proposed work is consistent with the approval (which must be provided to the ER before the commencement of the subject work)

Applicable CoA	Condition of Approval
A34	The Department, and relevant Councils must be notified in writing of the date of commencement of construction at least seven (7) days before the commencement of construction.
A35	If construction of the CSSI is to be staged, the Department, Liverpool City Council and Penrith City Council must be notified in writing at least seven (7) days before the commencement of each stage, of the date of the commencement of that stage.
A36	Independent Audits of the CSSI must be conducted and carried out in accordance with the <i>Independent Audit Post Approval Requirements</i> (DPIE, 2020).
A37	Notwithstanding Condition A36 , the Proponent may prepare an audit program to outline the scope and timing of each independent audit that will be undertaken during construction. If prepared, the audit program must be developed in consultation with, and approved by, the Planning Secretary prior to commencement of the first audit and implemented throughout construction.
A38	Proposed independent auditors must be approved by the Planning Secretary before the commencement of an Independent Audit .
A39	The Planning Secretary may require the initial and subsequent Independent Audits to be undertaken at different times to those specified in the <i>Independent Audit Post Approval Requirements</i> (DPIE, 2020), upon giving at least four (4) weeks' notice (or timing as stipulated by the Planning Secretary) to the Proponent of the date upon which the audit must be commenced.
A40	Independent Audit Reports and the Proponent's response to audit findings must be submitted to the Planning Secretary within two (2) months of undertaking the independent audit site inspection as outlined in the <i>Independent Audit Post Approval Requirements</i> (DPIE, 2020), unless otherwise agreed by the Planning Secretary
A41	The Planning Secretary must be notified via phone or in writing via the Major Projects website immediately after the Proponent becomes aware of an incident. Any notification via phone must be followed up by a notification in writing via the Major Projects website within 24 hours of the initial phone call. The written 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 general nature of the incident.
A43	Subsequent notification must be given and reports submitted in accordance with the requirements set out in Appendix A .
A44	The Planning Secretary must be notified in writing via the Major Projects website within seven (7) days after the Proponent becomes aware of any non-compliance with the terms of this approval.
A45	A non-compliance notification must identify the CSSI (including the application number for it), set out the condition of approval that the development is non-compliant with, the way in which it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be undertaken to address the non-compliance. <i>Note: A non-compliance which has been notified as an incident does not need to also be notified as a noncompliance.</i>
A46	All Heavy Vehicles used for spoil haulage must be clearly marked on the sides and rear with the project name and application number to enable immediate identification by a person viewing the Heavy Vehicle standing 20 metres away.
A47	The CSSI name, application number, telephone number, postal address and email address required under Condition B3 must be available on site boundary fencing / hoarding at each ancillary facility before the commencement of construction. This information must also be provided on the website required under Condition B11 .

Applicable CoA	Condition of Approval
B1	The Overarching Community Communication Strategy as provided in the documents listed in Condition A1 , or updated Strategy must be implemented for the duration of the work. Should the Overarching Community Communication Strategy be updated, a copy must be provided to the Planning Secretary for information
B2	A Complaints Management System must be prepared and implemented before the commencement of any work and maintained for the duration of construction and for a minimum for 12 months following completion of construction of the CSSI.
B3	The following information must be available to facilitate community enquiries and manage complaints before the commencement of work and for 12 months following the completion of construction: (a) a 24- hour telephone number for the registration of complaints and enquiries about the CSSI; (b) a postal address to which written complaints and enquires may be sent; (c) an email address to which electronic complaints and enquiries may be transmitted; and (d) a mediation system for complaints unable to be resolved. This information must be accessible to all in the community regardless of age, ethnicity, disability or literacy level.
B4	A Complaints Register must be maintained recording information on all complaints received about the CSSI during the carrying out of any work and for a minimum of 12 months following the completion of construction. The Complaints Register must record the: (a) number of complaints received; (b) date and time of the complaint; (c) number of people (in the household) affected in relation to a complaint, if relevant; (d) method by which the complaint was made; (e) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect; (f) issue of the complaint; (g) means by which the complaint was addressed and whether resolution was reached, with or without mediation; and (h) if no action was taken, the reason(s) why no action was taken.
B5	Complainants must be advised of the following information before, or as soon as practicable after, providing personal information: (a) the Complaints Register may be forwarded to government agencies, including the Department (Department of Planning Industry and Environment, 4 Parramatta Square, 12 Darcy Street, Parramatta NSW 2150), to allow them to undertake their regulatory duties; (b) by providing personal information, the complainant authorises the Proponent to provide that information to government agencies; (c) the supply of personal information by the complainant is voluntary; and (d) the complainant has the right to contact government agencies to access personal information held about them and to correct or amend that information (Collection Statement) The Collection Statement must be included on the Proponent or development website to make prospective complainants aware of their rights under the <i>Privacy and Personal Information Protection Act 1998</i> (NSW). For any complaints made in person, the complainant must be made aware of the Collection Statement .
B6	The Complaints Register must be provided to the Planning Secretary upon request, within the timeframe stated in the request. Note: <i>Complainants must be advised that the Complaints Register may be forwarded to Government agencies to allow them to undertake their regulatory duties.</i>
B7	A Community Complaints Mediator <i>that is independent of the design and construction personnel must be engaged by the Proponent, upon the referral of the complaint by the ER in accordance with the</i> Overarching Community Communication Strategy

Applicable CoA	Condition of Approval
B8	The role of the Community Complaints Mediator is to provide independent mediation services for any reasonable and unresolved complaint referred by the ER where a member of the public is not satisfied by the Proponent's response. Where a Community Complaints Mediator is required, a mediator accredited under the National Mediator Accreditation System (NMAS), administered by the Mediator Standards Board must be appointed
B9	The Community Complaints Mediator will: (a) review any unresolved disputes, referred by the ER in accordance with the Overarching Community Communication Strategy ; (b) make recommendations to the Proponent to satisfactorily address complaints, resolve disputes or mitigate against the occurrence of future complaints or disputes; and (c) provide a copy of the recommendations, and the Proponent's response to the recommendations, to the Planning Secretary within one month of the recommendations being made.
B10	Community Complaints Mediation will not be enacted before the Complaints Management System required by Condition B2 has been executed for a complaint and will not consider issues such as property acquisition, where other dispute processes are provided for in this approval, statute or clear government policy and resolution processes are available, or matters which are not within the scope of this CSSI
B11	A website or webpage providing information in relation to the CSSI must be established before commencement of work and maintained for the duration of construction, and for a minimum of 24 months following the completion of all stages of construction of the CSSI. Up-to-date information (excluding confidential, private, commercial information or other documents as agreed to by the Planning Secretary) must be published before the relevant work commencing and maintained on the website or dedicated pages including: (a) information on the current implementation status of the CSSI; (b) a copy of the documents listed in Condition A1 , and any documentation relating to any modifications made to the CSSI or the terms of this approval; (c) a copy of this approval in its original form, a current consolidated copy of this approval (that is, including any approved modifications to its terms), and copies of any approval granted by the Minister to a modification of the terms of this approval, or links to the referenced documents where available; (d) a copy of each statutory approval, licence or permit required and obtained in relation to the CSSI, or where the issuing agency maintains a website of approvals, licences or permits, a link to that website; (e) a current copy of each document required under the terms of this approval, which must be published within one (1) week of its approval or before the commencement of any work to which they relate or before their implementation, as the case may be; and (f) a copy of the audit reports required under this approval. Where the information / document relates to a particular work or is required to be implemented, it must be published before the commencement of the relevant work to which it relates or before its implementation. All information required in this condition is to be provided on the website or webpage, and easy to navigate.
C1	Construction Environmental Management Plans (CEMPs) and CEMP Sub-plans must be prepared in accordance with the Construction Environmental Management Framework (CEMF) included in the documents listed in Condition A1 to detail how the performance outcomes, commitments and mitigation measures specified in the documents listed in Condition A1 will be implemented and achieved during construction.
C2	With the exception of any CEMPs expressly nominated by the Planning Secretary to be endorsed by the ER , all CEMPs must be submitted to the Planning Secretary for approval. <i>Note: The Planning Secretary will consider the assessment of the predicted level of environmental risk and potential level of community concern required under Condition A1(e) when deciding whether any CEMP's may be endorsed by the ER.</i>
C3	The CEMP(s) not requiring the Planning Secretary's approval must be submitted to the ER for endorsement no later than one (1) month before the commencement of construction or where construction is staged no later than one (1) month before the commencement of that stage. That CEMP must obtain the endorsement of the ER as being consistent with the conditions of this approval and all undertakings made in the documents listed in Condition A1 .

Applicable CoA	Condition of Approval
C4	Any CEMP to be approved by the Planning Secretary must be endorsed by the ER and then submitted to the Planning Secretary for approval no later than one (1) month before the commencement of construction or where construction is staged no later than one (1) month before the commencement of that stage.
C6	The CEMP Sub-plans must state how: (a) the environmental performance outcomes identified in the documents listed in Condition A1 will be achieved; (b) the mitigation measures identified in the documents listed in Condition A1 will be implemented; (c) the relevant terms of this approval will be complied with; and (d) issues requiring management during construction (including cumulative impacts), as identified through ongoing environmental risk analysis, will be managed through SMART principles
C7	With the exception of any CEMP Sub-plans expressly nominated by the Planning Secretary to be endorsed by the ER , all CEMP Sub-plans must be submitted to the Planning Secretary for approval.
C8	The CEMP Sub-plans not requiring the Planning Secretary's approval must obtain the endorsement of the ER as being in accordance with the conditions of approval and all relevant undertakings made in the documents listed in Condition A1 . Any of these CEMP Sub-plans must be submitted to the ER with, or subsequent to, the submission of the CEMP but in any event, no later than one (1) month before construction or where construction is staged no later than one (1) month before the commencement of that stage.
C9	Any of the CEMP Sub-plans to be approved by the Planning Secretary must be submitted to the Planning Secretary with, or subsequent to, the submission of the CEMP but in any event, no later than one (1) month before construction or where construction is staged no later than one (1) month before the commencement of that stage
C10	Construction must not commence until the CEMP and all CEMP Sub-plans have been approved by the Planning Secretary or endorsed by the ER (whichever is applicable), unless otherwise agreed by the Planning Secretary. The CEMP and CEMP Sub-plans , as approved by the Planning Secretary or endorsed by the ER (whichever is applicable), including any minor amendments approved by the ER , must be implemented for the duration of construction
C11	In addition to the relevant requirements of the CEMF , the Flora and Fauna CEMP Sub-plan must include but not be limited to: (a) details of how the requirements of Conditions E11 will be met; (b) details of a dewatering plan of farm dams including: (i) supervision of dewatering by a suitably qualified ecologist; (ii) a methodology for the transfer of native fauna species known to inhabit and/or use the dam; (iii) the location and suitability of the proposed relocation sites; and (iv) any potential impacts of relocating the fauna to the relocation sites; (c) protocols for incidental finds of threatened species and ecological communities within the construction boundary
C12	In addition to the relevant requirements of the CEMF , the Soil and Water CEMP Sub-Plan must include but not be limited to: (a) details how the requirements of Conditions E127, E128 and E129 will be met; and (b) the unexpected contaminated finds protocol required by Condition E98 .
C13	The following Construction Monitoring Programs must be prepared in consultation with the relevant government agencies (as required by Condition A6) identified for each to compare actual performance of construction of the CSSI against the performance predicted in the documents listed in Condition A1 or in the CEMP . Where a government agency(ies) request(s) is not included, the Proponent must provide the Planning Secretary / ER (whichever is applicable) justification as to why

Applicable CoA	Condition of Approval															
	<table border="1"> <thead> <tr> <th></th> <th style="background-color: #cccccc;">Required Construction Monitoring Programs</th> <th style="background-color: #cccccc;">Relevant government agencies to be consulted for each Construction Monitoring Program</th> </tr> </thead> <tbody> <tr> <td>(a)</td> <td>Noise and vibration</td> <td>Relevant Councils and WaterNSW (in relation to its assets)</td> </tr> <tr> <td>(b)</td> <td>Surface water quality</td> <td>DPIE Water, DPI Fisheries, and Relevant Councils</td> </tr> <tr> <td>(c)</td> <td>Groundwater</td> <td>DPIE Water</td> </tr> <tr> <td>(d)</td> <td>Air Quality</td> <td>Relevant Councils</td> </tr> </tbody> </table>		Required Construction Monitoring Programs	Relevant government agencies to be consulted for each Construction Monitoring Program	(a)	Noise and vibration	Relevant Councils and WaterNSW (in relation to its assets)	(b)	Surface water quality	DPIE Water, DPI Fisheries, and Relevant Councils	(c)	Groundwater	DPIE Water	(d)	Air Quality	Relevant Councils
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(c)	Groundwater	DPIE Water														
(d)	Air Quality	Relevant Councils														
C14	<p>Each Construction Monitoring Program must provide:</p> <ul style="list-style-type: none"> (a) details of baseline data available including the period of baseline monitoring; (b) details of baseline data to be obtained and when; (c) details of all monitoring of the project to be undertaken; (d) the parameters of the project to be monitored; (e) the frequency of monitoring to be undertaken; (f) the location of monitoring; (g) the reporting of monitoring results and analysis results against relevant criteria; (h) details of the methods that will be used to analyse the monitoring data; (i) procedures to identify and implement additional mitigation measures where the results of the monitoring indicated unacceptable project impacts; (j) a consideration of SMART principles; (k) any consultation to be undertaken in relation to the monitoring programs; and (l) any specific requirements as required by Conditions C15 to C16. 															
C15	<p>The Noise and Vibration Construction Monitoring Program must include:</p> <ul style="list-style-type: none"> (a) noise and vibration monitoring at representative residential and other locations (including at the worst- affected residences), subject to property owner approval, to confirm construction noise and vibration levels; (b) monitoring undertaken during the day, evening and night-time periods throughout the construction period and cover the range of activities being undertaken; (c) method and frequency for reporting monitoring results; and (d) a process to undertake real time noise and vibration monitoring. <p>The results of the monitoring must be readily available to the construction team, the Proponent and ER. The Planning Secretary and EPA must be provided with access to the results on request</p>															
C16	<p>Groundwater Construction Monitoring Program must include:</p> <ul style="list-style-type: none"> (a) groundwater monitoring networks at each construction excavation site predicted to intercept groundwater in the documents listed in Condition A1; (b) detail of the location of all monitoring bores with nested sites to monitor both shallow and deep groundwater levels and quality; (c) define the location of saltwater interception monitoring where sentinel groundwater monitoring bores will be installed between the saline sources and that of each construction excavation site predicted to intercept groundwater in the documents listed in Condition A1; (d) results from existing monitoring bores; (e) monitoring and gauging of groundwater inflow to the excavations predicted to intercept groundwater in the documents listed in Condition A1, appropriate trigger action response plan for all predicted groundwater impacts upon each noted neighbouring groundwater system component for each excavation construction site; (f) trigger levels for groundwater quality, salinity and groundwater drawdown in monitoring bores and / or other groundwater users; (g) daily measurement of the amount of water discharged from the water treatment plants; 															

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	<p>(h) water quality testing of the water discharged from treatment plants;</p> <p>(i) management and mitigation measures and criteria, including measures to address impacts on groundwater dependent ecosystems;</p> <p>(j) groundwater inflow to the excavations to enable a full accounting of the groundwater take from the Sydney Basin Central Groundwater Source;</p> <p>(k) reporting of groundwater gauging at excavations, groundwater monitoring, groundwater trigger events and action responses; and</p> <p>(l) methods for providing the data collected to Sydney Water where discharges are directed to their assets</p>
C17	<p>With the exception of any Construction Monitoring Programs expressly nominated by the Planning Secretary to be endorsed by the ER, all Construction Monitoring Programs must be submitted to the Planning Secretary for approval</p>
C18	<p>The Construction Monitoring Programs not requiring the Planning Secretary's approval must obtain the endorsement of the ER as being in accordance with the conditions of approval and all undertakings made in the documents listed in Condition A1. Any of these Construction Monitoring Programs must be submitted to the ER for endorsement at least one (1) month before the commencement of construction or where construction is staged no later than one (1) month before the commencement of that stage</p>
C19	<p>Any of the Construction Monitoring Programs which require Planning Secretary approval 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 or where construction is staged no later than one (1) month before the commencement of that stage</p>
C20	<p>Unless otherwise agreed with the Planning Secretary, construction must not commence until the Planning Secretary has approved, or the ER has endorsed (whichever is applicable), all of the required Construction Monitoring Programs and all relevant baseline data for the specific construction activity has been collected</p>
C21	<p>The Construction Monitoring Programs, as approved by the Planning Secretary or the ER has endorsed (whichever is applicable), 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 or the ER (whichever is applicable), whichever is the greater</p>
C22	<p>The results of the Construction Monitoring Programs must be submitted to the Planning Secretary, ER and relevant regulatory agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program. <i>Note: Where a relevant CEMP Sub-plan exists, the relevant Construction Monitoring Program may be incorporated into that CEMP Sub-plan.</i></p>
E1	<p><i>All reasonably practicable measures must be implemented to minimise the emission of dust and other air pollutants during construction</i></p>
E19	<p>The Proponent must not destroy, modify or otherwise physically affect any Heritage item not identified in documents referred to in Condition A1. Unexpected heritage finds identified by the CSSI must be managed in accordance with the Unexpected Heritage Finds and Human Remains Procedure outlined in Conditions E34 to E36. Consideration of avoidance and redesign to protect unexpected finds of state heritage significance must be addressed where this condition applies</p>
E20	<p><i>The dismantling and reassembly of the jib crane at St Marys Station, if required, must only be undertaken under the supervision of a consultant experienced in the conservation of heritage machinery</i></p>
E21	<p>The St Marys Goods Shed must not be destroyed, modified or otherwise adversely affected, except as identified in the documents listed in Condition A1</p>
E23	<p>Before commencement of archaeological excavation, the Proponent must, in consultation with Heritage NSW, nominate a suitably qualified Excavation Director, who complies with Heritage Council of NSW's <i>Criteria for Assessment of Excavation Director</i> (September 2019), to oversee and advise on matters associated with historical archaeology for the approval of the Planning Secretary. The Excavation Director must be present to oversee excavation, advise</p>

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	on archaeological issues, advise on the duration and extent of oversight required during archaeological excavations consistent with the Archaeological Research Design and Excavation Methodology(s) identified in the documents listed in Condition A1 . More than one Excavation Director may be engaged for CSSI to exercise the functions required under the conditions of this approval
E24	Archival photographic digital recording must be undertaken for all listed heritage items which will be affected by the CSSI. The recordings must be undertaken prior to the commencement of Work which may impact the items and documented in an Archival Recording Report . The recordings must include buildings, structures and landscape features and detailed maps showing the location of features. The archival recording must be prepared in accordance with <i>How to Prepare Archival Records of Heritage Items</i> (NSW Heritage Office, 1998) and <i>Photographic Recording of Heritage Items Using Film or Digital Capture</i> (NSW Heritage Office, 2006)
E25	The Archival Recording Report must be submitted to the Planning Secretary, relevant councils and Heritage NSW for information within 12 months of completing all work described in the documents listed in Condition A1 in relation to heritage items. Copies of the Archival Recording Report must also be provided to relevant local historical societies
E26	Following completion of all work described in the documents listed in Condition A1 in relation to heritage items, a non-Aboriginal Archaeological Excavation Report including the details of further historical research either undertaken or to be carried out and archaeological excavations (<i>with artefact analysis and identification of a final repository for finds</i>) and addressing the research design, must be prepared in accordance with any guidelines and standards required by the Heritage Council of NSW and Heritage NSW
E27	The non-Aboriginal Archaeological Excavation Report must be submitted to the Planning Secretary, relevant councils and Heritage NSW for information within 12 months of completing all Work described in the documents listed in Condition A1 in relation to heritage items. Copies of the Report must also be provided to relevant local historical societies and local libraries
E28	<i>All reasonable steps must be taken so as not to harm, modify or otherwise impact Aboriginal objects or places of cultural significance except as authorised by this approval</i>
E29	The Registered Aboriginal Parties (RAPs) must be kept regularly informed about the CSSI. The RAPs must continue to be provided with the opportunity to be consulted about the Aboriginal cultural heritage management requirements of the CSSI throughout construction
E30	<p>The Aboriginal Cultural Heritage Management Plan included in the documents listed in Condition A1 must be updated to include:</p> <ul style="list-style-type: none"> (a) a methodology for the completion of pedestrian surveys for all areas within the project footprint yet to be surveyed; (b) procedures for undertaking further test excavation and, if necessary, salvage excavations prior to the commencement of works in areas subject to further test excavation; (c) mapping that clearly outlines all areas yet to be subject to survey, test excavations, and salvage excavations; (d) a procedure to update mapping following the completion of survey, test excavations, and salvage excavations that detail the archaeological works conducted across the project footprint; (e) a procedure for updating the predictive model following the identification of new Aboriginal heritage items; and (f) a procedure to report and update the effectiveness of the Aboriginal Cultural Heritage Management Plan following the completion of survey, test excavation activities or significant artefact finds. <p>The updated Plan must be submitted to the Planning Secretary for information prior to works in areas identified for further test excavations.</p> <p><i>Note: Salvage excavations in the areas identified for salvage in documents in Condition A1, may occur prior to additional test excavations occurring</i></p>
E33	Where previously unidentified Aboriginal objects or places of cultural significance are discovered, all work must immediately stop in the vicinity of the affected area. Works potentially affecting the previously unidentified objects or places must not recommence until Heritage NSW has been informed. The measures to consider and manage this process must be specified in the Unexpected Heritage Finds and Human Remains Procedure required by Condition E34 and include registration in the Aboriginal Heritage Information Management System (AHIMS), where required

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E34	An Unexpected Heritage Finds and Human Remains Procedure must be prepared to manage unexpected heritage finds (heritage items and values) in accordance with any guidelines and standards prepared by the Heritage Council of NSW or Heritage NSW
E35	The Unexpected Heritage Finds and Human Remains Procedure must be prepared by a suitably qualified and experienced heritage specialist in consultation with the Heritage Council of NSW (with respect to non-Aboriginal cultural heritage) and in relation to Aboriginal cultural heritage, in accordance with the <i>Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales</i> (DECCW 2010) and submitted to the Planning Secretary for information no later than one (1) month before the commencement of construction
E36	The Unexpected Heritage Finds and Human Remains Procedure , as submitted to the Planning Secretary, must be implemented for the duration of construction. Where archaeological investigations have been undertaken as a result of Unexpected Finds notifications then a Final Archaeological Report must be provided in accordance with Heritage Council guidance and standard requirements for final reporting under Excavation Permits. Note: <i>Human remains that are found unexpectedly during the carrying out of work may be under the jurisdiction of the NSW State Coroner and must be reported to the NSW Police immediately. Management of human remains in NSW is subject to requirements set out in the Public Health Act 2010 (NSW) and Public Health Regulation 2012 (NSW). Nothing in these conditions prevents separate procedures for the Unexpected Heritage Finds and Human Remains Procedure</i>
E37	Land Use Survey A detailed land use survey must be undertaken to confirm sensitive land use(s) (including critical working areas such as operating theatres and precision laboratories) potentially exposed to construction noise and vibration and construction ground-borne noise. The survey may be undertaken on a progressive basis but must be undertaken in any one area before the commencement of work which generates construction noise, vibration or ground-borne noise in that area. The results of the survey must be included in the Detailed Noise and Vibration Impact Statements required under Condition E47
E38	Construction Hours Work must only be undertaken during the following hours: (a) 7:00am to 6:00pm Mondays to Fridays, inclusive; (b) 8:00am to 1:00pm Saturdays; and (c) at no time on Sundays or public holidays
E39	Highly Noise Intensive Work Except as permitted by an EPL or approved in accordance with the Out-of-Hours Works Protocol required by Condition E42 , highly noise intensive work that result in an exceedance of the applicable NML at the same receiver must only be undertaken: (a) between the hours of 8:00 am to 6:00 pm Monday to Friday; (b) between the hours of 8:00 am to 1:00 pm Saturday; and (c) if continuously, then not exceeding three (3) hours, with a minimum cessation of work of not less than one (1) hour. For the purposes of this condition, 'continuously' includes any period during which there is less than one (1) hour between ceasing and recommencing any of the work.
E40	This approval does not permit blasting
E41	Variation to Work Hours Notwithstanding Conditions E38 and E39 work may be undertaken outside the hours specified in the following circumstances: (a) Safety and Emergencies , including: (i) for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or (ii) 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 (b) Low impact , including: (i) construction that causes LAeq(15 minute) noise levels:

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	<ul style="list-style-type: none"> • no more than 5 dB(A) above the rating background level at any residence in accordance with the ICNG, and • no more than the 'Noise affected' NMLs specified in Table 3 of the ICNG at other sensitive land user(s); and <p>(ii) construction that causes:</p> <ul style="list-style-type: none"> • continuous or impulsive vibration values, measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.2 of <i>Assessing Vibration: a technical guideline</i> (DEC, 2006), or • intermittent vibration values measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.4 of <i>Assessing Vibration: a technical guideline</i> (DEC, 2006); or <p>(c) By Approval, including:</p> <ul style="list-style-type: none"> (i) where different construction hours are permitted or required under an EPL in force in respect of the CSSI; or (ii) works which are not subject to an EPL that are approved under an Out-of-Hours Work Protocol as required by Condition E42; or (iii) negotiated agreements with directly affected residents and sensitive land user(s); or <p>(d) By Prescribed Activity, including:</p> <ul style="list-style-type: none"> (i) tunnelling and ancillary support activities (excluding cut and cover tunnelling and surface works not directly supporting tunneling) are permitted 24 hours a day, seven days a week; or (ii) grout batching at the Orchard Hills construction site is permitted 24 hours per day, seven days per week; or (iii) delivery of material that is required to be delivered outside of standard construction hours in Condition E38 to directly support tunnelling activities, except between the hours 10:00 pm and 7:00 am to / from the Orchard Hills ancillary facility; or (iv) haulage of spoil generated through tunnelling is permitted 24 hours per day, seven days per week except between the hours of 10:00 pm and 7:00 am to / from the Orchard Hills construction site; or (v) works within an acoustic enclosure are permitted 24 hours a day, seven days a week where there is no exceedance of noise levels or intermittent vibration levels under Low impact circumstances identified in Condition E41(b), unless otherwise agreed with the Planning Secretary; or (vi) tunnel and underground station box fit out works are permitted 24 hours per day, seven days per week. <p>On becoming aware of the need for emergency work in accordance with (a)(ii) above, the ER, the Planning Secretary and the EPA must be notified of the reasons for such work. The Proponent must use best endeavours to notify as soon as practicable all noise and/or vibration affected sensitive land user(s) of the likely impact and duration of those work.</p> <p>Notes:</p> <ol style="list-style-type: none"> 1. <i>Tunnelling does not include station box excavation.</i> 2. <i>Tunnelling ancillary support activities includes logistics support and material handling and delivery</i>
E42	<p><i>Out of hours works Protocol - work not subject to an EPL</i></p> <p>An Out-of-Hours Work Protocol must be prepared to identify a process for the consideration, management and approval of work (not subject to an EPL) that is outside the hours defined in Conditions E38 and E39. The Protocol must be approved by the Planning Secretary before commencement of the out-of-hours work. The Protocol must be prepared in consultation with the ER. The Protocol must provide:</p> <ul style="list-style-type: none"> (a) justification for why out-of-hours work need to occur; (b) identification of low and high-risk activities and an approval process that considers the risk of activities, proposed mitigation, management, and coordination, including where: <ul style="list-style-type: none"> (i) the ER reviews all proposed out-of-hours activities and confirms their risk levels; (ii) low risk activities that can be approved by the ER; and (iii) high risk activities that are approved by the Planning Secretary; (c) a process for the consideration of out-of-hours work against the relevant NML and vibration criteria; (d) a process for selecting and implementing mitigation measures for residual impacts in consultation with the community at each affected location, including respite periods consistent with the requirements of Condition E56. The measures must take into account the predicted noise levels and the likely frequency and duration of the out-of-hours works that sensitive land user(s) would be exposed to, including the number of noise awakening events; (e) procedures to facilitate the coordination of out-of-hours work including those approved by an EPL or undertaken by a third party, to ensure appropriate respite is provided; and (f) notification arrangements for affected receivers for all approved out-of-hours works and notification to the Planning Secretary of approved low risk out-of-hours works. <p>This condition does not apply if the requirements of Condition E41 are met.</p> <p>Note: <i>Out-of-hours work is any work that occurs outside the construction hours identified in Condition E38 and E39</i></p>

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E43	<p>Construction Noise Management Levels and Vibration Criteria</p> <p>Mitigation measures must be implemented with the aim of achieving the following construction noise management levels and vibration criteria:</p> <p>(a) construction 'Noise affected' noise management levels established using the <i>Interim Construction Noise Guideline</i> (DECC, 2009);</p> <p>(b) preferred vibration criteria established using the <i>Assessing vibration: a technical guideline</i> (DEC, 2006) (for human exposure);</p> <p>(c) Australian Standard AS 2187.2 - 2006 "<i>Explosives - Storage and Use - Use of Explosives</i>" (for human exposure);</p> <p>(d) BS 7385 Part 2-1993 "<i>Evaluation and measurement for vibration in buildings Part 2</i>" as they are "applicable to Australian conditions"; and</p> <p>(e) the vibration limits set out in the <i>German Standard DIN 4150-3: Structural Vibration- effects of vibration on structures</i> (for structural damage).</p> <p>Any work identified as exceeding the noise management levels and / or vibration criteria must be managed in accordance with the <i>Noise and Vibration CEMP Sub-plan</i></p> <p><i>Note: The ICNG identifies 'particularly annoying' activities that require the addition of 5 dB(A) to the predicted level before comparing to the construction Noise Management Level</i></p>
E44	<p>All reasonable and feasible mitigation measures must be applied when the following residential ground-borne noise levels are exceeded:</p> <p>(a) evening (6:00 pm to 10:00 pm) — internal LAeq(15 minute): 40 dB(A); and</p> <p>(b) night (10:00 pm to 7:00 am) — internal LAeq(15 minute): 35 dB(A).</p> <p>The mitigation measures must be outlined in the Noise and Vibration CEMP Sub-plan, including in any Out-of-Hours Work Protocol, required by Condition E42</p>
E45	<p>Noise generating work in the vicinity of potentially-affected community, religious, educational institutions and noise and vibration-sensitive businesses and critical working areas (such as theatres, laboratories and operating theatres) resulting in noise levels above the NMLs must not be timetabled within sensitive periods, unless other reasonable arrangements with the affected institutions are made at no cost to the affected institution</p>
E46	<p>Noise and Vibration Mitigation and Management</p> <p>Industry best practice construction methods must be implemented where reasonably practicable to ensure that noise and vibration levels are minimised around sensitive land use(s). Practices may include, but are not limited to:</p> <p>(a) use of regularly serviced low sound power equipment;</p> <p>(b) at source control, temporary noise barriers (including the arrangement of plant and equipment) around noisy equipment and activities such as rock hammering and concrete cutting;</p> <p>(c) use of non-tonal reversing alarms; and</p> <p>(d) use of alternative construction and demolition techniques</p>
E47	<p>Detailed Noise and Vibration Impact Statements (DNVIS) must be prepared for any work that may exceed the NMLs, vibration criteria and / or ground-borne noise levels specified in Conditions E43 and E44 at any residence outside construction hours identified in Condition E38, or where receivers will be highly noise affected or subject to vibration levels above those otherwise determined as appropriate by a suitably qualified structural engineer under Condition E87. The DNVIS must include specific mitigation measures identified through consultation with affected sensitive land user(s) and the mitigation measures must be implemented for the duration of the works. A copy of the DNVIS must be provided to the ER before the commencement of the associated works. The Planning Secretary and the EPA may request a copy (ies) of the DNVIS</p>
E48	<p>Owners and occupiers of properties at risk of exceeding the screening criteria for cosmetic damage must be notified before works that generate vibration commences in the vicinity of those properties. If the potential exceedance is to occur more than once or extend over a period of 24 hours, owners and occupiers must be provided a schedule of potential exceedances on a monthly basis for the duration of the potential exceedances, unless otherwise agreed by the owner and occupier. These properties must be identified and considered in the Noise and Vibration CEMP Sub-plan</p>
E49	<p>Where sensitive land use(s) are identified in Appendix B as exceeding the highly noise affected criteria during typical case construction, mitigation measures must be implemented with the objective of reducing typical case construction noise below the highly noise affected criteria at each relevant sensitive landuse(s). Activities that would exceed highly noise affected criteria during typical case construction must not commence until the measures identified in this condition have been implemented, unless otherwise agreed with the Planning Secretary.</p>

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	<p><i>Note: Mitigation measures may include path barrier controls such as acoustic sheds and/or noise walls, at-property treatment, or a combination of path and at-property treatment</i></p>
E51	<p>Where Condition E49 determines that at-property treatment (temporary or permanent) is the appropriate measure to reduce noise impacts, this at-property treatment must be offered to landowners of residential properties for habitable living spaces, unless other mitigation or management measures are agreed to by the landowner. Landowners must be advised of the range of options that can be installed at or in their property and given a choice as to which of these they agree to have installed. A copy of all guidelines and procedures that will be used to determine at-property treatment at their residence must be provided to the landowner</p>
E52	<p>Any offer for at-property treatment or the application of other noise mitigation measures in accordance with Condition E51, does not expire until the noise impacts specified in Condition E49, affecting that property are completed, even if the landowner initially refuses the offer. <i>Note: If an offer has been made but is not accepted, this does not preclude the commencement of construction under Condition E49</i></p>
E53	<p>The implementation of at-property treatment does not preclude the application of other noise and vibration mitigation and management measures including temporary and long term accommodation</p>
E54	<p>Construction Vibration Mitigation - Heritage Items Vibration testing must be conducted during vibration generating activities that have the potential to impact on Heritage items to verify minimum working distances to prevent cosmetic damage. In the event that the vibration testing and attended monitoring shows that the preferred values for vibration are likely to be exceeded, the Proponent must review the construction methodology and, if necessary, implement additional mitigation measures. Such measures must include, but not be limited to, review or modification of excavation techniques</p>
E55	<p>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 items</p>
E56	<p>All 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 any work to provide respite to impacted noise sensitive land use(s) so that the respite is achieved in accordance with Condition E57; or (b) consider the provision of alternative respite or mitigation to impacted noise sensitive land use(s); and (c) provide documentary evidence to the ER in support of any decision made by the Proponent in relation to respite or mitigation The consideration of respite must also include all other approved Critical SSI, SSI and SSD projects which may cause cumulative and / or consecutive impacts at receivers affected by the delivery of the CSSI</p>
E57	<p>Out-of-Hours Works – Community Consultation on Respite In order to undertake out-of-hours work outside the work hours specified under Condition E38, appropriate respite periods for the out-of-hours work must be identified in consultation with the community at each affected location on a regular basis. This consultation must include (but not be limited to) providing the community with: (a) a progressive schedule for periods no less than three (3) months, of likely out-of-hours work; (b) a description of the potential work, location and duration of the out-of-hours work; (c) the noise characteristics and likely noise levels of the work; and (d) likely mitigation and management measures which aim to achieve the relevant NMLs under Condition E43 (including the circumstances of when respite or relocation offers will be available and details about how the affected community can access these offers). The outcomes of the community consultation, the identified respite periods and the scheduling of the likely out-of-hour work must be provided to the ER, EPA and the Planning Secretary prior to the out-of-hours work commencing. <i>Note: Respite periods can be any combination of days or hours where out-of-hours work would not be more than 5 dB(A) above the RBL at any residence</i></p>

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E61	<p>Construction Sites Wayfinding information must be incorporated on temporary hoardings to guide pedestrians around the St Marys construction site and enhance their understanding and experience of the locality and space</p>
E62	<p>The CSSI must be constructed in a manner that minimises visual impacts of construction sites including temporary landscaping and vegetative screening, minimising light spill, and incorporating architectural treatment and finishes within key elements of temporary structures that reflect the context within which the construction sites are located, wherever practicable</p>
E63	<p>The CSSI must be designed with consideration of: the design objectives, principles and guidelines identified in documents listed in Condition A1; the principles and objectives of the draft <i>Connecting with Country Framework</i>; relevant land use changes, masterplans and initiatives, where this information is known and/or available; existing and proposed future local context and character; and transport and land use integration and system functionality in the context of precincts, to the extent it is known and/or defined. Responses to items (a) – (e) must be reviewed by the Design Review Panel (DRP) to inform the design of permanent built works and landscape design of the CSSI. The outcome of the DRP review must be provided to the Planning Secretary prior to the submission of the Place, Urban Design and Corridor Landscape Plan (PUDCLP). Note: In accordance with Condition A10 and Condition A16, the requirements of this condition can be staged</p>
E64	<p>Design Guidance and Standards - Lighting and Security The CSSI must be constructed and operated with the objective of minimising light spill to surrounding properties. All lighting associated with the CSSI must be consistent with the requirements of: <i>AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting, relevant Australian Standards in the series AS/NZS 1158 - Lighting for Roads and Public Spaces, NASF Guideline E: Managing the Risk of Distractions to Pilots from Lighting in the Vicinity of Airports, and NASF Guideline C: Managing the risk of wildlife strikes in the vicinity of airports</i>. Mitigation measures must be provided to manage residual night lighting impacts to protect properties adjoining or adjacent to the CSSI, in consultation with affected landowners</p>
E82	<p><i>The CSSI must be designed and constructed with the objective of minimising impacts to, and interference with third party property, and that such infrastructure and property is protected during construction</i></p>
E83	<p><i>The utilities and services (hereafter “services”) potentially affected by construction must be identified to determine requirements for diversion, protection and / or support. Alterations to services must be determined by negotiation between the Proponent and the service providers. Disruption to services resulting from construction must be avoided, wherever possible, and advised to customers where it is not possible</i></p>
E84	<p>A suitably qualified and experienced person must undertake condition surveys of all buildings, structures, utilities and the like identified in the documents listed in Condition A1 and the further assessment carried out under mitigation measure GW1 of the Submissions Report as being at risk of damage before commencement of any work that could impact on the subject surface / subsurface structure. The results of the surveys must be documented in a Pre-construction Condition Survey Report for each item surveyed. Copies of Pre-construction Condition Survey Reports must be provided to the relevant owners of the items surveyed in the vicinity of the proposed work, and no later than one (1) month before the commencement of the work that could impact on the subject surface / subsurface structure</p>
E85	<p>Condition surveys of all items for which condition surveys were undertaken in accordance with Condition E84 must be undertaken by a suitably qualified and experienced person after completion of the work identified in Condition E84. The results of the surveys must be documented in a Post-construction Condition Survey Report for each item surveyed. Copies of Post-construction Condition Survey Reports must be provided to the landowners of the items surveyed, and no later than three (3) months following the completion of the work that could impact on the subject surface / subsurface structure</p>
E86	<p>The Proponent, where liable, must rectify any property damage caused directly or indirectly (for example from vibration or from groundwater change) by the work at no cost to the owner. Alternatively, the Proponent may pay compensation for the property damage as agreed with the property owner. Rectification or compensation must be undertaken within 12 months of completion of the work identified in Condition E84 unless another timeframe is agreed with the owner of the affected surface or sub-surface structure or recommended by the Independent Property Impact Assessment Panel (IPIAP).</p>

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E91	Small Business Owners Engagement Plan(s) must be prepared for St Marys and implemented in accordance with the Overarching Community Communication Strategy to minimise impact on small businesses directly affected by construction activities at St Marys during construction. The plan must be prepared and submitted to the Planning Secretary for information before the commencement of construction at St Marys
E98	An Unexpected Contaminated Land and Asbestos Finds Procedure must be prepared before the commencement of construction and must be followed should unexpected contaminated land or asbestos (or suspected contaminated land or asbestos) be excavated or otherwise discovered during construction
E99	The Unexpected Contaminated Land and Asbestos Finds Procedure must be implemented throughout construction
E100	A Sustainability Plan must be prepared to achieve an Infrastructure Sustainability Council of Australia (ISCA) Infrastructure Sustainability rating of +75 (Version 1.2) (or equivalent level of performance using a demonstrated equivalent rating tool) or a 5-Star Green Star rating (or equivalent level of performance using a demonstrated equivalent rating tool)
E101	The Sustainability Plan must be submitted to the Planning Secretary for information within six (6) months of the date of this approval and must be implemented throughout construction and operation. <i>Note: Nothing in this condition prevents the Proponent from preparing separate Sustainability Strategies for the construction and operational stages of the CSSI</i>
E103	TRAFFIC AND TRANSPORT Construction Traffic Management Plans (CTMPs) must be prepared in accordance with the Construction Traffic Management Framework. A copy of the CTMPs must be submitted to the Planning Secretary for information before the commencement of any construction in the area identified and managed within the relevant CTMP
E105	Local roads proposed to be used by Heavy Vehicles to directly access ancillary facilities / construction sites that are not identified in the documents listed in Condition A1 must be approved by the Planning Secretary and be included in the CTMP
E106	All requests to the Planning Secretary for approval to use local roads under Condition E105 above must include the following: (a) a swept path analysis; (b) demonstration that the use of local roads by Heavy Vehicles for the CSSI will not compromise the safety of pedestrians and cyclists of the safety of two-way traffic flow on two-way roadways; (c) details as to the date of completion of the road dilapidation surveys for the subject local roads; and (d) measures that will be implemented to avoid where practicable the use of local roads past schools, aged care facilities and child care facilities during their peak operation times; and (e) written advice from an appropriately qualified professional on the suitability of the proposed Heavy Vehicle route which takes into consideration items (a) to(d) of this condition
E107	Road Dilapidation Before any local road is used by a Heavy Vehicle for the purposes of construction of the CSSI, a Road Dilapidation Report must be prepared for the road. A copy of the Road Dilapidation Report must be provided to the Relevant Road Authority(s) within three (3) weeks of completion of the survey and at no later than one (1) month before the road being used by Heavy Vehicles associated with the construction of the CSSI
E108	If damage to roads occurs as a result of the construction of the CSSI, the Proponent must either (at the Relevant Road Authority's discretion): (a) compensate the Relevant Road Authority for the damage so caused; or (b) rectify the damage to restore the road to at least the condition it was in pre-work as identified in the Road Dilapidation Report

Applicable CoA	Condition of Approval
E109	<p>Construction Parking and Access Management Vehicles associated with the project workforce (including light vehicles and Heavy Vehicles) must be managed to:</p> <ul style="list-style-type: none"> (a) minimise parking on public roads; (b) minimise idling and queueing on state and regional roads; (c) not carry out marshalling of construction vehicles near sensitive land use(s); (d) not block or disrupt access across pedestrian or shared user paths at any time unless alternate access is provided; and (e) ensure spoil haulage vehicles adhere to the nominated haulage routes identified in the CTMP
E110	<p>Property Access Access to all utilities and properties must be maintained during works, unless otherwise agreed with the relevant utility owner, landowner or occupier</p>
E111	<p>The Proponent must maintain access to properties during the entirety of works unless an alternative access is agreed in writing with the landowner(s) whose access is impacted by the CSSI works</p>
E112	<p>Where construction of the CSSI restricts a property's access to a public road, the Proponent must, until their primary access is reinstated, provide the property with temporary alternate access to an agreed road decided through consultation with the landowner, at no cost to the property landowner, unless otherwise agreed with the landowner</p>
E113	<p>Any property access physically affected by the CSSI must be reinstated to at least an equivalent standard, unless otherwise agreed by the landowner or occupier. Property access must be reinstated within one (1) month of the work that physically affected the access is completed or in any other timeframe agreed with the landowner or occupier</p>
E114	<p>During construction, all reasonably practicable measures must be implemented to maintain pedestrian, cyclist and vehicular access to, and parking in the vicinity of, businesses and affected properties. Disruptions are to be avoided, and where avoidance is not possible, minimised. Where disruption cannot be avoided, alternative pedestrian, cyclist and vehicular access, and parking arrangements must be developed in consultation with affected businesses and landowners and implemented before the disruption. Adequate signage and directions to businesses must be provided before, and for the duration of, any disruption</p>
E115	<p>Pedestrian and Cyclist Access Safe pedestrian and cyclist access must be maintained around the St Marys construction site during construction. In circumstances where pedestrian and cyclist access is restricted or removed due to construction activities, a proximate alternate route which complies with the relevant standards, must be provided and signposted before the restriction or removal of the impacted access</p>
E116	<p>Road Traffic and Safety A Traffic and Transport Liaison Group(s) must be established in accordance with the Construction Traffic Management Framework to inform the development of CTMP</p>
E117	<p>Supplementary analysis and modelling as required by TfNSW and / or the Traffic and Transport Liaison Group(s) must be undertaken to demonstrate that construction and operational traffic can be managed to minimise disruption to traffic network operations, including changes to and the management of pedestrian, bicycle and public transport networks, public transport services, and pedestrian and cyclist movements. Revised traffic management measures must be incorporated into the CTMP</p> <p>Permanent road works included in the CSSI must be designed, constructed and operated with the objective of integrating with existing and proposed road and related transport networks and minimising adverse changes to the safety, efficiency and, accessibility of the network. Design and assessment of related traffic, parking, pedestrian and cycle accessibility impacts and changes shall be undertaken:</p> <ul style="list-style-type: none"> (a) in consultation with, and to the reasonable requirements of the relevant Traffic and Transport Liaison Group;

Applicable CoA	Condition of Approval
	(b) in consideration of existing and future demand, connectivity (in relation to permanent changes), performance and safety requirements; (c) to minimise and manage local area traffic impacts; (d) to, where possible and appropriate, retain or reinstate parking in St Marys; (e) to ensure access is maintained to property and infrastructure (f) to address relevant design, engineering and safety guidelines, including Austroads, Australian Standards and TfNSW requirements. Copies of civil, structural and traffic signal design plans shall be submitted to the Relevant Road Authority for consultation during design development and before completion of construction of the CSSI
E118	As part of Condition E117 the Traffic and Transport Liaison Group(s) is to identify opportunities to improve the intersection performance during operation at: (a) Queen Street/Great Western Highway/Mamre Road in St Marys; (b) Glossop Street/ Forrester Road in St Marys; and (c) Glossop Street / Great Western highway in St Marys. Identified improvements must be implemented prior to the commencement of operation
E119	Permanent road works, including vehicular access, signalised intersection works, and works relating to pedestrians, cyclists, and public transport users must be subject to safety audits demonstrating consistency with relevant design, engineering and safety standards and guidelines. Safety audits must be prepared in consultation with the relevant Traffic and Transport Liaison Group before the completion and use of the subject infrastructure and must be made available to the Planning Secretary upon request.
E121	Warragamba to Prospect Water Supply Pipeline The proponent must consult with WaterNSW regarding design, construction and operational management where the proposal interacts with the Warragamba to Prospect Water Supply Pipeline, and ensure that proposed construction and operational agreements are consistent with the “Guidelines for Development Adjacent to the Upper Canal and Warragamba Pipelines” and implement all practical measures to protect the Warragamba to Prospect Water Supply Pipelines infrastructure, or as otherwise agreed to by WaterNSW
E122	WASTE Waste generated during construction and operation must be dealt with in accordance with the following priorities: (a) waste generation must be avoided and where avoidance is not reasonably practicable, waste generation must be reduced; (b) where avoiding or reducing waste is not possible, waste must be re-used, recycled, or recovered; and (c) where re-using, recycling or recovering waste is not possible, waste must be treated or disposed of
E123	The importation of waste and the storage, treatment, processing, reprocessing or disposal of such waste must comply with the conditions of the current EPL for the CSSI, or be done in accordance with a Resource Recovery Exemption or Order issued under the <i>Protection of the Environment Operations (Waste) Regulation 2014</i> , as the case may be
E124	Waste must only be exported to a site licensed by the EPA for the storage, treatment, processing, reprocessing or disposal of the subject waste, or in accordance with a Resource Recovery Exemption or Order issued under the <i>Protection of the Environment Operations (Waste) Regulation 2014</i> , or to any other place that can lawfully accept such waste
E125	All waste must be classified in accordance with the EPA’s <i>Waste Classification Guidelines</i> , with appropriate records and disposal dockets retained for audit purposes
E126	The CSSI must be designed and constructed so as to maintain the <i>NSW Water Quality Objectives</i> (NSW WQO) where they are being achieved as at the date of this approval, and contribute towards achievement of the NSW WQO over time where they are not being achieved as at the date of this approval, unless an EPL in force in respect of the CSSI contains different requirements in relation to the NSW WQO, in which case those requirements must be complied with

Applicable CoA	Condition of Approval
E127	<p>Construction Requirements The Proponent must consider the <i>Guidelines for controlled activities on waterfront land riparian corridors</i> (Department of Industry 2018) when carrying out work within 40 metres of a watercourse, including its bed</p>
E128	<p>Before undertaking any work and during maintenance or construction activities, erosion and sediment controls must be implemented and maintained to prevent water pollution consistent with <i>Managing Urban Stormwater: Soils and Construction Vol 1 4th ed. by Landcom, 2004 (The Blue Book)</i></p>
E129	<p>Unless an EPL is in force in respect to the CSSI and that licence specifies alternative criteria, discharges from construction wastewater treatment plants to surface waters must not exceed: (a) the <i>Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2018</i> (ANZG (2018)) default guideline values for toxicants at the 95 per cent species protection level; (b) for physical and chemical stressors, the guideline values set out in Tables 3.3.2 and 3.3.3 of the <i>Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000</i> (ANZECC/ARMCANZ); and (c) for bioaccumulative and persistent toxicants, the ANZG (2018) guidelines values at a minimum of 99 per cent species protection level. Where the ANZG (2018) does not provide a default guideline value for a particular pollutant, the approaches set out in the ANZG (2018) for deriving guideline values, using interim guideline values and/or using other lines of evidence such as international scientific literature or water quality guidelines from other countries, must be used</p>
E130	<p>If construction stage stormwater discharges are proposed, a Water Pollution Impact Assessment will be required. Any such assessment must be prepared in consultation with the EPA and be consistent with the National Water Quality Guidelines, with a level of detail commensurate with the potential water pollution risk</p> <p><i>Note: If an EPL is required the Water Pollution Impact Assessment will be required to inform licensing consistent with section 45 of the POEO Ac</i></p>
E131	<p>Drainage feature crossings (permanent and temporary watercourse crossings and stream diversions) and drainage swales and depressions must be carried out in accordance with relevant guidelines and designed by a suitably qualified and experienced person</p>

The following table presents the relevant REMMs as identified within the Staging Report

REMM Reference	REMM Description
T1	Construction Traffic Management Plans would be prepared in accordance with the Construction Traffic Management Framework
T2	The Construction Traffic Management Plan for St Marys would be developed in consultation with the Traffic and Transport Liaison Group to ensure existing transport interchange infrastructure continues to operate effectively within the St Marys station precinct.
T3	Coordination with Western Sydney Airport and Transport for NSW would be undertaken through the Traffic and Transport Liaison Group to manage potential cumulative construction traffic impacts with M12 Motorway and Elizabeth Drive
T4	Road Safety Audits would be carried out to address vehicular access and egress, and pedestrian, cyclist and public transport safety. Road Safety Audits would be carried out as per the guidelines outlined in Section 10 of the Construction Traffic Management Framework
T5	Maintain access for pedestrians and cyclists around construction sites as per the guidelines outlined in the Construction Traffic Management Framework. Appropriate signage and line marking would be provided to guide pedestrians and cyclists past construction sites and on the surrounding network to allow access to be maintained
T6	Access for construction vehicles to be planned as per the guidelines outlined in the Construction Traffic Management Framework. Construction site traffic would be managed to minimise movements during peak periods. Vehicle access to and from construction sites would be managed to maintain pedestrian, cyclist and motorist safety
T7	Temporary relocation of bus stops and the bus layovers at to the Station Street car park in St would be implemented prior to the commencement of construction works that impacts on the existing bus facilities. The temporary relocation of bus stops and the bus layover at St Marys would be carried out in consultation with the Transport for NSW, Penrith City Council and bus operators. Wayfinding and customer information would guide customers to temporary bus stop locations
T8	Transport for NSW would be consulted to discuss opportunities for their delivery of intersection upgrades at Mamre Road/M4 Western Motorway on and off ramps prior to the peak year of construction
T9	A construction worker car parking strategy for St Marys would be prepared in consultation with Penrith City Council and Transport for NSW prior to the commencement of construction. The strategy would seek to: <ul style="list-style-type: none"> • minimise overall demand for construction worker car parking through initiatives such as use of other project construction worksites in combination with shuttle buses, car-pooling and encouraging the use of public transport • minimise potential use of on-street car parking by construction workers The construction worker car parking strategy would be implemented throughout construction
OT1	Interchange access plans would be prepared, in consultation with the Traffic and Transport Liaison Group and relevant authorities including Western Parkland City Authority, to ensure adequate pedestrian and cycle facilities and other transport interchange infrastructure is provided at each station precinct
OT2	The project would be designed such that access to properties and existing infrastructure neighbouring the proposed stations would be maintained
OT3	Consultation and coordination would be undertaken with Transport for NSW through the Traffic and Transport Liaison Group to align proposed planned road and intersection upgrades with the year of opening, to enable safe and efficient interchanges between transport modes

REMM Reference	REMM Description
OT4	An operational car parking strategy for St Marys would be prepared in consultation with Penrith City Council and Transport for NSW prior to commencement of operation. The strategy would include consideration of measures that could be implemented to address any parking impacts as a result of the project
NV1	Where acoustic sheds are installed, the internal lining and type of material used in the construction of the sheds would be considered during design development and construction planning to ensure appropriate attenuation is provided
NV2	To avoid potential vibration impacts to the Warragamba to Prospect Water Supply Pipelines, a detailed construction vibration assessment would be undertaken in accordance with the Guidelines for Development Adjacent to the Upper Canal and Warragamba Pipelines (WaterNSW, 2020) and would consider the following requirements: <ul style="list-style-type: none"> • velocity limits for construction activities and the impact the works will have on WaterNSW assets • excavation methods in accordance with German Standard DIN 4150-3:2016 (2.5 mm/s PPV) • vibration monitoring would be undertaken prior to and during construction for high risk construction activities • Vvibration monitoring reports would be provided to WaterNSW
NAH1	Potential moveable heritage items would be identified and assessed and a significant fabric salvage schedule would be prepared by an appropriately qualified and experienced heritage specialist for St Marys Railway Station, Bringelly RAAF Base, McGarvie-Smith Farm, and McMasters Farm. Significant fabric would only be salvaged if it can be salvaged in such a way that it can be reused and is likely to be able to be reused
NAH5	Archaeological investigations would be undertaken in accordance with recommendations in the non-Aboriginal Archaeological Research Design
NAH6	The following heritage items would be monitored for potential vibration impacts during construction: <ul style="list-style-type: none"> • St Marys Railway Station Group • Queen Street Post-War Commercial Building • St Marys Munitions Workers Housing • McGarvie Smith Farm • McMaster Farm
NAH7	If required, the St Marys Station jib crane would be temporarily relocated prior to construction that may impact on this item, safely stored and appropriately maintained and conserved before reinstatement. If relocation is required, a detailed methodology for the removal and reinstatement of the jib crane would be prepared in consultation with an appropriately qualified heritage advisor
NAH9	If suspected human remains or unexpected items of potential heritage significance are discovered within the on-airport area, all activity would cease and the unexpected/chance finds requirements specified in the Western Sydney Airport European and Other Heritage Construction Environmental Management Plan would be followed
ONAH1	Design development for the project would endeavour to minimize adverse impacts to heritage buildings, elements, fabric, and heritage significant settings and view lines that contribute to the overall heritage significance of heritage items
ONAH3	Consultation with the Heritage Council and relevant stakeholders would occur for the design of works that have the potential to impact State significant items including for St Marys Railway Station

REMM Reference	REMM Description
AH1	Aboriginal stakeholder consultation would continue to be carried out in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (NSW Office of Environment and Heritage, 2010). Registered Aboriginal Parties would be provided with opportunities to participate in survey and testing in unverified areas of Aboriginal archaeological sensitivity, archaeological salvage works and unexpected find assessments (if required).
AH2	Areas of unverified Aboriginal archaeological sensitivity would be subject to archaeological survey, if required, and test excavation prior to construction in accordance with the Aboriginal Cultural Heritage Management Plan
AH6	Aboriginal Heritage Information Management System site cards would be produced for all newly identified sites other than those identified on Commonwealth land, and These should be submitted to the Aboriginal Heritage Information Management System Registrar as soon as practicable within one month of being identified. Newly identified sites within the revised boundaries of Defence Establishment Orchard Hills (Commonwealth land) would be reported to the Department of Defence to be managed in accordance with the relevant provisions of the Defence Establishment Orchard Hills Heritage Management Plan
AH7	Aboriginal Site Impact Recording forms for sites subject to archaeological salvage would be submitted to the Aboriginal Heritage Information Management System register within one month of the completion of salvage works within their bounds
AH8	If any suspected human remains or unexpected Aboriginal cultural heritage objects are discovered within the on-airport area, all activity would cease and the unexpected finds protocol and discovery of human remains protocol specified in the Western Sydney Airport Aboriginal Cultural Heritage Construction Environmental Management Plan would be followed
AH9	Works within the bounds of existing Aboriginal Heritage Impact Permit areas should be undertaken in accordance with the conditions of those permits and with permission from the relevant Aboriginal Heritage Impact Permit holder. Works undertaken within the revised boundaries on Defence Establishment Orchard Hills (Commonwealth land) should be undertaken in accordance with the Defence Establishment Orchard Hills Heritage Management Plan
AH10	Impacted Aboriginal Sites would be managed in accordance with the Aboriginal Cultural Heritage Management Plan
AH11	Measures would be implemented to ensure that Aboriginal sites located outside of the construction footprint, but within 100m of it, would not be affected by construction activities
AH12	An Archaeological Salvage Report detailing the results of the archaeological salvage program (including the results of any post excavation analyses) would be completed within two years of the completion of the fieldwork component of the program. The Archaeological Salvage Report would be consistent with the best practice guidelines suggested by the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (DECCW 2010) and the Aboriginal Cultural Heritage Standards & Guidelines Kit (NSW NPWS 1997)
AH13	Measures to manage and protect the identified cultural values would be developed collaboratively through a consultation process with knowledge holders to inform construction planning and design development
OAH1	A heritage interpretation strategy would be prepared for the project in consultation with Aboriginal knowledge holders. Aboriginal heritage interpretation would be developed with reference to the findings of the Aboriginal Cultural Heritage Assessment Report and Aboriginal Archaeological Report, to promote understanding and awareness of cultural heritage values
HYD1	Construction planning would consider flood related mitigation, including:

REMM Reference	REMM Description
	<ul style="list-style-type: none"> • staging construction works to reduce the duration of works within the floodplain • daily and continuous monitoring of weather forecasts and storm events, rainfall levels and water levels in key watercourses to identify potential flooding events and related flood emergency response <p>consultation with NSW State Emergency Services and relevant local councils to ensure consistent approaches to the management of flood events (off-airport only)</p> <p>provide flood-proofing to excavations at risk of flooding during construction, where reasonable and feasible, such as raised entry into shafts and/or pump-out facilities to minimise ingress of floodwaters into shafts and the dive structure</p> <p>review of site layout and staging of construction works to avoid or minimise obstruction of overland flow paths and limit the extent of flow diversion required</p>
OWQ6	At all locations where stormwater is discharged, water quality measures such as gross pollutant traps, bio-retention swales and Water Sensitive Urban Design features would be investigated and implemented where feasible and reasonable
GW1	<p>Further assessment would be undertaken during design development, and prior to construction commencing, to ensure that damage to buildings and structures at risk of ground movement impacts around St Marys, Claremont Meadows, Orchard Hills and Bringelly are avoided or managed</p> <p>Where building damage risk is rated as slight, moderate or high (as per Rankin 1988), a structural assessment of the affected buildings/structures would be carried out and specific measures implemented to address the risk of damage</p>
SC1	<p>The Soil and Water Management Plan would incorporate the following measures:</p> <ul style="list-style-type: none"> • for low risk areas of environmental concern, worker health and safety measures, waste management and tracking for contamination would be outlined for medium and high risk areas of environmental concern, detailed site investigations and review of further available information would be undertaken prior to the start of construction
SC2	<p>Based on outcomes of SC1:</p> <ul style="list-style-type: none"> • if a medium or high risk area of environmental concern is reassessed as low risk, the site would be managed in accordance with the Soil and Water Management Plan. This would typically occur where there is minor, isolated contamination that can be readily remediated through standard construction practices such as excavation and off-site disposal • for areas of environmental concern that remain or change to medium risk, visual inspections and monitoring would be performed during earthworks. If suspected contamination is encountered, the materials would be subject to sampling and analysis to assess management requirements in accordance with statutory guidelines made or endorsed by the NSW Environment Protection Authority • for areas of environmental concern that remain or change to high risk, a Sampling, Analysis and Quality Plan would be prepared for Detailed Site Investigations or data gap investigations. The results from the site investigations would be assessed against criteria contained within the National Environment Protection (Assessment of Site Contamination) Measure (2013) and other applicable NSW statutory guidelines to assess whether remediation is required. Remediation works would be performed in accordance with the hierarchy of preferred strategies in the Guidelines for the NSW Site Auditor Scheme (NSW Environment Protection Authority, 2017) and other guidelines made or endorsed by the NSW Environment Protection Authority <p>Where practical, remediation works would be integrated with excavation and development works performed during construction.</p>
SC3	Where information gathered from investigations for medium and high risk areas of environmental concern (as per mitigation measure SC1) is insufficient to determine the risk of contamination, a detailed site investigation would be carried out in accordance with the National Environment Protection Measure (2013) and other guidelines made or endorsed by the NSW Environment Protection Authority Where data from the additional data review (mitigation measure SC1) or the detailed site investigation (mitigation measure SC2) confirms that contamination would require remediation, a Remediation Action Plan would be developed for

REMM Reference	REMM Description
	the area of the construction footprint If a Remediation Action Plan is required, it would be developed in accordance with NSW Environment Protection Authority statutory guidelines and a Site Auditor would be engaged. Remediation methodologies would be undertaken in accordance with Australian Standards and other relevant government guidelines and codes of practice Remediation would be performed as an integrated component of construction and to a standard commensurate with the proposed end use of the land
SC4	If a duty to report to the NSW Environment Protection Authority under Section 60 of the Contaminated Lands Management Act 1997 is triggered, or where a medium to high risk of contamination is identified, an accredited Site Auditor would review and approve the Remediation Action Plan (including issue of interim audit advice), and would develop a Site Audit Statement and Site Audit Report upon completion of remediation
SC5	An unexpected finds procedure would be developed and implemented as part of the project Soil and Water Management Plan, outlining a set of potential contamination issues which could be encountered, and detailing the management actions to be implemented. The unexpected finds procedure would include a process for chemical and asbestos contamination and would generally include: <ul style="list-style-type: none"> • cessation of works within the affected area until inspection of the suspected contamination by a qualified contaminated lands consultant • collection of soil samples for chemical or asbestos analysis, where required, based on observations • assessment of results against applicable land use or waste classification criteria in accordance with statutory guidelines made or endorsed by the NSW Environment Protection Authority • management of the contamination in accordance with statutory guidelines made or endorsed by the NSW Environment Protection Authority statutory guidelines • the unexpected finds procedure for on-airport construction would be consistent with the Western Sydney Airport unexpected finds procedure detailed in the Western Sydney Airport Soil and Water Construction Environmental Management Plan
SC6	Post construction, an inspection of construction, stockpiling and laydown sites and soil validation of redundant sedimentation/water quality basins would be undertaken to assess if further investigation and remediation is required. Investigation and remediation (if required) would be undertaken in accordance with the Soil and Water Management Plan (off-airport) and a project specific Remediation Action Plan that would be prepared in a manner consistent with the Western Sydney Airport Remediation Action Plan (on-airport). All inspections, investigations and remediation would be undertaken by a qualified contaminated lands consultant with reports prepared or reviewed by a Certified Contaminated Land Consultant
SC7	Prior to ground disturbance in areas of potential acid sulfate soil occurrence, testing would be carried out to determine the actual presence of acid sulfate soils. If acid sulfate soils are encountered, they would be managed in accordance with the Acid Sulfate Soil Manual (Acid Sulfate Soil Management Advisory Committee, 1998)
SC8	Prior to ground disturbance in high probability salinity areas testing would be carried out to determine the presence of saline soils. If salinity is encountered, excavated soils would not be reused or would be managed in accordance with Book 4 Dryland Salinity: Productive Use of Saline Land and Water (NSW DECC 2008). Erosion controls would be implemented in accordance with the Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom, 2004)
SC9	Targeted groundwater investigations would be undertaken prior to construction to identify high salinity areas at risk from rising groundwater. Where high saline areas (>1000 $\mu\text{S}/\text{cm}$) are identified, measures such as planting, regenerating and maintaining native vegetation and good ground cover in recharge, transmission and discharge zones would be implemented where possible
SC10	Where the construction footprint is not used as part of the operational footprint (residual land), an assessment of the suitability of the site for the proposed land use would be undertaken in accordance with statutory guidelines made or endorsed by the NSW Environment Protection Authority
SUS1	A Sustainability Plan would be developed and implemented during construction of the project. The Sustainability Plan would identify the sustainability, climate change and greenhouse gas objectives, initiatives and targets which would be implemented during further design development and construction of the project. The Sustainability Plan would be developed to be consistent with the Western Sydney Airport Sustainability Plan for on-airport works The Sustainability Plan would also inform the preparation of Sustainability Management Plans for each off-airport construction work package

REMM Reference	REMM Description
SUS2	Protect sensitive construction equipment from the effects of extreme weather and climate, such as direct exposure to the sun on extreme heat days and flooding
SUS3	Address climate change impacts in emergency management procedures for the construction of the project, such as consideration of impacts of flash flooding on evacuation procedures
GHG1	Carry out an iterative process of greenhouse gas assessments and design refinement prior to construction to identify opportunities to minimise greenhouse gas emissions Performance would be measured in terms of a percentage reduction in greenhouse gas emissions, and assessed against a business as usual project benchmark verified by Infrastructure Sustainability Council of Australia or equivalent independent industry body
OSUS1	A Sustainability Plan would be developed and implemented during operation of the project. The Sustainability Plan would identify the sustainability, climate change and greenhouse gas objectives, initiatives and targets which would be implemented during further design development and operation of the project. The Sustainability Plan would be developed to be consistent with the Western Sydney Airport Sustainability Plan for on-airport works
OSUS2	Climate change risk treatments would be confirmed and incorporated during further design development
OGHG1	Carry out an iterative process of greenhouse gas assessments and design refinement during detailed design to identify opportunities to minimise greenhouse gas emissions Performance would be measured in terms of a percentage reduction in greenhouse gas emissions, and assessed against a business as usual project benchmark verified by Infrastructure Sustainability Council of Australia or equivalent independent industry body
WR1	Construction waste would be minimised by accurately calculating materials brought to the site and limiting materials packaging
WR2	Waste streams would be segregated to avoid cross-contamination of materials and maximise reuse and recycling opportunities
WR3	A materials tracking system would be implemented for material transferred between construction sites
LU1	Areas of land leased for the purposes of construction would be reinstated at the end of the lease to at least equivalent standard in consultation with the landowner
LU2	Where required property adjustments have the potential to impact farm infrastructure (such as fencing or dams) or local access to properties., Consultation with affected property owners would be carried out prior to these works occurring, in order to determine reasonable, feasible and acceptable solutions
SE1	<p>Consultation with the local community and project stakeholders would be undertaken to:</p> <ul style="list-style-type: none"> • identify and deliver opportunities for facilitating local creative and cultural activities in appropriate project locations • identify and deliver initiatives and opportunities to provide a positive contribution to the potentially affected community and affected locations such as temporary public art and targeted community events and programs

REMM Reference	REMM Description
AQ1	<p>The Air Quality Management Plan for the project would incorporate the following best-practice odour management measures which would be implemented as appropriate during relevant construction works:</p> <ul style="list-style-type: none"> • the extent of opened and disturbed contaminated soil at any given time would be minimized • temporary coverings or odour suppressing agents would be applied to excavated areas where appropriate • regular odour monitoring would be conducted during excavation to verify that no offensive odours are being generated
AQ3	<p>Air quality monitoring, consistent with the Western Sydney Airport Air Quality Construction Environmental Management Plan would be carried out during construction to ensure that works meet the requirements under Schedule 1 of the Airports (Environment Protection) Regulations 1997</p>
HR1	<p>All hazardous substances that may be required for construction would be stored and managed in accordance with the Storage and Handling of Dangerous Goods Code of Practice (WorkCover NSW, 2005), the Hazardous and Offensive Development Application Guidelines: Applying SEPP 33 (Department of Planning, Industry and Environment, 2011) the Work Health and Safety Act 2011 (Commonwealth and NSW) and the requirements of the Environmentally Hazardous Chemicals Act 1985 (NSW)</p>
HR2	<p>A Bushfire Management Plan would be prepared and implemented to manage current bushfire risk and identify response actions during construction of the project. The Plan would be prepared in consultation with the NSW Rural Fire Service and Western Sydney Airport. For project areas within Western Sydney International the Plan would be prepared having regard to the existing Western Sydney Airport Site at Badgerys Creek Bushfire Risk Management Plan</p>
HR3	<p>A hazardous materials analysis would be carried out prior to stripping and demolition of structures and buildings which are suspected of containing hazardous materials (particularly asbestos) Hazardous materials and special waste (such as asbestos) would be removed and disposed of in accordance with the relevant legislation, codes of practice and Australian Standards (including the Work Health and Safety and Regulation 2011 (NSW))</p>
HR4	<p>Where the project crosses or is adjacent to the Warragamba to Prospect Water Supply Pipelines, Construction planning, and approaches to minimising risks of damage or rupture to of the Pipelines, would be developed in consultation with WaterNSW, and in accordance with the Guidelines for Development Adjacent to the Upper Canal and Warragamba Pipelines (Water NSW, 2020)</p>
OHR4	<p>The project would be designed to avoid pilot distraction and minimize the risk of headlight glare from metro trains where on surface rail alignment. This would include providing glare screens in those locations where the project creates an unacceptable risk of pilot distraction</p>
CL1	<p>A Cumulative Construction Impacts Management Plan would be developed and would detail co-ordination and consultation requirements with the following stakeholders (as relevant) to manage the interface of projects under construction at the same time:</p> <ul style="list-style-type: none"> • Western Sydney Airport • Transport for NSW • Western Parkland City Authority • Sydney Water • Emergency service providers • Utility providers <p>Co-ordination and consultation requirements with these stakeholders would be detailed in the plan to include:</p> <ul style="list-style-type: none"> • provision of regular updates to the detailed construction program, construction sites and haul routes • identification of key interfaces with other construction projects • development of mitigation strategies to manage cumulative impacts associated with these interfaces

APPENDIX D. PROJECT RISK ASSESSMENT

A risk assessment for the project has been undertaken. The risk assessment considers the scope of works and using the following parameters to categorise the risk.

Risk Assessment Rankings:

- Very High;
- High;
- Medium; and
- Low.

Issues or activities that represent a Very High risk after the application of control measures are not to be undertaken.

Where a risk is identified to be medium or high, an environmental procedure will be developed to manage the risks

Where the risk is identified to be low, management measures will be included within the CEMP.

Probability	One off event How likely?	Frequency	Repeated How often?	Likelihood		Consequence					
						Insignificant	Minor	Moderate	Major	Severe	Catastrophic/ Transformational
						C6	C5	C4	C3	C2	C1
Probability	Expected to occur frequently during time of activity or project. Greater than a 90% chance of occurring.	Frequency	10 times or more every year	Almost certain	L1	Medium	High	High	Very High	Very High	Very High
	Expected to occur occasionally during time of activity or project. A 75-90% chance of occurring.		1-10 times every year	Very Likely	L2	Medium	Medium	High	High	Very High	Very High
	More likely to occur than not occur during time of activity or project A 50-75% chance of occurring.		Once each year	Likely	L3	Low	Medium	Medium	High	High	Very High
	More likely not to occur than occur during time of activity or project. A 25-50% chance of occurring.		Once every 1 to 10 years	Unlikely	L4	Low	Low	Medium	Medium	High	High
	Not expected to occur during the time of activity or project. A 10-25% chance of occurring.		Once every 10 to 100 years	Very Unlikely	L5	Low	Low	Low	Medium	Medium	High
	Not expected to ever occur during time of activity or project. Less than 10% chance of occurring.		Less than once every 100 years	Almost Unprecedented	L6	Low	Low	Low	Low	Medium	Medium

	CONSEQUENCES					
	Insignificant	Minor	Moderate	Major	Severe	Catastrophic
	C6	C5	C4	C3	C2	C1
Environment	No appreciable changes to environment and/or highly localised event.	Change from normal conditions within environmental regulatory limits and environmental effects are within site boundaries.	Short-term and/or well-contained environmental effects. Minor remedial actions probably required.	Impacts external ecosystem and considerable remediation is required.	Long-term environmental impairment in neighbouring or valued ecosystems. Extensive remediation required.	Irreversible large-scale environmental impact with loss of valued ecosystems.
Regulatory or Legal Breach	Low-level non-compliance with legal and/or regulatory requirement or duty by individuals or TfNSW.	Minor non-compliance with legal and/or regulatory requirement or duty. Investigation and/or report to authority.	Moderate non-compliance. Subject to comment and monitoring from applicable regulator. Small fine and no disruption to services.	Systemic non-compliance/Major breach resulting in enforcement action and/or prohibition notices. Substantial fine and no disruption to services.	Substantial breach resulting in prosecution, fines and/or litigation. Licence or accreditation restricted or conditional affecting ability to operate.	Prosecution leading to imprisonment of TfNSW executive. Loss of operating licence.
Customer Experience and Satisfaction	Infrequent or unrelated written complaints.	A stream of written complaints for more than 3 months.	A stream of written complaints for more than a year.	A substantial and sustained uplift in the rate of complaints.	A deluge of complaints for up to 6 months with normal background rates increasing by a factor of 3 or more.	A prolonged deluge of complaints for more than 6 months, with some normal background rates increasing by a factor of 10 or more.

Risk Area	Risk Statements	C	L	Initial Risk Rating	Controls	C	L	Residual Risk Rating
Transport / traffic - construction	A lack of mitigation measures and management systems in relation to traffic management leads to frequent non-compliance with the Planning Approval. Complaints from the public Traffic incidents due to change in conditions	C4	L1	High	<ul style="list-style-type: none"> CTMF/CTMP ROs to be developed, approved by TMC and implemented during works 	C5	L4	Low
Noise and vibration - construction	A lack of mitigation measures and management systems in relation to Noise and Vibration management leads to unreasonable impacts on residents and businesses, and structural damage to buildings or heritage items. Disturbance to residents or neighbouring businesses during standard hours and out of hours works . Potential for complaints.	C5	L3	Medium	<ul style="list-style-type: none"> Mitigation measures as per NVMP are to be implemented. Respond to community enquiries and complaints in accordance with Sydney Metro requirements and implement the OCCS. Consult with the community in relation to upcoming activities that may result in concern. Monitor noise for compliance as the works progress at receiver locations. Provide periods of respite for high noise generating activities. Apply noise mitigation measures during entire project. Control Measures as per the NVMP are to be implemented Noise efficient equipment to be used on site. Implement noise mitigation strategies for OOHW Monitor noise for compliance to project goals Determine vibration limits and structure/receiver offset distances. Consult with potentially affected parties prior to commencement of works on their 	C5	L3	Medium

Risk Area	Risk Statements	C	L	Initial Risk Rating	Controls	C	L	Residual Risk Rating
					<p>upcoming activities that may be impacted by construction vibration.</p> <ul style="list-style-type: none"> Ongoing vibration monitoring during vibration intensive works Lethbridge Scope of works – works to be staged to minimize works required to be completed out of hours to reduce impacts to receivers. Note that milling and resheeting (including line marking) to be undertaken during out of hours works 			
Biodiversity – construction	<p>A lack of mitigation measures and management systems in relation to biodiversity management leads to unreasonable impacts to flora and fauna, spread of weeds and pathogens, and unintended vegetation clearance.</p> <p>Unauthorised works / removal of vegetation outside defined work area, possibility of removing threatened species, fines incurred</p> <p>No vegetation removal anticipated during this scope of works.</p>	C5	L6	Low	<ul style="list-style-type: none"> Unexpected Threatened Species Finds to be implemented 	C6	L6	Low
Non-Aboriginal heritage - construction	<p>A lack of mitigation measures and management systems in relation to Heritage management leads to poor integration of heritage values in design and impacts on heritage items outside of what has been approved.</p> <p>Damage to heritage fabric of heritage items by Project works.</p> <p>In line with the EIS and consistency assessment (document reference – SM-21-</p>	C5	L4	Low	<ul style="list-style-type: none"> If suspected heritage item encountered. Works to stop immediately and implement the Sydney Metro Unexpected Heritage Finds Procedure Mitigation measures to be included within CEMP General inductions toolbox training on heritage management protocols. Label any known heritage items on Environmental Control Maps. 	C5	L5	Low

Risk Area	Risk Statements	C	L	Initial Risk Rating	Controls	C	L	Residual Risk Rating
	00400109) no works are anticipated to impact heritage items				<ul style="list-style-type: none"> Work within the safe working distances nominated in the NVMP. Undertake vibration compliance monitoring as per the NVMP. Clearly highlight no-go zones on the ECM and communicate requirements to construction personnel during pre-start briefs, inductions and tool-box talks. Demarcation of worksites and communicate it clearly with all construction personnel. 			
Aboriginal heritage – construction	<p>A lack of mitigation measures and management systems in relation to Heritage management leads to poor integration of heritage values in design and impacts on heritage items outside of what has been approved.</p> <p>In line with the EIS and consistency assessment (document reference – SM-21-00400109) , no works are anticipated to impact Aboriginal heritage items</p>	C4	L6	Low	<ul style="list-style-type: none"> Unexpected Finds Procedure to be implemented Approved / updated ACHMP 	C5	L6	Low
Flooding, Hydrology and Water Quality – construction	<p>A lack of mitigation measures and management systems in relation to soil and water management leads to unexpected pollution events, water quality impacts on adjacent water bodies, and soil erosion.</p> <p>Degradation of local watercourses. Increased turbidity in local water ways resulting in impact on aquatic life.</p> <p>Fines for sediment escaping site.</p> <p>Wind and water erosion causing weed/seed dispersion offsite.</p>	C5	L5	Low	<ul style="list-style-type: none"> Mitigation Measures as per CEMP and any ESCP to be implemented. Install erosion and sediment controls within the project area. Ensure measures are inspected and maintained as the works progress and also prior to and post rainfall events. Provide training and awareness on the need to prevent pollution. Relevant people to undertake Erosion and Sediment Control training 	C5	L4	Low

Risk Area	Risk Statements	C	L	Initial Risk Rating	Controls	C	L	Residual Risk Rating
	<p>Location of stockpiling next to waterways causing weeds/seeds to disperse from construction site</p> <p>Non-compliant water entering stormwater system waterways (i.e. polluting - not compliant with discharge criteria).</p>				<ul style="list-style-type: none"> Develop Environmental Control Maps to show stockpile areas. Utilise appropriate locations for stockpiling (away from waterways, watercourses, drains where feasible and reasonable). Designated vegetation stockpiling areas. Minimise stockpiling / Use temporary stockpiling Cover stockpiles if left for extended periods Environmental Manager to approve all water discharges from site. Induction and toolbox talks Toolbox training on site procedures for water discharge Educate site staff on requirements and consequences of prosecution 			
Groundwater and Geology - construction	<p>A lack of mitigation measures and management systems in relation to groundwater management leads to groundwater drawdown, groundwater pollution and impacts of groundwater dependent ecosystems.</p> <p>Ground water entering excavations without appropriate safeguards onsite could lead to ground water contamination. Spreading contamination via groundwater management.</p> <p>As per EIS, groundwater is anticipated between 2-7m. Maximum excavation depth currently 1.5m below ground surface.</p>	C5	L4	Low	<ul style="list-style-type: none"> Stop works process to be implemented if ground water is encountered. 	C6	L5	Low

Risk Area	Risk Statements	C	L	Initial Risk Rating	Controls	C	L	Residual Risk Rating
	Interaction to groundwater is not anticipated during the scope of works							
Soils and contamination - construction	<p>A lack of mitigation measures and management systems in relation to soil and water management leads to unexpected pollution events, water quality impacts on adjacent water bodies, and soil erosion.</p> <p>In accordance with the EIS, currently soil contamination is not anticipated to be encountered during the project.</p> <p>It is noted that some utility conduits may contain asbestos</p>	C4	L3	Med	<ul style="list-style-type: none"> Unexpected contaminated Land and Asbestos Finds Procedure Mitigation measures in accordance with the CEMP are to be implemented Waste classification to be undertaken prior to waste disposal 	C5	L4	Low
Sustainability, climate change and greenhouse gas - construction	A lack of mitigation measures and management systems in relation to waste management leads to excessive waste generation, and inappropriate waste classification and disposal.	C5	L3	Low	<ul style="list-style-type: none"> Mitigation measures to be incorporated into the CEMP / sustainability management strategies 	C6	L4	Low
Resource management - construction	<p>A lack of mitigation measures and management systems in relation to waste management leads to excessive waste generation, and inappropriate waste classification and disposal.</p> <p>Incorrect disposal of waste, further costs incurred for classifications and disposal, fines may be issued.</p> <p>Incorrect classification of waste (spoil) resulting in incorrect / illegal disposal/reuse.</p>	C5	L4	Low	<ul style="list-style-type: none"> Identify opportunities to incorporate recovered materials into the permanent works. Provide facilities on site for source separation and recycling. Ensure accurate waste records are retained. Removal of wastes from the site would only be undertaken by a licensed contractor as required by the POEO Act and with appropriate approvals, if required, for contaminated materials, etc. 	C6	L5	Low

Risk Area	Risk Statements	C	L	Initial Risk Rating	Controls	C	L	Residual Risk Rating
					<ul style="list-style-type: none"> All material that requires off-site disposal to be appropriately tested and classified against the Waste Classification Guidelines (NSW EPA, 2014) 			
Land use and property - construction	A lack of mitigation measures and management systems in relation to land use and property lead to land use and property impacts outside of project approval.	N/A	N/A	N/A	<ul style="list-style-type: none"> Works outside of project footprint to be assessed by SM-WSA prior 	N/A	N/A	Low
Landscape and Visual Impact - construction	A lack of mitigation measures and management systems in relation to visual amenity management leads to unreasonable visual impacts on the surrounding community, landscape features and poor landscape design outcomes.	C4	L3	Med	<ul style="list-style-type: none"> Screening to be erected around long term work areas TfNSW branded shade clothe to be erected Work areas to be kept clean and tidy Lighting required during night works shall be directed towards the work area and are from adjacent sensitive receivers 	C5	L4	Low
Social and economic - construction	Amenity impacts not appropriately mitigated or managed lead to unreasonable impacts on the community. A lack of mitigation measures and management systems in relation to community management results in community concern.	C4	L3	Med	<ul style="list-style-type: none"> Screening to be erected around long term work areas Community interaction to be undertaken in accordance with the SM-WSA OCCS 	C5	L4	Low
Air Quality - construction	A lack of mitigation measures and management systems in relation to air quality management leads to unreasonable particulate pollutant emissions from construction activities.	C5	L3	Med	<ul style="list-style-type: none"> Provide dust mitigation measures through water sprays/misting as required. Cover stockpiles that are not to be worked on for a period of greater than 10 days. Erosion and Sediment Control Plans approved before works commence. 	C5	L4	Low

Risk Area	Risk Statements	C	L	Initial Risk Rating	Controls	C	L	Residual Risk Rating
	Dust activity in close proximity to residential and commercial premises, complaints received.							
Hazard and risk - construction	A lack of management systems in relation to hazards and risks leads to breaches of legislation and environmental standards	N/A	N/A	Low	<ul style="list-style-type: none"> Works to be undertaken in accordance with guidelines and approved CEMP 	N/A	N/A	Low
Cumulative impacts - construction	A lack of management systems in relation to cumulative impacts leads to excessive impacts on local community	C5	L4	Low	<ul style="list-style-type: none"> Cumulative impacts to be considered during staging of works 	C6	L5	Low



APPENDIX E. ENVIRONMENTAL CONTROL MAPS

ENVIRONMENTAL CONTROL MAP (PESCP/ECM)

Site Name: St Marys TBI Site Number: 725 On Site Location: Station Street – Utility Works Map # 725.ECM.05.R5.0

Figure 1: General work area



CONSTRUCTION NOTES

- Locations of controls are indicative and should be adjusted to suit the site conditions
- All mitigation measures identified in this ECM and PESCPs must be implemented prior to site establishment
- Refer to traffic control plans for vehicle and pedestrian management measures
- Staff are to be inducted and trained on the requirements of this ECM. Training is to include instruction on the identification of potential Aboriginal or historic heritage items
- Work areas are to be reinstated to pre-existing at the conclusion of construction
- Works must not commence until competent environmental staff and work crews have reviewed and signed the ECM.
- Area to be swept prior to rain events

KEY

	Excavation area
	Load out / hard stand area
	New stormwater pit
	Raised kerb and gutter
	Existing stormwater pit
	Spill kit
	Water diversion bund
	Surface water flow direction (hard stand)
	Site layback / access
	Sand bags
	Heritage curtilage
	ATF with shade clothe
	Water filled barriers
	Concrete barriers
	Concrete kerb / median
	Pedestrian access
	Wheel wash run off sump
	Water storage tank
	Onsite water detention

ENVIRONMENTAL CONTROL MAP (PESCP/ECM)

Site Name: St Marys TBI **Site Number:** 725 **On Site Location:** Station Street – Utility Works **Map #** 725.ECM.05.R5.0

GENERAL SITE ENVIRONMENTAL CONTROL MEASURES				
Work Activity* This ECM is relevant to TBI construction works. *Works must not commence until competent environmental staff have reviewed approval documentation and work crews have reviewed and signed the ECM.				
STOP WORK REQUIREMENTS CONTACT INFORMATION (TO BE COMPLETED BY CONTRACTOR)		KEY PROJECT CONTACTS		
Aspect	Requirements	Construction Manager	[REDACTED]	[REDACTED]
Unexpected heritage finds	Stop all work in vicinity immediately. Contact Project Environmental Manager. Project Environmental Manager to contact TfNSW Environmental Manager and implement Unexpected finds protocol	Project Manager	[REDACTED]	[REDACTED]
		Project Engineer	[REDACTED]	[REDACTED]
		Environmental Manager	[REDACTED]	[REDACTED]
Water discharge	Approval is required prior to discharge of water.	WHS Manager	[REDACTED]	[REDACTED]
Contamination /Hazardous Materials– Suspected contamination material discovered	Stop all work in vicinity immediately. Contact Project Environmental Manager. Contact TfNSW Environmental Manager. Follow TfNSW Environment Incident and Classification Reporting Guidelines.	Community Advisor	[REDACTED]	[REDACTED]
		TfNSW Project Manager	[REDACTED]	[REDACTED]
		TfNSW Environmental Manager	[REDACTED]	[REDACTED]
Hydrocarbon / Chemical Spill, Contaminated Material Release or Turbid Run-off to Surface Water	Contact the Project Environmental Manager immediately and without delay and follow instruction. A fully stocked spill kit is to be present in the work area	TfNSW Communications manager	[REDACTED]	[REDACTED]
		TfNSW Engineer	[REDACTED]	[REDACTED]
		Environmental Representative	TBC	TBC
Dust leaving work area	Stop dust generating work immediately. Contact Project Environmental Manager. Recommence work only when controls are implemented and effective.	TfNSW Project Information Line		TBC
		Fire and Rescue		000
		Workcover		13 10 50
Native fauna found within work site	Stop potentially impacting work. Contact Project Environmental Manager and action instructions.	Ministry of Health		(02) 9391 9000
Emergency Works outside of approved works	<ul style="list-style-type: none"> Stop works, contact Ward Environmental Officer, TfNSW Environmental Officer and Project Environmental Representative (ER) 	Wires		1300 094 737
Noise	<ul style="list-style-type: none"> If noise monitoring indicates that noise levels are above predicted levels. Works will stop and construction methodology will be reviewed. 			
NOISE AND VIBRATION <ul style="list-style-type: none"> High noise generating activities may only be carried out in continuous blocks, not exceeding three hours each, with a minimum respite period of one hour between each block of work. Community must be notified prior commencement of works. No unnecessary shouting or use of loud radios is to be permitted. Noise & Vibration verification monitoring to be completed during works to ensure appropriate mitigation measure are undertaken where levels are found to be exceeded. 				
HERITAGE <ul style="list-style-type: none"> In the event of possible Heritage Finds all works are to stop and heritage Consultant to be contacted. The unexpected finds procedure and training is to be included in the works induction. 				
CHEMICAL FUEL STORAGE AND USE <ul style="list-style-type: none"> Any chemicals brought onto site must be accompanied by a materials safety data sheet (SDS). All chemicals or hazardous materials are to be stored within the worksite boundary and within bunded areas. Where possible refuelling is to be conducted offsite. Where practicable, refuelling is to be conducted on a hardstand area as far as practical from stormwater drains and using appropriate equipment. Where possible, ensure refuelling hardstand area is bunded/lined or appropriate drip tray utilised to avoid whilst refuelling. Plant is to be checked daily for leaks. A fully stocked spill kit is always to be located onsite. 				
FLORA AND FAUNA <ul style="list-style-type: none"> Tree protection fencing to be installed outside of the drip line of trees If wildlife is encountered on site. Do not approach and contact Wires. All trees are to be recorded for replanting considerations 				
VISUAL AMENITY <ul style="list-style-type: none"> Good housekeeping practices to be always implemented during works. If required, surfaces are to be swept regularly to ensure it is free of dirt. TfNSW signage is to be erected and maintained for the duration of the project. 				
SOIL AND WATER (SEDIMENT AND EROSION) <ul style="list-style-type: none"> Hardstand is to be swept regularly to ensure it is free of dirt. Fence to be regularly inspected and maintained. Water diversion bunds are to be constructed and maintained to prevent off-site water entering the work area Sand bags to be used to protect stormwater pits during works. Active work area is to be stabilised at the conclusion of each shift ie with geofabric. Controls are to remain in place until works are complete. Inspections are to occur weekly or prior to a rainfall event of greater than 80% of 10mm of rain in a 24 hours period Blue book design rainfall event (Table 6.3a): <ul style="list-style-type: none"> 80% - 5 day event: 27.4mm Stockpiles are to be covered prior to rainfall events Stockpiles are to have bunds on upper side to prevent erosion No discharge of water permitted 				
AIR QUALITY <ul style="list-style-type: none"> Vehicles and machinery are to be switched off when not in use. Equipment, machinery and vehicles used on-site are to be maintained to manufacturer's specs to minimise emissions. Trucks must be covered to transport materials (site work or compounds.) Any dust generated is to be controlled by water spray. Dust is to be monitored daily to confirm minimal dust is leaving site. Continuous visual air monitoring will be undertaken by the site supervisor, if visual dust is leaving the work area, work is to cease immediately and mitigation measures are to be reviewed Water cart must be onsite prior to works commencing 				
TRAFFIC AND TRANSPORT <ul style="list-style-type: none"> Works must have a low impact on public transport and traffic Traffic controls to be established as per approved TCPs and ROLs 				
WASTE AND RECYCLING <ul style="list-style-type: none"> Waste is to be disposed at an appropriately licensed facility. Waste is to be recycled where possible. Waste volumes are to be tracked and recorded for reporting purposes. Fuel usage is to be tracked and recorded for all plant and equipment 				
COMMUNITY INTERACTION <ul style="list-style-type: none"> If you are approached by the member of the community Be polite, professional and courteous If a community member has a general enquiry you are able answer, please do so If a community member has a complaint or requires further information Listen and acknowledge 				

ENVIRONMENTAL CONTROL MAP (PESCP/ECM)

Site Name: St Marys TBI **Site Number:** 725 **On Site Location:** Station Street – Utility Works **Map #** 725.ECM.05.R5.0

INCIDENT RESPONSE In the event of an environmental incident (for example hydrocarbon spill, turbid water runoff, unexpected heritage find, contamination or tree damaged) the Environmental Manager must be contacted immediately. The environmental manager is to contact the TfNSW Environmental Manager and Project Manager without delay. Act on instructions. The incident is to be reported through the TfNSW Environmental Incident Report Procedure	HOURS OF WORK Approved hours of work (COVID-19 hours only): Monday – Sunday, 7am to 6pm Out of hours works to be undertaken in accordance with Out of Hours permit: 725.OOHW.01 R6		
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- Inform your supervisor
- Provide the member of the public the Project Information Line phone number TBC
- Give way to pedestrians when entering / exiting compound.
-

NAME	SIGNATURE	DATE	NAME	SIGNATURE	DATE



APPENDIX F. SUSTAINABILITY MANAGEMENT PLAN



**Sydney Metro -
Western Sydney Airport**

Sustainability Management Plan Sydney Metro Western Sydney Airport St Marys TBI

Document History

Version	Date of approval	Doc. control no.	Summary of change
1.0	17 November 2021	SMP_01	Initial document

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Ward have developed a project based Environment and Sustainability Management System (E&SMS) which meets the following Project requirements under the CEMF:	5
• consistent with the Principal Contractors corporate Environmental Management System and AS/NZS ISO 14001:2016;	5
• supported by a process for identifying and responding to changing legislative or other requirements;	5
• includes processes for assessing design or construction methodology changes for consistency against the planning approvals;	5
• includes processes for tracking and reporting performance against sustainability and compliance targets;	5
• includes a procedure for the identification and management of project specific environmental risks and appropriate control measures; and	5
• is consistent with the Sydney Metro Environment and Sustainability Statement of Commitment.	5
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SUSTAINABILITY POLICY

Ward Civil and Environmental Engineering Pty Ltd ("Ward") is a multi-disciplined and full service civil and environmental engineering contractor. Ward emphasizes the importance of the environment and the safety of all people on our sites. We understand that what we do today can affect the lives of both current and future generations. We are committed to acting in a sustainable manner with respect to the environment and the wider community. We acknowledge that we need to do this in partnership with our clients, suppliers and subcontractors, with the goal of maintaining and improving the sustainability of our projects and communities in which we live and work.

Ward recognises that we need to approach the issue of sustainability from a variety of angles, including environmental, social and economic. We intend to achieve our long-term goal of working in a sustainable manner by defining clear objectives, monitoring our performance with respect to these objectives and then setting improvement targets to measure our progress.

Our sustainability objectives include:

- minimising impacts on the natural environment (including plant and animal life as well as air and water);
- complying with all applicable legislation and regulations associated with the environment;
- minimising impacts on all forms of heritage (including Aboriginal and European cultural heritage);
- respecting the link between Indigenous Australians and the land on which we work by improving participation of Indigenous Australians in our workforce;
- managing noise associated with construction works, and to develop systems to reduce or mitigate noise impacts;
- minimising energy use associated with construction; and
- maintaining and improving the visual amenities of the communities that we work in.


To assist in achieving our sustainability objectives we will undertake the following tasks:

- integrate sustainability considerations throughout our Health, Safety, Environmental and Quality ("HSEQ") management systems which will drive sustainable behavior with respect to the design, construction and operation of our projects;
- set targets, which will then be measured, to minimise emissions (both environmental and noise-related);
- reduce, reuse and recycle materials where practicable;
- promote efficient water and energy usage through the introduction of water and energy saving technologies and initiatives;
- engage with all stakeholders, including our supply chain, to drive efficiency and sustainability;
- provide our workforce with the information, training and support they require to meet our sustainability objectives;
- provide our staff with volunteer opportunities in the local communities in which they work;
- identify and engage suppliers and subcontractors that promote the participation of Indigenous Australians; and
- assess and reduce any undesirable impacts that our business activities may have on the community and environment.

Our commitment to sustainability will be evident through continual improvement via training, communication, consultation, monitoring, and review with full support from the directors and senior management.

Authorised by:

Julia Ward
Chief Executive Officer


Signature

20 December 2019
Date

1. Background and approach

This Sustainability Management Plan (CEMP) details sustainability management measures, controls, resources and responsibilities required during the Advanced and Enabling Works (AEW) St Marys – Temporary Bus Interchange (TBI) (the Project) for the Sydney Metro – Western Sydney Airport (SM – WSA).

Ward are committed to completing their scope of works in line with the Sydney Metro Sustainability Statement of Commitment reflects a commitment in the delivery of the project to:

- *Optimise sustainability outcomes, transport service quality, and cost effectiveness.*
- *Develop effective and appropriate responses to the challenges of climate change, carbon management, resource and waste management, land use integration, customer and community expectation, and heritage and biodiversity conservation.*
- *Be environmentally responsible, by avoiding pollution, enhancing the natural environment and reducing the project ecological footprint, while complying with all applicable environmental laws, regulations and statutory obligations.*
- *Be socially responsible by delivering a workforce legacy which benefits individuals, communities, the project and industry, and is achieved through collaboration and partnerships.*
-

This plan outlines the commitment to the Sydney Metro Environment and Sustainability commitments as well as pursuing those of Ward. It presents the minimum requirements for a Sustainability Plan on this Project and how Ward will meet these commitments applicable to this scope of works.

Sustainability requirements in regards to the TBI works will be relevant to the scale and nature of the Project. During the carrying out of this scope of works, Ward will strive where practicable and reasonable, to address carbon management, resource and waste management, customer and community expectation and heritage and biodiversity conservation and social responsibility.

The CSSI conditions of approval require that SM develop a Sustainability Plan within 6 months of approval granted for the Project. The TBI works will meet the basic sustainability requirements of the Sydney Metro and TfNSW sustainability management systems without the requirement for the completion of a Sustainability Plan.

2. Environmental and Sustainability Management System

Ward have developed a project based Environment and Sustainability Management System (E&SMS) which meets the following Project requirements under the CEMF:

- consistent with the Principal Contractors corporate Environmental Management System and AS/NZS ISO 14001:2016;
- supported by a process for identifying and responding to changing legislative or other requirements;
- includes processes for assessing design or construction methodology changes for consistency against the planning approvals;
- includes processes for tracking and reporting performance against sustainability and compliance targets;
- includes a procedure for the identification and management of project specific environmental risks and appropriate control measures; and
- is consistent with the Sydney Metro Environment and Sustainability Statement of Commitment.



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2.1. Sustainability Management requirements

In accordance with the CEMF requirement to prepare and implement a Sustainability Management Plan relevant to the scale and nature of the Project, the TBI contractor will address the following sustainability requirements within the CEMP:

Sustainability Requirement	Sustainability Requirement	How addressed
SMP1	The relevant requirements of the Sydney Metro Environment and Sustainability Statement of Commitment and the Sydney Metro – Western Sydney Airport Sustainability Plan	CEMP Section 1 and 2
SMP2	A sustainability policy statement	CEMP Appendix B Sustainability Policy
SMP3	The sustainability management team structure, including key personnel authority and roles of key personnel, lines of responsibility and communication, minimum skill levels of each role and interfaces with the overall project organisation structure	CEMP Section 3.3 Roles and Responsibilities
SMP4	How sustainability initiatives will be identified and integrated into the design of the Project Works	CEMP Table 5 Key Objectives and Targets
SMP5	The carbon and energy mitigation measures as detailed in the planning approval documentation that are applicable to the Project Works	Ward will operate in a manner that drives down the environmental and health impacts of our operations by preventing or minimising pollution, reducing waste and minimising the Project's carbon footprint.
SMP6	The low carbon strategies and initiatives that will be implemented to minimise the carbon emissions	N/A for this scope of works
SMP7	The energy efficiency strategies and initiatives that will be implemented to minimise energy use	Ward Civil hierarchy of avoidance; avoidance of unnecessary resource consumption; resource recovery (including reuse, reprocessing, recycling and energy recovery), disposal (as a last resort).

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Sydney Metro Western Sydney Airport
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		There will also be the avoidance of the use of diesel or petrol powered generators and instead using mains electricity or battery powered equipment, where practicable;
SMP8	Support innovative and cost effective approaches to energy efficiency, low carbon / renewable energy sources and energy procurement	Where applicable, the following waste objectives will apply to construction: <ol style="list-style-type: none"> i. Minimise waste throughout the project life-cycle; ii. Waste management strategies for off-airport works will be implemented in accordance with the Waste Avoidance and Resource Recovery Act 2001 management hierarchy as follows: <ol style="list-style-type: none"> a. Avoidance of unnecessary resource consumption; b. Resource recovery (including reuse, reprocessing, recycling and energy recovery); and c. Disposal.
SMP9	The strategies and initiatives that will be implemented to enhance the biodiversity	This is not applicable to the scope of works
SMP10	The processes and methodologies (including frequency) for assurance, monitoring, auditing, corrective action, continuous improvement and reporting on sustainability performance	In accordance with CoA C14, each Construction Monitoring Program must include the following: <ol style="list-style-type: none"> a) details of baseline data available including the period of baseline monitoring; b) details of baseline data to be obtained and when; c) details of all monitoring of the project to be undertaken; d) the parameters of the project to be monitored; e) the frequency of monitoring to be undertaken; f) the location of monitoring; g) the reporting of monitoring results and analysis results against relevant criteria; h) details of the methods that will be used to analyse the monitoring data; i) procedures to identify and implement additional mitigation measures where the results of the



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		<p>monitoring indicated unacceptable project impacts;</p> <p>j) a consideration of SMART principles;</p> <p>k) any consultation to be undertaken in relation to the monitoring programs; and</p> <p>l) any specific requirements as required by Conditions C15 to C16.</p> <p>Regular weekly inspections and auditing of the works will be carried out to ensure that environmental and sustainability safeguards are being followed.</p> <p>Opportunities and methods for continual improvement will be promoted through the processes of monitoring and inspections and ongoing communications between the environmental team and construction personnel.</p> <p>More formal continuous improvement will be driven through the Auditing and Management review process where corrective actions and recommendations will provide a closed loop into the parent CEMP.</p>
SMP11	A process (or processes) for compliance record generation and management	<p>Where a non-conformance is detected a Non-Conformance Report (NCR) will be raised in the Corrective Action Request (CAR) form.</p> <p>The Ward, ER, and TfNSW representatives will determine if issues identified during an environment inspection or audit will be closed out as part of the inspection or audit reporting process or via the issue of an NCR based on the severity of the issue and its potential to impact sensitive receivers or the environment.</p> <p>Where a non-conformance is a result of non-compliance with the requirements of any law or CoA regarding the Environment, Ward will immediately notify TfNSW in writing.</p> <p>In the event that repetitive observations are made i.e. if non-corrected low risk site improvement actions are not corrected within the agreed timing for actions (for more than a month in</p>

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		<p>most cases) the Environment Manager will request that a NCR be raised.</p> <p>Environmental related non-conformances are raised with the Environment Manager to determine appropriate actions and dates. On completion of agreed actions, the Environment Manager shall sign-off the NCR to signify close-out and provide a copy to TfNSW. Any changes to operations or practices resulting from actions are to be communicated to employees and sub-constructors as required. A register of all NCRs raised on the Project will maintained on the Ward system.</p>
SMP12	The processes and methodologies which will be used to achieve the required scores under rating systems identified in General Specification for Sustainability	N/A
SMP13	The strategy and methodology for incorporating climate change adaption in designs that response to the climate change risks and baseline adaptation measures allocated to the Project Works	<p>N/A</p> <p>This is a design requirement which is not covered under this Construction scope of works.</p>
SMP14	The strategies and initiatives that will be implemented to reduce overall water use and wastewater discharge, and maximise the availability and use of non-potable water sources	<p>The following water resources management objectives will apply to the construction of the project:</p> <ul style="list-style-type: none"> i. Minimise demand for, and use of potable water; ii. Maximise opportunities for water re-use from captured stormwater, wastewater and groundwater; iii. Examples of measures to minimise potable water consumption include: <ul style="list-style-type: none"> a. Water efficient controls, fixtures and fittings in temporary facilities; b. Collecting, treating and reusing water generated in tunnelling operations, concrete batching and casting facility processes;

		<ul style="list-style-type: none"> c. Using recycled water or treated water from onsite sources in the formulation of concrete; d. Harvesting and reusing rainwater from roofs of temporary facilities; e. Using water from recycled water networks; f. Collecting, treating and reusing groundwater and stormwater; g. Using water efficient construction methods and equipment; and h. Providing designated sealed areas for equipment wash down.
SMP15	Estimates of the quantity of potable water which will be consumed during construction	N/A This is a design requirement which is not covered under this Construction scope of works.
SMP16	Estimates of the quantity of water from non-potable sources which will be consumed during construction	N/A This is a design requirement which is not covered under this Construction scope of works.
SMP17	The strategy to reduce material use throughout the project life-cycle	<ul style="list-style-type: none"> • Sustainability considerations are integrated throughout design, Construction, and operation • A minimum 95 per cent recycling target is achieved for construction and demolition waste • Products made from recycled content are prioritised • The use of potable water for non-potable purposes is avoided if non-potable water is available <p>The reuse of water is maximised, either on-site or off-site Management of natural resources will be managed throughout delivery in accordance with the mitigation measures in Section 12.3</p>
SMP18	The strategies and initiatives that will be implemented to maximise the use of recycled materials	
SMP19	The strategies and initiatives that will be implemented to recycle and reuse materials onsite	
SMP20	The strategies and initiatives to prioritise the use of materials with a lower environmental and social embodied impact	

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SMP21	Estimates of the Portland cement reduction which will be achieved in concrete (averaged across all mixes) compared to a reference case	N/A This is a design requirement which is not covered under this Construction scope of works.
SMP22	The strategies and initiatives to prioritise the use of low-VOC, low emission materials	Where reasonable and practical Ward will aim to utilise low VOC low emissions materials.
SMP23	The use of sustainably sourced and certified timber and wood products	N/A to this scope of works.
SMP24	The development of a deconstruction plans to enable recycling and reuse at end-of-life	N/A This is a design requirement which is not covered under this Construction scope of works.
SMP25	Estimates of fuel consumption	N/A This is a design requirement which is not covered under this Construction scope of works.
SMP26	Estimates of electricity consumption	N/A This is a design requirement which is not covered under this Construction scope of works.
SMP27	Estimates of 'Scope 1', 'Scope 2', 'Scope 3' and total carbon emissions (Carbon Emission Targets) that incorporates direct and indirect emissions associated with electricity and fuel consumption, on-site process emissions and embodied emissions for all main materials used and undertaken in accordance with ISO 14064-1, ISO 14064-2 & ISO 14064-3.	N/A The carbon emissions will be collected through energy use, but no estimates will be provided.
SMP28	Reporting of carbon and energy will be undertaken in accordance with the National Greenhouse and Energy Reporting Act 2007.	Report on greenhouse gas and energy usage data as required by the Act for both on and off airport works. No Relevance In accordance with the staging report, greenhouse gas reporting is not required for this scope of works
SMP29	The strategy and initiatives to influence subcontractors and materials suppliers to adopt sustainability objectives in their works and procurement	Scale makes this N/A

SMP30	<p>A Sustainable Procurement Policy that must, as a minimum, include:</p> <ul style="list-style-type: none"> ☐ The processes and procedures that will be used to provide environmental and social improvement ☐ The responsibilities of key project personnel with respect to the implementation of the policy ☐ Compliance record generation and management ☐ The processes and environmental and social criteria that will be used for the selection of Subcontractors ☐ The processes that will be used to ensure ethical sourcing of labour and materials ☐ Local sourcing ☐ Where equipment, materials or labour are procured from locations outside Australia, the processes that will be used to ensure human rights impacts and risks are identified and mitigated as well as processes to ensure compliance with modern slavery, and modern slavery reporting ☐ Engagement with social enterprises and local businesses 	<p>N/A The timeframe and footprint of the Project is too small to trigger this requirement.</p>
SMP31	<p>The retention of records detailing the consideration of sustainability in the procurement of all materials</p>	<p>All procurement records will be kept</p>

Appendix A – Sustainability Policy



SUSTAINABILITY POLICY

Ward Civil and Environmental Engineering Pty Ltd (“Ward”) is a multi-disciplined and full service civil and environmental engineering contractor. Ward emphasises the importance of the environment and the safety of all people on our sites. We understand that what we do today can affect the lives of both current and future generations. We are committed to acting in a sustainable manner with respect to the environment and the wider community. We acknowledge that we need to do this in partnership with our clients, suppliers and subcontractors, with the goal of maintaining and improving the sustainability of our projects and communities in which we live and work.

Ward recognises that we need to approach the issue of sustainability from a variety of angles, including environmental, social and economic. We intend to achieve our long-term goal of working in a sustainable manner by defining clear objectives, monitoring our performance with respect to these objectives and then setting improvement targets to measure our progress.

Our sustainability objectives include:

- minimising impacts on the natural environment (including plant and animal life as well as air and water);
- complying with all applicable legislation and regulations associated with the environment;
- minimising impacts on all forms of heritage (including Aboriginal and European cultural heritage);
- respecting the link between Indigenous Australians and the land on which we work by improving participation of Indigenous Australians in our workforce;
- managing noise associated with construction works, and to develop systems to reduce or mitigate noise impacts;
- minimising energy use associated with construction; and
- maintaining and improving the visual amenities of the communities that we work in.


To assist in achieving our sustainability objectives we will undertake the following tasks:

- integrate sustainability considerations throughout our Health, Safety, Environmental and Quality (“HSEQ”) management systems which will drive sustainable behavior with respect to the design, construction and operation of our projects;
- set targets, which will then be measured, to minimise emissions (both environmental and noise-related);
- reduce, reuse and recycle materials where practicable;
- promote efficient water and energy usage through the introduction of water and energy saving technologies and initiatives;
- engage with all stakeholders, including our supply chain, to drive efficiency and sustainability;
- provide our workforce with the information, training and support they require to meet our sustainability objectives;
- provide our staff with volunteer opportunities in the local communities in which they work;
- identify and engage suppliers and subcontractors that promote the participation of Indigenous Australians; and
- assess and reduce any undesirable impacts that our business activities may have on the community and environment.

Our commitment to sustainability will be evident through continual improvement via training, communication, consultation, monitoring, and review with full support from the directors and senior management.

Authorised by:

Julia Ward
Chief Executive Officer



Signature

20 December 2019
Date



APPENDIX G. SM-WSA ENVIRONMENTAL INCIDENT AND NON COMPLAINT REPORTING PROCEDURE



Environmental Incident and Non-compliance Reporting Procedure

SM-17-00000096

Metro Body of Knowledge (MBoK)

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1. Purpose and scope

This procedure documents the process to be used when classifying and reporting Environmental Events.

This procedure applies to Sydney Metro and any contractor Sydney Metro engages to carry out works. Principal Contractors must ensure their processes for managing Environmental Events is consistent with this document. The requirement for consistency is documented in the Construction Environmental Management Framework (Section 3.3(f)) and shall be allocated as a contractual requirement to each delivery partner.

2. Introduction

Sydney Metro is committed to minimising risks to the environment, the rapid identification and rectification of breaches to Environmental Requirements and efficient and effective responses to Environmental Incidents that grows our ability to minimise harm and prevent future re-occurrences.

This procedure defines an approach to classifying Environmental Issues, Incidents and Non-compliances and establishes the immediate, interim and long term actions that are taken in response to Environmental Events.

3. Definitions

All terminology in this Procedure is taken to mean the generally accepted or dictionary definition with the following exceptions:

Term	Definition
Environment	means components of the earth, including: a) land, air and water, and b) any layer of the atmosphere, and c) any organic or inorganic matter and any living organism, and d) human-made or modified structures and areas, and includes interacting natural ecosystems that include components referred to in (a)-(c).
Environmental Event	An occurrence that identifies actual or potential environmental impacts or non-compliances. Events can include conversations, inspections, incidents, or failures of process.
Environmental Harm	Includes any direct or indirect alteration of the environment that has the effect of degrading the environment and, without limiting the generality of the above, includes any act or omission that results in pollution.
Environmental Incident	An occurrence or set of circumstances, as a consequence of which pollution (air, water, noise, and land) or an adverse environmental impact has occurred or is likely to have occurred.
Environmental Issue	An occurrence or set of circumstances where Environmental Harm or Non-compliance could occur if not rectified.
Environmental Non-compliance	A breach of an Environmental Requirement originating from Planning Approvals, Environment Protection Licenses, lease agreements, and other requirements documented in environmental management plans.

Term	Definition
Material Harm to the Environment	harm to the environment is material if: <ol style="list-style-type: none"> a) it involves actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial, or b) it results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding \$10,000 (or such other amount as is prescribed by the regulations), and c) loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment. It does not matter that harm to the environment is caused only in the premises where the pollution incident occurs.

Terms and jargon specific to this procedure are defined within [SM-17-00000203 Sydney Metro Glossary](#).

4. Accountabilities

The Executive Director, Safety, Sustainability & Environment is accountable for this Procedure. Accountability includes authorising the document, monitoring its effectiveness and performing a formal document review.

Direct Reports to the Chief Executive are accountable for ensuring the requirements of this document are implemented within their area of responsibility.

The Direct Reports to the Chief Executive who are accountable for specific projects/programs are accountable for ensuring associated contractors comply with the requirements of this document if specified in the relevant contracts.

5. Environmental Events

Environmental surveillance data is relied upon to inform Sydney Metro of performance trends, to provide assurance that legislative requirements are being met and indicate where surveillance activities should be directed. In order to rely upon environmental data for this purpose there needs to be a high degree of consistency in the manner by which it is collected and interpreted. Due to the need for consistency, any incident/Non-compliance procedure produced by a delivery partner to Sydney Metro is required to be consistent with the requirements of this document.

The concept of Environmental Events forms a common starting point for understanding what types of occurrences should be managed and reported as Incidents and what should be reported as Non-compliances or Issues. When an Environmental Event occurs a series of questions can be asked to consistently determine what type of event it is. Commonly, Environmental Events lead to three different processes:

1. Reporting of an Environmental Incident;
2. Reporting of an Environmental Non-compliance; or
3. Reporting of an Environmental Issue.

Incidents and Non-compliances are recorded using [SM-17-00000105 Environmental Incident and Non-compliance Notification Report Form](#) and Environmental Issues are recorded through environmental inspection reports using [SM-17-00000107 Environmental Inspection Report Template](#). These paper based records are subsequently entered into the Sydney Metro Compliance Register (Section 6.7) which is used to disseminate the data and facilities reporting internally and externally. Note where a Principal Contractor has submitted alternative processes and these have been approved by Sydney Metro they may also be used.

The figure below shows the process by which Environmental Events are classified (Figure 1).

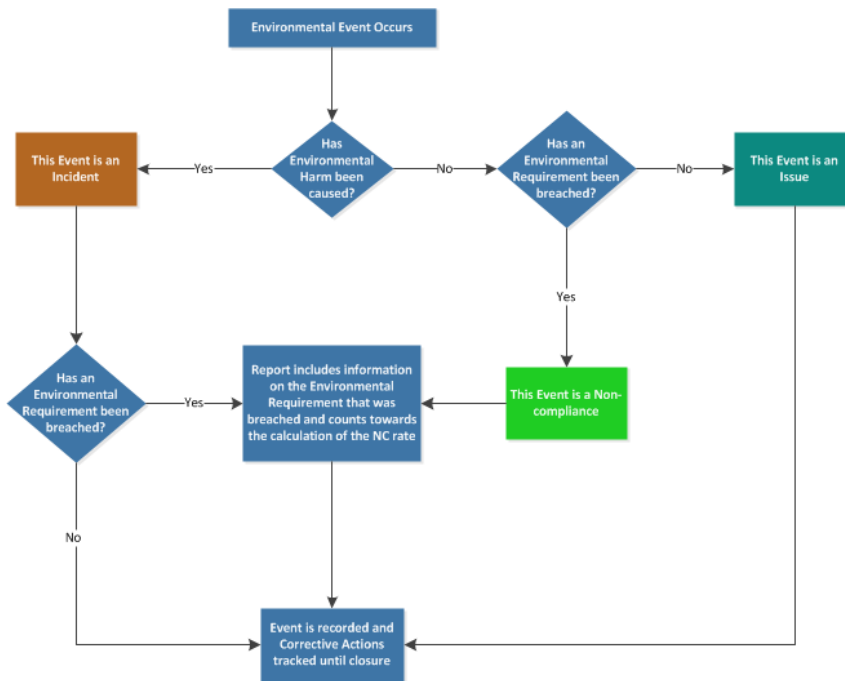


Figure 1: Environmental Event Classification Process

Where Environmental Harm has been caused the event will always be classified as an Environmental Incident regardless of whether one or more Environmental Requirements have been breached. Only when an event occurs without harm being caused to the environment will it be classified as a Non-compliance or Issue. It should be noted that the Incident management process still captures any breaches of Environmental Requirements and these incidents contribute towards the calculation of the NC Rate (Section 7.1).

This flowchart above is intended to be a guide and there may be situations where it is unclear exactly how an Environmental Event should be classified. In these situations a judgement call should be made in consultation with your Manager.

5.1. Worked Example – Classifying Environmental Events

This Section provides a fictitious example of Environmental Events which fall into each of the three different categories. The situations outlined below are provided to explain how event classifications are made. The background for these worked examples is as follows:

Sydney Metro is carrying out works in a newly established site and substantial earthworks are occurring to construct piers for an elevated viaduct. A nearby creek contains a variety of important fish species and the local community are known to use this creek for recreational fishing. The Environmental Impact Statement identified the creek as being at risk of increased sedimentation from dirty water run-off and the Conditions of Approval include a requirement to have a Progressive Erosion and Sediment Control Plan in place. This plan has been produced and indicates that sediment fences must be in place at specific locations to capture dirty water run-off. Regular daily inspections of the sediment controls are carried out by the contractor's Environment Manager and an Independent Environmental Representative has commenced a monthly inspection on this site at 7 am on Thursday morning.

5.1.1. Soil and Water Issue

The Environmental Representative notices a sediment fence has been knocked over in one of the areas indicated as requiring fencing on the ERSED plan. It appears to have occurred recently and there is no record of rainfall in the last few days. During the course of the inspection all other ERSED controls appeared to be in good condition and erected in accordance with the requirements of the Blue Book. In this example no harm has yet been caused and no environmental requirement has been breached so the event is classified as an Environmental Issue which is raised on the inspection report with an action to reinstall the fence.

5.1.2. Soil and Water Non-compliance

Alternatively, the Environmental Representative might have noticed many sediment fences had been knocked down and in some areas an absence of sediment fences where the plan indicates they are required. Despite there being no rain in recent days the Environmental Representative concludes that the requirements of the plan are not being followed and have been breached. The event is raised as non-compliance and actions are set in place to reinforce the requirements of the ERSED plan for that sites workforce as well as the immediate reinstatement of controls.

5.1.3. Soil and Water Incident

Finally, in a third scenario the Environmental Representative notices many sediment fences are down and some are absent where required by the plan. However, significant rainfall has occurred in recent days and the Environmental Representative determines that it is likely dirty water has escaped through the area into the nearby creek potentially causing harm to the fish population. This event is classified as an Incident by the inspector and immediate notification is undertaken. Similar controls are implemented as described above.

5.2. Notifiable Events

There are a number of Acts and regulations that include a specific requirement to notify a Regulatory Authority. When an Environmental Event triggers one of these notification requirements we then also refer to that event as a Notifiable Event (Table 1).

The Principal Contractor’s Environment Manager must determine whether an event is notifiable, and may rely upon advice from Sydney Metro if it is provided.

Table 1: Examples of Notifiable Events

Event type	Legislation		Trigger for Notification
Pollution Incident ¹	POEO Act 1997	Part 5.7	Where Material Harm has occurred contact the EPA Pollution Line as soon as practicable
	POEO (General) Regulation 2009	Section 101	
Land contamination	Contaminated Land Management Act 1997	Section 60(1)	As soon as practicable, after becoming aware of contamination that exceeds the relevant investigation levels in the National Environment Protection Measure, where a person has or will be exposed to the contamination
Discovery of an Aboriginal relic	National Parks & Wildlife Act 1974	Section 89A	Director General of EPA in writing within a reasonable time after becoming aware. Note this is not required for Projects approved under Part 5.2 of the Environmental Planning and Assessment Act (see section 115ZG). Notification and reporting is addressed in the relevant Infrastructure Approval
Discover Aboriginal Remains	Commonwealth Aboriginal & Torres Strait Islanders Heritage Protection Act 1984	Section 20	Commonwealth Minister of the Environment in writing as soon as practicable after becoming aware
Discovery of a relic	Heritage Act 1977	Section 146	Heritage Council in writing within a reasonable time after becoming aware Note -this is not required for Projects approved under Part 5.2 of the Environmental Planning and Assessment Act (see section 115ZG). Notification and reporting is addressed in Infrastructure Approvals

5.3. Event Types

Each Environmental Event is assigned a secondary classification of an Event Type for the purpose of data analysis and general environmental management. They are grouped by areas of environmental management so that targeted auditing, training or awareness initiatives can be initiated in response to emergent trends. Each Event Type is explained in Table 2.

¹ Further information on reporting pollution incidents to EPA is provided in Section 6.6 Environmental Incident/Non-compliance Report

Table 2: Environmental Event Types and their descriptions

Event Type	Applies To:			Description
	Issue	Incident	Non-compliance	
Soil and Water	●	●	●	Covers the physical location, chemical composition and ecology of soils and waterways. Any event which changes these compositions is a Soil and Water event. Within this event type all instances of contamination, erosion and sedimentation of waterways is covered.
Flora and Fauna	●	●	●	Covers vegetation and vegetation communities as well as animals and animal habitat. Any event where vegetation is felled or damaged, animals are killed or injured, or habitat is harmed or destroyed is covered.
Waste and Spoil	●	●	●	Covers the management of Excavated Natural Material (ENM) and Virgin Excavated Natural Material (VENM) including on-site management, and disposal and also the classification and management of Waste materials. Note: that the transportation of spoil is covered under Traffic, Transport and Access.
Heritage	●	●	●	Covers the management of known heritage artefacts or sites, and the treatment of unexpected finds, archaeological investigations and other impacts.
Air Quality	●	●	●	Covers the management of emissions of particulate matter, odours, and gasses used as air quality parameters from worksites.
Noise and Vibration	●	●	●	Covers the management of airborne and ground borne noise and vibration and includes hold points on the commencement of any work where Out of Hours Works permits or Construction Noise Impact Statements are required.
Community Stakeholder and Business	●	●	●	Covers the management of Community and Stakeholder requirements and includes complaint response procedure, community management protocols, and the maintenance of information on websites.
Traffic Transport and Access	●	●	●	Covers the management of traffic inside and outside of sites including access points and parking requirements. This event type also covers any requirements in relation to vehicles and vehicle maintenance or the transportation of waste and spoil.
Spills and Leaks	●	●	●	Covers all instances where environmentally sensitive substances are held within a container which has the potential to leak or spill and covers pipes, hoses, fuel tanks, storage tanks and plastic containers. Note: Spills and Leaks specifically exclude anything in relation to the transport and deposition of sedimentation.
Management Systems	●	●	●	Covers procedural or administrative processes that are common across all areas. It specifically does not cover procedural or administrative processes which are unique to any of the other event types. For example, not completing a vegetation removal form prior to vegetation clearing is still a Flora and Fauna event. Note: A good example of a Management Systems NC would be not reporting an Environmental Incident within required timeframes.

6. Environmental Incident Classification and Management

Sydney Metro has defined an Environmental Incident as:

An occurrence or set of circumstances, as a consequence of which pollution (air, water, noise, and land) or an adverse environmental impact has occurred or is likely to have occurred.

Adverse environmental impact includes contamination, harm to flora and fauna (either individual species or communities), damage to heritage items, or adverse community impacts.

Planning Approvals and Environment Protection Licences permit some environmental impacts and these are not intended to be captured as Environmental Incidents.

Table 3: Examples of Environmental Incidents

Type	Example Incident
Air Quality	Odour that travels beyond the site boundary
Air Quality	Dust exceeding reasonable levels without active management measures in place
Air Quality	Operation or maintenance of plant in a manner that causes or has likely caused excessive air pollution
Soil and Water	Discharge of water on or off site in a manner that causes or has likely caused water pollution without required approvals.
Noise and Vibration	Noise that travels beyond the site boundary as a result of poorly maintained plant or operation of plant in an inefficient manner
Noise and Vibration	Failure to comply with the approved hours of work
Soil and Water	Where the chemical composition of soil or water has been detrimentally modified by a contaminant leading to potential or actual environmental harm. For example, rainfall causes a flow of water across a site that erodes soil and enters a waterway increasing the total suspended solids of that water body.
Spills and Leaks	Where a substance has leaked from, or spilt from a container that is designed to prevent that substance from escaping into the environment (including bunds, fuels tanks, chemical bottles and other containers). Spills and Leaks specifically exclude anything in relation to the transport and deposition of sedimentation.
Soil and Water	Dispose of waste in a manner that harms or is likely to harm the environment
Flora and Fauna	Harm or “pick” a threatened species, endangered population or endangered ecological community without required approvals
Flora and Fauna	Damage to vegetation, fauna or habitat including watercourses without required approvals
Heritage	Damage, disturbance, destruction or works to heritage items/relics without required approvals
Heritage	Damage, disturbance, or destruction of Aboriginal objects or places without required approvals

6.1. Incident Classification

Environmental Incidents are classified into one of three Classes that are based upon the consequence descriptors for environmental risks in the Sydney Metro Risk Matrix (refer to [SM-17-00000182 Risk Management Standard](#)). Each of these classifications trigger a variety of management actions and/or legislative requirements depending on the severity of the consequence described where Class 3 represents minor consequences and Class 1 represents major consequences.

This matrix is further sub-divided into consequence ratings ranging from C6 (low impact) to C1 (high impact). An incident transitions between a Class 3 to a Class 2 incident once material harm has been caused, and transitions into a Class 1 incident once it is determined that the Environmental Harm caused in large-scale and cannot be remediated (Table 4).

Table 4: Classification System for Environmental Incidents

Class 3			Class 2		Class 1
C6	C5	C4	C3	C2	C1
No appreciable changes to environment and/or highly localised event	Change from normal conditions within environmental regulatory limits and environmental effects are within site boundaries	Short-term and/or well-contained environmental effects. Minor remedial actions probably required	Impacts external ecosystem and considerable remediation is required	Long-term environmental impairment in neighbouring or valued ecosystems Extensive remediation required	Irreversible large-scale environmental impact with loss of valued ecosystems

6.1.1. Class 3 Incidents

These Incidents are events which cause Environmental Harm, but do not cause Material Harm to the environment. Normally Class 3 Incidents are not Notifiable Events and therefore a simple notification protocol is adopted whereby Sydney Metro must be notified within 48 hours verbally, and in writing.

In some cases it will be unclear whether Material Harm has been caused in the early stages of Incident Management. If this is the case then the process for Class 2 Incidents is followed (see Section [Class 2 Incidents](#)) until it is clear that Material Harm has not been caused.

A formal Incident Investigation report is not required for Class 3 Incidents, however, it is expected that the person responsible for completing the Incident Notification Report makes appropriate enquiries to determine the likely causal factors involved and assigns effective corrective actions.

6.1.2. Class 2 Incidents

These Incidents are events which cause Material Harm to the environment and they always trigger notification of Regulatory Authorities. These Incidents represent events that are far more serious than Class 3 Incidents and therefore strict communication protocols are required to ensure that effective and informed decisions are made (Figure 2).

The Environmental Lead, contract Environment Manager and the Independent Environmental Representative must be notified verbally as soon as possible after the observer becomes aware of a Class 2 Incident.

Class 2 Incidents must be investigated and the investigation must produce an investigation report containing corrective or preventative actions. This investigation report must be provided to Sydney Metro within 7 days of the event unless another timeframe is agreed with the EL.

Despite any arrangements for the submission of investigation reports, an Incident Notification Report must be provided with all available information and submitted to Sydney Metro within 48 hours. It is not expected that initial Incident Notification Reports for Incidents under investigation initially include actions as these will be informed by the findings of the investigation. The report should be updated with actions resulting from the investigation when available.

6.1.3. Class 1 Incidents

Class 1 Environmental Incidents are managed in the same manner as Class 2 Incidents expect where a determination is made by the Chief Executive (or delegate) that a Crisis Management Team should be activated. In this situation [SM-19-00053243 Crisis Management Procedure](#) is followed.

6.2. Incident Notification

When an Environmental Event occurs which causes Environmental Harm in all cases both verbal and written communication of the incident must be carried out immediately and within 48 hours respectively. For Class 1 and 2 Incidents the notification process shown in Figure 2 must be followed. Written communication of Environmental Incidents is via an Incident Notification Report (Section 6.3).

This process includes specific roles and responsibilities within Sydney Metro and our delivery Partners who are required to take notification actions in response to Incidents.

This notification process has been developed to ensure that crucial information about Incidents is captured early and communicated to specific individuals who can ensure the Environmental Impacts are minimised and efficient and effective responses to the event are implemented.

In particular the Principals Representative and the Environmental Lead for Sydney Metro play a crucial role in the communication of Incidents within Sydney Metro and these roles are explained in more detail below.

6.2.1. Principal's Representative (PR)

Each works package establishes a contractual interface for communication between the contracted party and Sydney Metro. Generally this interface is between the Principal Contractors Project Director and an appointed representative of Sydney Metro called the Principals Representative.

All formal written communications must pass between these two individuals electronically using TeamBinder. The Principals Representative holds certain responsibilities in the Incident management Process outlined in Figure 2.

6.2.2. Environmental Lead (EL)

Where this procedure is applied to a works package an Environmental Lead (EL) will be selected for the relevant works package. The Environmental Lead must possess environmental experience and competency in managing Incidents and be a representative of Sydney Metro for those works. This representative holds specific responsibilities outlined in Figure 2.

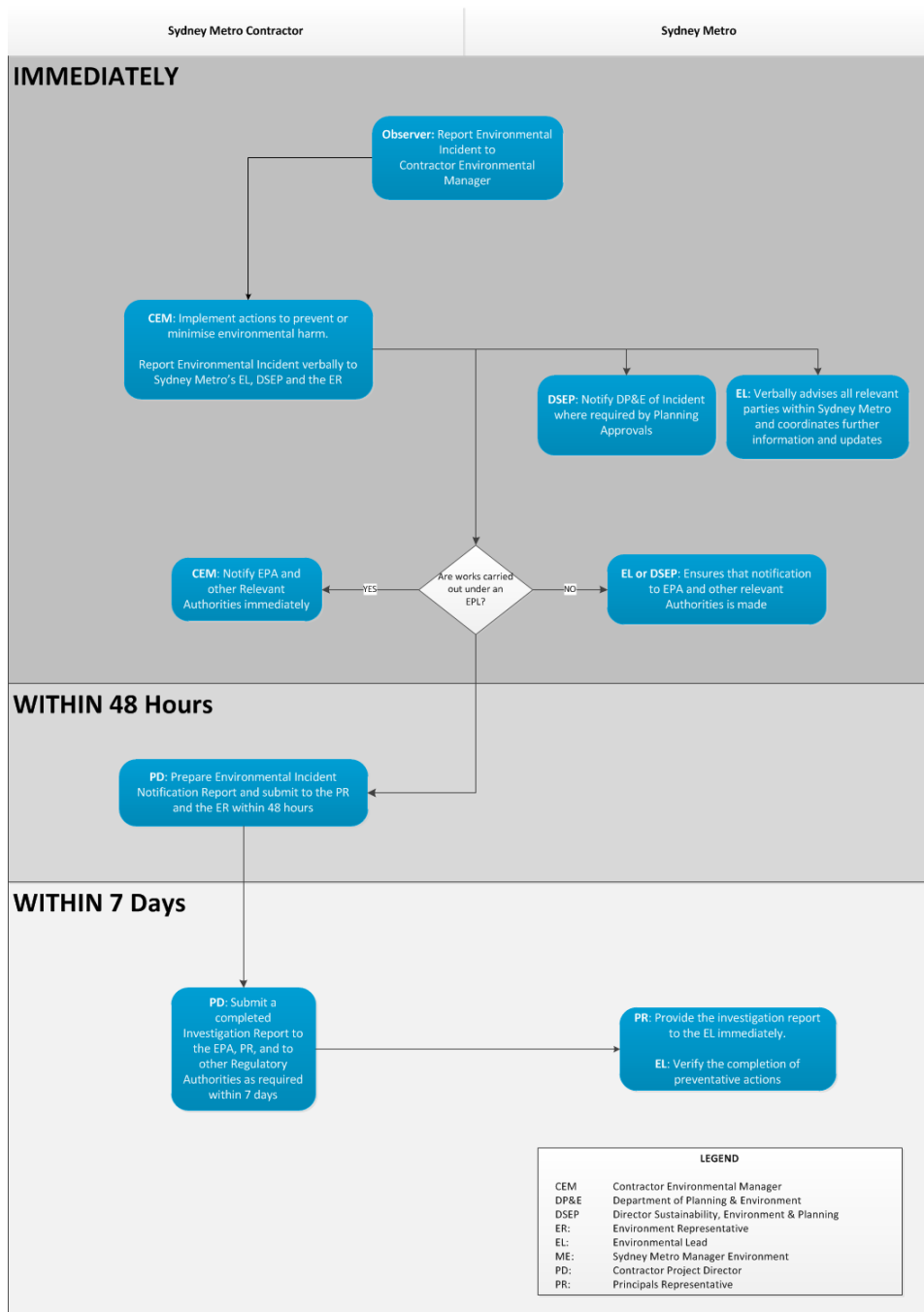


Figure 2: Environment Incident notification process for Class 1 and 2 Incidents

6.3. Incident Notification Reports

For all Incidents an Incident Notification Report must be completed and submitted to Sydney Metro within 48 hours. These reports satisfy the requirement for written communication to Sydney Metro and are completed using [SM-17-00000105 Environmental Incident and Non-compliance Notification Report Form](#) or a similar and consistent form approved by Sydney Metro.

6.4. Incident Investigations

Environmental Incident Investigations must be carried out for all Class 1 and Class 2 Incidents. Investigations may also be requested for any other Environmental Event at the discretion of Sydney Metro. This discretion is likely to be exercised where incidents of a similar nature are occurring repetitively.

When conducting an Environmental Incident investigation, they must:

- Be led by a lead investigator who is suitably independent investigator capable of arriving at objective findings and is experienced in conducting environmental incident investigations;
- Consider the need for legal privilege during the investigation process in consultation with legal counsel;
- Be informed by all available information that is relevant to the investigation;
- Analyse the timeline of events which led up to and followed the occurrence of Environmental Harm including the immediate incident response;
- Be conducted in a manner that is consistent with recognised investigation techniques such as ICAMS;
- Gather and record evidence;
- Seek the input of key stakeholders; and
- Identify Preventative and Corrective actions and document these in the Incident Notification Report.

6.5. Environmental Incidents with Health and Safety Impacts

It is possible that where an Event occurs that causes Environmental Harm, harm is also caused to the health, safety or wellbeing of people. In these situations there will also be a Health and Safety Incident process undertaken which is separate to the process outlined in this document.

While the definition of the Environment covers people under the POEO Act, the management of impacts upon them are carried out using the Health and Safety Incident Management protocols. This is because Health, Safety and Wellbeing requirements are governed by a range of legislation other than the POEO Act and this procedure is not comprehensive in that regard. Sydney Metro has well established processes to manage impacts on people without the need for the Environmental Incident Process to intervene.

Furthermore, where Environmental Events cause harm to both the 'environment' and people it is possible that the root causes for the respective impacts are different. It is also possible that differences in the severity of the impacts trigger inconsistent notification requirements and investigation levels. It is prudent to identify appropriate and effective corrective actions that reduce the risk of impacts to both people and the environment, therefore separate Incident Management Processes are undertaken in these situations.

For more detail on the management of Health and Safety Incidents please refer to [SM-17-0000040 Health & Safety Incident Reporting & Investigation Standard](#).

6.6. Reporting Pollution Incidents to Relevant Authorities

If an Incident or Non-compliance is a Notifiable Event, then a report must be provided to the relevant Regulatory Authority within the timeframe(s) specified by the relevant legislation. Pollution Incidents which are causing or threatening Material Harm to the environment must be reported to each of the following authorities immediately after project personnel become aware of the Incident, as required by Section 148 of the POEO Act 1997. The contact numbers for these authorities are listed in Table 5.

Table 5: Contact details for Relevant Authorities

Type	Example incident
EPA Environment Line	131 555
Local Authority	Local Council (specific to area)
Ministry of Health	Public Health Unit (refer to http://www.health.nsw.gov.au/Pages/default.aspx to confirm local area contact details)
SafeWork NSW	131 050 or contact@safework.nsw.gov.au
Fire and Rescue NSW	000

Relevant information required to be given to EPA when making a notification is specified in Section 150 of the POEO Act 1997 as follows:

- Time, date, nature, duration and location of the incident;
- Location of the place where pollution is occurring or is likely to occur;
- Nature, the estimated quantity or volume and the concentration of any pollutants involved;
- Circumstances in which the Incident occurred (including the cause of the Incident, if known);
- Action taken or proposed to be taken to deal with the Incident and any resulting pollution or threatened pollution; and
- Other information prescribed by the regulations.

All relevant information known at the time of making the notification must be reported. If the information required by (c), (d) or (e) above is not known at the time of initial notification but becomes known afterwards, it must be reported to each authority immediately after it becomes known. Verbal notification must be followed by notification in writing within seven days of the date on which the Incident occurred.

Pollution Incidents are not required to be reported if the Incident has already come to the attention of the EPA or the Incident involves only the emission of an odour.

Failure to report a pollution Incident as required by the POEO Act 1997 is an offence.

Where any work or activity is regulated by an Environment Protection License (EPL), notification of a pollution Incident to the EPA should be made by the licensee. Thus, where the contractor holds the EPL for the project, notification to EPA shall be made by the contractor.

For any work or activity that is not regulated by an EPL, notification of pollution Incidents to EPA shall be made by Sydney Metro, unless the contractor is instructed otherwise by Sydney Metro. This includes pollution Incidents that occur as a result of pre-construction activities which may be undertaken prior to an EPL being required for a project. Pre-construction activities are determined by the Planning Approval and may include, for example, geotechnical investigations or surveys.

Where the Environmental Representative determines there to have been a significant off-site impact on people or the biophysical environment, the program Director Sustainability Environment and Planning will notify the Secretary of the Department of Environment and Planning within 48 hours in accordance with Project Infrastructure Approval Conditions. This notification will be followed by a full written report within seven days of the date on which the incident occurred.

6.6.1. Maritime Related Incident Notification and Reporting

Marine Incidents involving vessels and personnel on board vessels must be reported to the Australian Maritime Safety Authority in accordance with the guidance published on their website at:

- [Australian Maritime Safety Authority Incident Reporting](#); and
- [Reporting obligations of owners and masters of domestic commercial vessels](#).

6.7. Environmental Compliance Register

The Environmental Compliance Register is used to manage the information associated with reporting of Environmental Events. This register is maintained by the Manager Environment and may be used by a variety of individuals to input data. For access to the register or information on its use contact the Manager Environment.

This register analyses the data it contains and produces environmental compliance statistics that are used to meet a range of reporting and environmental management requirements.

7. Environmental Non-compliance

An Environmental Non-compliance is a breach of an Environmental Requirement originating from Planning Approvals, Environment Protection Licenses, lease agreements, and other requirements documented in environmental management plans. It is important to note that regardless of whether an event is classified as a Non-compliance or an Incident the process behind managing the event remains the same, with the following exceptions:

- Non-compliances are not notifiable to Regulatory Authorities under the POEO Act;
- Non-compliances are reported to have occurred on the day the breach was raised as opposed to the date when the requirement was breached (this is to preserve historical reporting and analysis – see Section 7.1);
- Non-compliances are not divided into severity classes (Section 5.2);
- Non-compliances do not have the potential to trigger crisis or emergency management processes; and
- There is an informal notification process in the immediate timeframe following a Non-compliance being raised.

When an Environmental Event occurs that causes Environmental Harm and also breaches one or more Environmental Requirements, then an Incident Notification Report will be created which records what requirements were breached.

If a Non-compliance is identified then it must be raised using [SM-17-00000105 Environmental Incident and Non-compliance Notification Report Form](#) within 48 hours by the party responsible for the breach.

7.1. Non-compliance Rate

A key environmental performance statistic used by Sydney Metro is the Non-compliance Rate. This statistic provides a standardised way of comparing the performance of different projects or contractors. The NC Rate is calculated using the following formula:

$$= \left(\frac{NCs + Incidents\ with\ breaches\ raised\ in\ month + (Open\ NCs + Open\ Incidents\ with\ breaches\ from\ previous\ months)}{Total\ Number\ of\ Ongoing\ Requirements} \right) \times 100$$

Each month a count of the number of NCs raised, and Incident raised where Environmental Requirements have also been breached is counted. Added to this number is the number of these events which were raised in previous months that still held an Open status in the current reporting period. Non-compliance and incident Events are considered Open if any of the associated Actions are Open. The total is divided by the number of Environmental Requirements which are actively being complied with (Ongoing Requirements) and a multiplying factor of 100 is applied.

8. Corrective and Preventative Actions

Whenever an Environmental Event is raised actions will be assigned to the event irrespective of whether it is an Issue, Incident or Non-compliance. These actions will generally be Corrective Actions which are implemented to eliminate the cause of the Incident, Non-compliance or Issue and can be thought of as reactive measures in response to the Environmental Event.

Preventative Actions may also be assigned to prevent the occurrence of an Incident, Non-compliance or Issue and can be considered pro-active measures which may be recommended following a detailed investigation of the event.

Actions must:

- Limit impacts as far as is reasonably practicable;
- Eliminate risk where practicable;
- Where is it not practicable to eliminate the risk, follow the hierarchy of controls;
- Address root causes and contributing factors; and
- Be prioritised based on risk.

The Executive Director, Safety Sustainability & Environment must ensure there are systems in place to:

- Monitor corrective action status;
- Escalate issues to the executive where progress on a corrective action is inadequate; and
- Retain all corrective action responses for recording purposes.

8.1. Action Status

Actions are allocated to a person who will take accountability for ensuring it is carried out within a timely manner and completed by the due date.

Actions are either closed immediately if the Action has already been carried out and verified by Sydney Metro, or are created with an open status. The Action will remain in an open state until such a time as Sydney Metro verifies that the responsible person has completed the Action in a satisfactory manner. Until all actions associated with an Incident, Non-compliance or Issue are closed the original Environmental Event is considered to be open as well. This is relevant when calculating the NC Rate as open Non-compliances and Incidents contribute toward the calculation of this statistic.

Verification is determined by the Environmental Lead by sighting evidence of the Actions implementation.

9. Related documents and references

Related documents and references

- [SM-17-0000022 Environmental & Sustainability Management Manual](#)
- [SM-17-0000182 Risk Management Standard](#)
- [SM-17-0000040 Health & Safety Incident Reporting & Investigation Standard](#)
- [SM-19-00053243 Crisis Management Procedure](#)
- [SM-17-0000105 Environmental Incident and Non-compliance Notification Report Form](#)
- [SM-17-0000107 Environmental Inspection Report Template](#)
- [SM-17-0000203 Sydney Metro Glossary](#)

10. Superseded documents

Superseded documents

There are no documents superseded as a result of this document.

11. Document history

Version	Date of approval	Notes
1.0	31 March 2015	New document
2.0	7 July 2016	IMS Review
3.0	7 April 2017	IMS Review
4.0	23 November 2018	IMS Review
5.0	11 February 2019	IMS Review
5.1	18 February 2019	Minor correction to formula



APPENDIX H. STATION STREET LAYDOWN ASSESSMENT

An equipment and storage area will be established at the vacant area on Station Street. This area will be used for the storage of pits / pipes etc and site amenities (lunch shed). It is not anticipated that this area will be used for fill / spoil materials. This area was previously used as a storage area to support works on the rail corridor.



Figure 9: Station Street Laydown Arrangement

In accordance with

Location:

The site is located within the EIS assessment boundary

Operation:

The laydown area will be in use to support construction activities. The activities to be undertaken at the laydown include:

- Crib shed / lunch room for crews
- Storage / laydown area for materials such as pits / pipes, bedding sands etc
- Loading / unloading of materials to support site works

Noise and Vibration Impacts:

The use of the laydown area is included within the St Mary’s Bus Exchange Early Works Addendum Detailed Noise & Vibration Impact statement (DNVIS) – Stormwater Variation (Report 11.00323R_AD-01).

Details regarding the predicted noise limits are present below in Table 52. Assumptions used in the modelling are shown in Table 51.

Table 10-30 in Chapter 10 of the EIS assessed the predicted noise levels represent the noise levels from all site-related operational non-rail noise sources at the identified receiver at 3 Station Street, St Marys.

The DNVIS predicted levels for the use of the Station Street laydown are predicted to be higher than the predicted levels presented within Table 10-30 of the EIS. Notwithstanding, the DNVIS reported that *the loading activities are anticipated to be relatively infrequent and for much of the time the compound would generate no notable noise*

emissions. In addition, Sound curtains would be installed on the chain-link fencing facing onto Station Street to minimise any noise breakout from the compound.

A door knock of the identified affected receivers has been undertaken to discuss the works and the noise and vibration impacts. The receivers generally had no objections to the works.

Table 10-30 Predicted fixed facilities noise levels and project noise trigger levels for stations fixed facilities

Station	Nearest receiver type	Nearest receiver address	Project Noise Trigger Levels (PNTL) dBA ¹	Predicted Noise Levels, dBA
St Marys	Residential	3 Station Street	36	38
Orchard Hills	Residential	Kent Road, Orchard Hills	35	18
Luddenham Road	Residential	611 Luddenham Road	35	26
Aerotropolis Core	Residential	175 Badgerys Creek Road	39	30

Notes:

Limiting PNTL for night time period adopted due to continuous nature of mechanical operations

Figure 10 Table 10-30 from Chapter 10 of EIS.

Table 51 Laydown Area model assumptions

Stage	Activity	Construction equipment	Sound Power Level - SWL (L _{aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL (L _{Aeq} ,15min dBA)	Activity SWL (L _{A1} ,1min dBA)
Model Stage 20	Materials	Hand Tools	90	5	85	100	115
	Laydown and Amenities	2t Tipper	105	5	100		115
	Compound	14t Excavator	105	5	100		115

The predicted construction noise impacts related to the use of the lay down are presented in Table 52. The Location of the receivers is presented in Figure 11. It is noted that the assessment considers works undertaken during standard hours only. OOHW when required will be assessed and mitigated in accordance with the Out of Hours Protocol.

Table 52 Noise Predictions for Selected Residential Receivers

Receiver ID	Address	Land Use / Description	RBL Day	NML Day	Noise Predictions (L _{Aeq} , 15min)
R26	3 Station Street	Residential	37	47	58

R27	1 Station Street	Residential	37	47	51
R28	1A Chesham Street	Residential	37	47	44
R29	6 Chesham Street	Residential	37	47	42

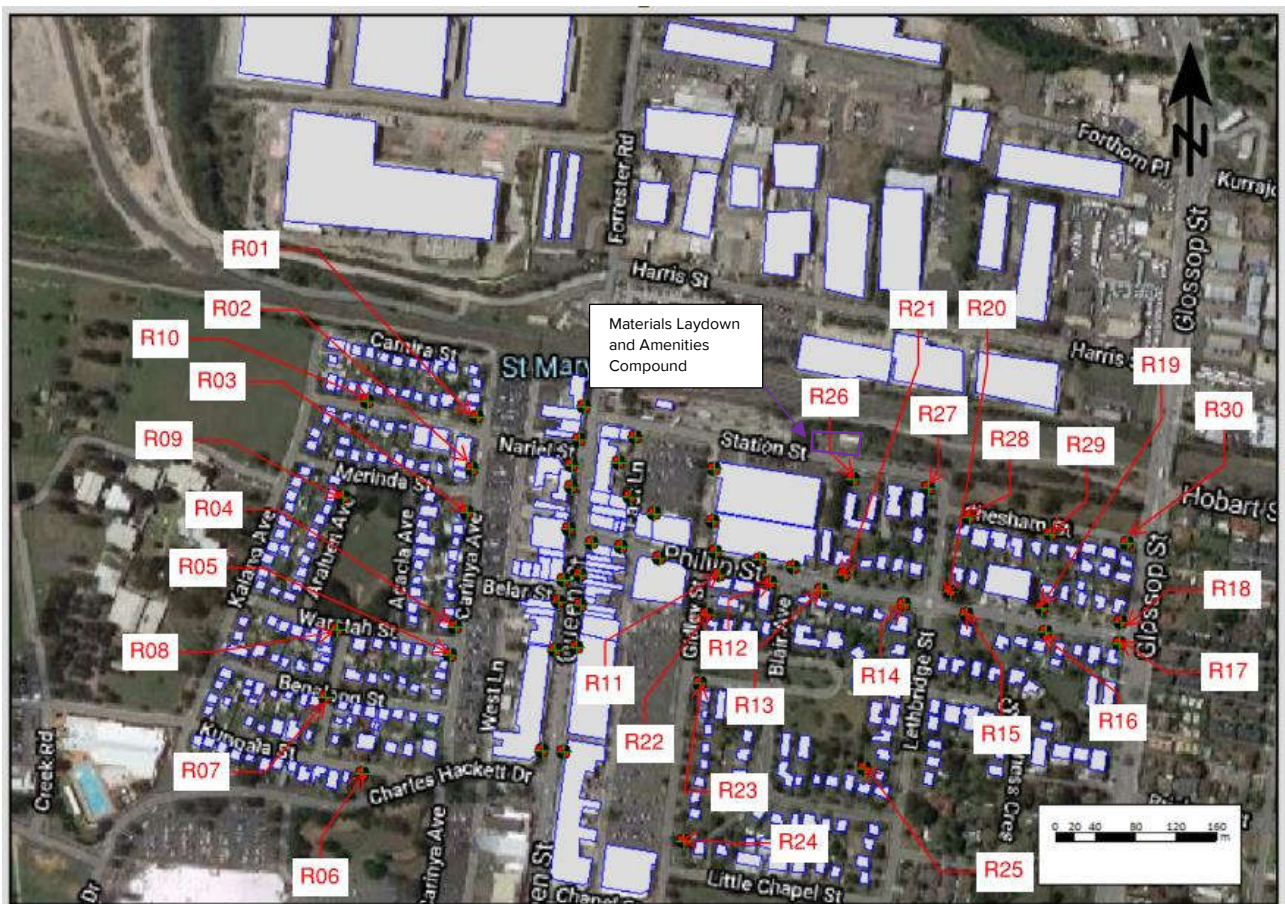


Figure 11 Representative Modelled Receiver Locations

Vibration

No vibratory works will be undertaken with the laydown area.

Traffic

The area has previously been used as a storage area for the nearby rail corridor. Subsequently, there is existing access to allow for vehicles to enter and exit. During construction, there will be minimal traffic movements, as materials are brought to the work area. The use of the area will not impact access to nearby residents or businesses.

Dust

Minimal material storage will be undertaken at the laydown area, as spoil is anticipated to be direct loaded for offsite disposal. Material stored at the lay down area, will be used to support night shift works. Any loose materials will be stabilised / wet down to prevent dust generation in accordance with the stockpile management measures in Section 12. Additionally, shade clothe will be erected on the site boundary fences to minimise dust migration.

Odour

No odour issues are anticipated related to the use of the area as a laydown facility. It is noted that the crib sheds will be connected to the existing sewer line.

Visual Impacts

The area was previously used as a storage area to support works on the rail corridor. Subsequently the visual impacts of the laydown area are not anticipated to be different to what the area was previously used for. To minimise impacts, TfNSW branded shade clothe will be erected on the Station Street façade.

No additional lighting will be used. The existing flood lights for the site will be utilised. Light spill will be managed with lights positioned to avoid spill into residents located on Station Street.

Waste Impacts

Any waste materials will be disposed of in accordance with the NSW EPA Waste Classification Guidelines (2014). It is noted that the site will be connected to the existing sewer line. Waste bins will be located within the laydown area to prevent litter.

Flooding

No additional works are being undertaken to affect the flooding risk of the laydown area.

Impacts on Biodiversity, Soil and Water and Heritage Items

The area is located within the previously assessed boundary of the EIS. The site was previously used as a storage area to support works on the rail corridor. Subsequently no additional impacts are anticipated from the use of this area as a laydown area.

No intrusive works will be undertaken at the site. Additionally the site has not been identified as having heritage potential.



APPENDIX I. DETAILED NOISE AND VIBRATION IMPACT STATEMENT



**ST MARY'S TEMPORARY BUS
INTERCHANGE EARLY WORKS
DETAILED NOISE & VIBRATION
IMPACT STATEMENT (DNVIS)**

Report 11.00323R-03

prepared for Ward Civil Engineering Pty Ltd
on 24/11/2021



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BASIS OF REPORT

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

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from ACA. ACA disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

REFERENCE	DATE	PREPARED	REVIEWED	AUTHORISED
11.00323R-01	19/09/2021	SF	MdlM	SF
11.00323R-02	07/10/2021	SF	MdlM	SF
11.00323R-03	18/11/2021	SF	MdlM	SF

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Report 11.00323R-03

1. INTRODUCTION

Acoustics Consultants Australia (ACA) has been engaged by Ward Civil & Engineering Pty Ltd (Ward) to prepare a Detailed Noise and Vibration Impact Statement (DNVIS) for the Advanced and Enabling Works (AEW) in relation to the St Marys Temporary Bus Interchange (TBI), which form part of the Sydney Metro Western Sydney Airport (SMWSA) Project (SSI 10051).

Primarily, this document has been prepared to fulfil the requirements of the Critical State Significant Infrastructure (CSSI) Approval Condition E47 that requires a DNVIS and Condition C13 that requires a Construction Noise and Vibration Monitoring Program. This DNVIS forms part of the Construction Environmental Management Plan (CEMP), or equivalent document, in accordance with the Sydney Metro Construction Environmental Management Framework (CEMF).

The included assessments have been undertaken in accordance with the provisions of the NSW Interim Construction Noise Guideline – (ICNG), the Sydney Metro – Western Sydney Airport Construction Noise & Vibration Strategy (Ver 4.2, 8 September 2020) – (CNVS) and relevant Conditions of Approval as set out in the Department of Planning, Industry and Environment's Critical State Significant Infrastructure Approval for Sydney Metro – Western Sydney Airport (SSI 10051).

The AEW – St Marys TBI scope is not subject to an Environment Protection Licence (EPL).

The AEW – St Marys TBI works are proposed to generally occur within standard construction hours, however, the planning approval allows for alternate working hours for the works that cannot be completed during standard hours, provided the works are managed appropriately.

This document details Noise Management Level (NML) exceedances and mitigation requirements for the standard hours works and the proposed out-of-hours works. The extent of works undertaken outside of standard hours would be dependent on relevant approvals and be subject to specific negotiated respite measures, as permissible under the CSSI Approval.

The main objectives of this DNVIS are to minimise unreasonable noise and vibration impacts on residents and businesses, and to avoid structural damage to buildings or heritage items as a result of construction vibration.

This DNVIS aims to support active community communication and maintain positive, cooperative relationships with local residents, businesses and building owners. The mitigation measures proposed in this DNVIS have been determined in consultation with the potentially affected members of the community.

It is noted that ongoing community engagement and management of such relationships is primarily managed via the Sydney Metro – Western Sydney Airport Community Communications Strategy.

A copy of this DNVIS must be provided to the ER before commencement of the works.

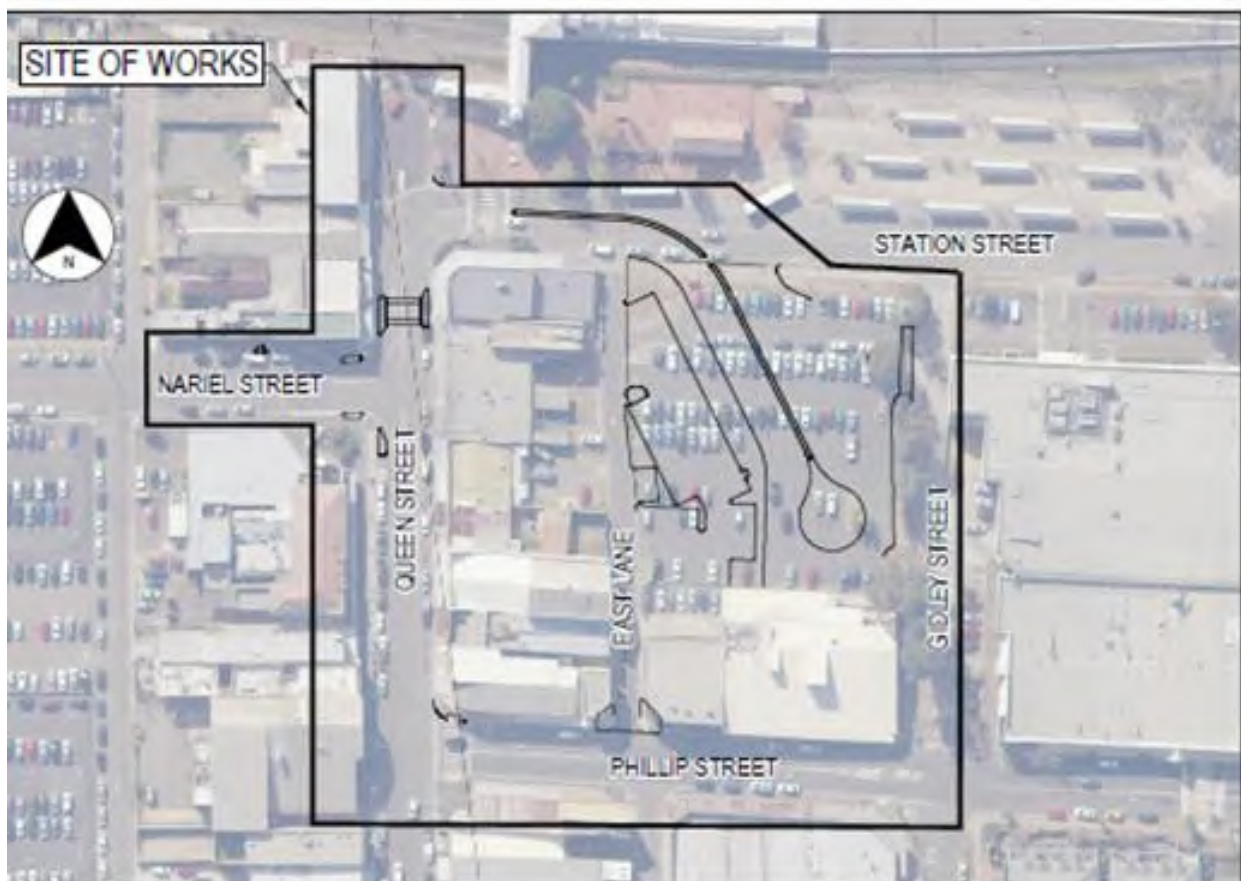
2. SITE DESCRIPTION

The primary works area is currently a council managed public car park (Station Street). The primary work area is primarily an existing hard stand area, with a grass nature strip and pedestrian path adjacent to Station Street. The car park provides limited duration public parking. The remaining work areas are located on surrounding local roads.

The site is located within the Penrith City Council LGA and is zoned B4 Mixed Use with the surrounding area a combination of R4 (high density residential), R2 (low density residential), R3 (medium density residential) and SP2 (Infrastructure Railway) immediately to the north to site.

St Marys Station is located immediately to the north on the opposite side of Station Street

Figure 2-1 St Mary's Bus Exchange Early Works – Overview



3. PROJECT DESCRIPTION

The key features of Ward's scope of works are to complete the AEW – St Marys TBI which is being constructed off Station Street within an existing car parking facility. The works will involve:

- Establishment of an ancillary facility in a vacant parcel of land off Station Street, St Marys;
- Construct the permanent and temporary pavements for the St Marys TBI;
- Mill and place asphalt overlay to the existing pavement on Station Street to match existing levels and carpark to required levels;
- Raised pedestrian crossings on Queen Street and at grade pedestrian crossing on Nariel Street and pram ramps;
- Bus stops on Phillip Street;
- Reconfiguration of existing carpark on East Lane;
- Utility relocations;
- Drainage installation;
- Install road furniture;
- Install CCTV Surveillance;
- Install wayfinding signage;
- Relocate bus shelters for customers and shades for kiss-and-ride passengers;
- Install street lighting;
- Lane resurfacing on Phillip Street/ Queen Street and Nariel Street; and
- Construction of dedicated driver facility (DDF) unit in the temporary bus interchange.

This Scope of works is depicted in **Figures 3-1** and **3-2**.

ST MARY'S TEMPORARY BUS INTERCHANGE EARLY WORKS
DETAILED NOISE & VIBRATION IMPACT STATEMENT (DNVIS)

Figure 3-1 Key Features for the St Marys TBI Works



Figure 3-2 Key features for the Nariel St Scope of Works



4. RELEVANT CONDITIONS OF APPROVAL

The Sydney Metro Western Sydney Airport Approval includes several Conditions that relate to noise and vibration. These Conditions are interrelated with the requirements of the DNVIS and accordingly have been considered by this assessment.

The specific requirements of the DNVIS are set out under Condition E47, as follows:

E47 - Detailed Noise and Vibration Impact Statements (DNVIS) must be prepared for any work that may exceed the NMLs, vibration criteria and / or ground-borne noise levels specified in Conditions E43 and E44 at any residence outside construction hours identified in Condition E38, or where receivers will be highly noise affected or subject to vibration levels above those otherwise determined as appropriate by a suitably qualified structural engineer under Condition E87. The DNVIS must include specific mitigation measures identified through consultation with affected sensitive land user(s) and the mitigation measures must be implemented for the duration of the works. A copy of the DNVIS must be provided to the ER before the commencement of the associated works. The Planning Secretary and the EPA may request a copy (ies) of the DNVIS.

Table 4-1 summarises the DNVIS requirements set out in the CNVS and **Table 4-2** summarises the various noise and vibration Approval Conditions and where reference to these is made by this DNVIS.

Table 4-1 DNVIS Requirements per CNVS

DNVIS Requirements	Where Addressed
Identify all Noise and Vibration Sensitive Receivers (NSRs) which may be affected by the project.	Section 6
Conduct background noise monitoring at representative NSRs to determine the rating background noise levels (RBLs) in accordance with the procedures presented in the EPA's Noise Policy for Industry, where RBLs have not been established in previous project stages.	Section 7
Determine the appropriate noise and vibration management levels of each NSR.	Section 8 / 9
Determine the source noise levels (Sound Power Levels) of each noise generating plant and equipment item required to undertake the construction scenario. Note: Sound Power Levels for each plant and equipment would be less than the maximum allowable levels found in Table 13 and Table 14.	Section 8
Clearly indicate which mitigation measures identified in Section 4 have been/are to be incorporated into the noise assessment. Noise mitigation measures to be implemented will vary for reasons such as safety and space constraints, these are to be identified and the calculations adjusted accordingly.	Section 8

DNVIS Requirements	Where Addressed
<i>For location specific construction scenarios and where applicable for generic scenarios, include the effects of noise shielding provided by site offices, residential fences, noise barriers or natural topographic features.</i>	Section 8
<i>Where applicable include the effects of noise reflections and ground attenuation.</i>	Section 8
<i>Calculate the LAeq noise or range of levels from construction scenarios at sensitive receiver groups, with the use of noise contour maps where appropriate and/or at 10 m, 25 m, 50 m, 75 m, 100 m and 200 m for more general construction activities.</i>	Section 8 Appendix D Appendix E
<i>Compare these against the goals identified for each NSR and identify predicted exceedances.</i>	Appendix D
<i>For night-time activities, calculate exceedances over the:</i> <ul style="list-style-type: none"> <i>o LAeq, 15min 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and</i> <i>o LAFmax 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater.</i> <i>Where exceedances are predicted to occur, undertake a detailed maximum noise level event assessment in accordance with the Noise Policy for Industry (EPA, 2017).</i>	Appendix D
<i>On completion of all DNVIS reports for the subjective classification of the noise impact is to be evaluated and documented as:</i> <ul style="list-style-type: none"> <i>o Low Impact</i> <i>o Moderate Impact</i> <i>o High Impact</i> 	Section 11
<i>As a result of noise classification and/or the noise level exceedances at sensitive receivers provided by the DNVIS reports, appropriate reasonable and feasible noise mitigation is to be adopted and implemented. For sites where works are predicted to significantly exceed noise goals and impact on receivers for a significant period of time, additional reasonable and feasible noise mitigation measures such as those outlined in Section 5 would be considered if practical to reduce the noise levels and impact on sensitive receivers.</i>	Section 11 Appendix D

Table 4-2 Approval Conditions Relating to Noise and Vibration

Approval Conditions	Where Addressed
<p>E37 - Land Use Survey</p> <p><i>A detailed land use survey must be undertaken to confirm sensitive land use(s) (including critical working areas such as operating theatres and precision laboratories) potentially exposed to construction noise and vibration and construction ground-borne noise. The survey may be undertaken on a progressive basis but must be undertaken in any one area before the commencement of work which generates construction noise, vibration or ground-borne noise in that area. The results of the survey must be included in the Detailed Noise and Vibration Impact Statements required under Condition E47.</i></p>	Section 6
<p>E38 - Construction Hours</p> <p><i>Work must only be undertaken during the following hours:</i></p> <p>(a) 7:00am to 6:00pm Mondays to Fridays, inclusive;</p> <p>(b) 8:00am to 1:00pm Saturdays; and</p> <p>(c) at no time on Sundays or public holidays.</p>	Section 5
<p>E39 - Highly Noise Intensive Work</p> <p><i>Except as permitted by an EPL or approved in accordance with the Out-of-Hours Works Protocol required by Condition E42, highly noise intensive work that result in an exceedance of the applicable NML at the same receiver must only be undertaken:</i></p> <p>(a) between the hours of 8:00 am to 6:00 pm Monday to Friday;</p> <p>(b) between the hours of 8:00 am to 1:00 pm Saturday; and</p> <p>(c) if continuously, then not exceeding three (3) hours, with a minimum cessation of work of not less than one (1) hour.</p> <p><i>For the purposes of this condition, 'continuously' includes any period during which there is less than one (1) hour between ceasing and recommencing any of the work.</i></p>	Section 8

Approval Conditions	Where Addressed
<p>E41- Variation to Work Hours</p> <p><i>Notwithstanding Conditions E38 and E39 work may be undertaken outside the hours specified in the following circumstances:</i></p> <p><i>(a) Safety and Emergencies, including:</i></p> <p><i>(i) for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or</i></p> <p><i>(ii) 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</i></p> <p><i>(b) Low impact, including:</i></p> <p><i>(i) construction that causes LAeq(15 minute) noise levels:</i></p> <ul style="list-style-type: none"> <i>• no more than 5 dB(A) above the rating background level at any residence in accordance with the ICNG, and</i> <i>• no more than the 'Noise affected' NMLs specified in Table 3 of the ICNG at other sensitive land user(s); and</i> <p><i>(ii) construction that causes:</i></p> <ul style="list-style-type: none"> <i>• continuous or impulsive vibration values, measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.2 of Assessing Vibration: a technical guideline (DEC, 2006), or</i> <i>• intermittent vibration values measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.4 of Assessing Vibration: a technical guideline (DEC, 2006); or</i> <p><i>(c) By Approval, including:</i></p> <p><i>(i) where different construction hours are permitted or required under an EPL in force in respect of the CSSI; or</i></p> <p><i>(ii) works which are not subject to an EPL that are approved under an Out-of-Hours Work Protocol as required by Condition E42; or</i></p> <p><i>(iii) negotiated agreements with directly affected residents and sensitive land user(s);</i></p>	<p>Section 5</p>

Approval Conditions	Where Addressed
<p>E42 - Out-of-Hours Work Protocol – Work not subject to an EPL</p> <p><i>An Out-of-Hours Work Protocol must be prepared to identify a process for the consideration, management and approval of work (not subject to an EPL) that is outside the hours defined in Conditions E38 and E39. The Protocol must be approved by the Planning Secretary before commencement of the out-of-hours work. The Protocol must be prepared in consultation with the ER. The Protocol must provide:</i></p> <ul style="list-style-type: none"> <i>(a) justification for why out-of-hours work need to occur;</i> <i>(b) identification of low and high-risk activities and an approval process that considers the risk of activities, proposed mitigation, management, and coordination, including where:</i> <ul style="list-style-type: none"> <i>(i) the ER reviews all proposed out-of-hours activities and confirms their risk levels;</i> <i>(ii) low risk activities that can be approved by the ER; and</i> <i>(iii) high risk activities that are approved by the Planning Secretary;</i> <i>(c) a process for the consideration of out-of-hours work against the relevant NML and vibration criteria;</i> <i>(d) a process for selecting and implementing mitigation measures for residual impacts in consultation with the community at each affected location, including respite periods consistent with the requirements of Condition E56. The measures must take into account the predicted noise levels and the likely frequency and duration of the out-of-hours works that sensitive land user(s) would be exposed to, including the number of noise awakening events;</i> <i>(e) procedures to facilitate the coordination of out-of-hours work including those approved by an EPL or undertaken by a third party, to ensure appropriate respite is provided; and</i> <i>(f) notification arrangements for affected receivers for all approved out-of-hours works and notification to the Planning Secretary of approved low risk out-of-hours works.</i> <p><i>This condition does not apply if the requirements of Condition E41 are met.</i></p> <p><i>Note: Out-of-hours work is any work that occurs outside the construction hours identified in Condition E38 and E39.</i></p>	<p>Section 5 Section 8</p>

Approval Conditions	Where Addressed
<p>E43 - Construction Noise Management Levels and Vibration Criteria</p> <p>Mitigation measures must be implemented with the aim of achieving the following construction noise management levels and vibration criteria:</p> <p>(a) construction 'Noise affected' noise management levels established using the Interim Construction Noise Guideline (DECC, 2009);</p> <p>(b) preferred vibration criteria established using the Assessing vibration: a technical guideline (DEC, 2006) (for human exposure);</p> <p>(c) Australian Standard AS 2187.2 - 2006 "Explosives - Storage and Use - Use of Explosives" (for human exposure);</p> <p>(d) BS 7385 Part 2-1993 "Evaluation and measurement for vibration in buildings Part 2" as they are "applicable to Australian conditions"; and</p> <p>(e) the vibration limits set out in the German Standard DIN 4150-3: Structural Vibration-effects of vibration on structures (for structural damage).</p> <p>Any work identified as exceeding the noise management levels and / or vibration criteria must be managed in accordance with the Noise and Vibration CEMP Sub-plan.</p> <p>Note that in accordance with the Sydney Metro Staging Plan, a noise and vibration sub-plan is not required for this scope of works. Noise and vibration impacts will be managed under the Project CEMP and relevant management procedures.</p> <p>Note: The ICNG identifies 'particularly annoying' activities that require the addition of 5 dB(A) to the predicted level before comparing to the construction Noise Management Level.</p>	<p>Section 8</p>
<p>E44 - All reasonable and feasible mitigation measures must be applied when the following residential ground-borne noise levels are exceeded:</p> <p>(a) evening (6:00 pm to 10:00 pm) — internal LAeq(15 minute): 40 dB(A); and</p> <p>(b) night (10:00 pm to 7:00 am) — internal LAeq(15 minute): 35 dB(A).</p> <p>The mitigation measures must be outlined in the Noise and Vibration CEMP Sub-plan, including in any Out-of-Hours Work Protocol, required by Condition E42.</p>	<p>Section 9 Section 11</p>

Approval Conditions	Where Addressed
<p>E45 - Noise generating work in the vicinity of potentially-affected community, religious, educational institutions and noise and vibration-sensitive businesses and critical working areas (such as theatres, laboratories and operating theatres) resulting in noise levels above the NMLs must not be timetabled within sensitive periods, unless other reasonable arrangements with the affected institutions are made at no cost to the affected institution.</p>	<p>Section 6 Section 8</p>
<p>E46 - Construction Noise and Vibration Mitigation and Management Industry best practice construction methods must be implemented where reasonably practicable to ensure that noise and vibration levels are minimised around sensitive land use(s). Practices may include, but are not limited to:</p> <ul style="list-style-type: none"> (a) use of regularly serviced low sound power equipment; (b) at source control, temporary noise barriers (including the arrangement of plant and equipment) around noisy equipment and activities such as rock hammering and concrete cutting; (c) use of non-tonal reversing alarms; and (d) use of alternative construction and demolition techniques. 	<p>Section 11</p>
<p>E47 - Detailed Noise and Vibration Impact Statements (DNVIS) must be prepared for any work that may exceed the NMLs, vibration criteria and / or ground-borne noise levels specified in Conditions E43 and E44 at any residence outside construction hours identified in Condition E38, or where receivers will be highly noise affected or subject to vibration levels above those otherwise determined as appropriate by a suitably qualified structural engineer under Condition E87. The DNVIS must include specific mitigation measures identified through consultation with affected sensitive land user(s) and the mitigation measures must be implemented for the duration of the works. A copy of the DNVIS must be provided to the ER before the commencement of the associated works. The Planning Secretary and the EPA may request a copy (ies) of the DNVIS.</p>	<p>Throughout</p>
<p>E48 - Owners and occupiers of properties at risk of exceeding the screening criteria for cosmetic damage must be notified before works that generate vibration commences in the vicinity of those properties. If the potential exceedance is to occur more than once or extend over a period of 24 hours, owners and occupiers must be provided a schedule of potential exceedances on a monthly basis for the duration of the potential exceedances, unless otherwise agreed by the owner and occupier. These properties must be identified and considered in the Noise and Vibration CEMP Sub-plan</p>	<p>Section 9</p>

Approval Conditions	Where Addressed
<p>E49 - Where sensitive land use(s) are identified in Appendix B as exceeding the highly noise affected criteria during typical case construction, mitigation measures must be implemented with the objective of reducing typical case construction noise below the highly noise affected criteria at each relevant sensitive landuse(s). Activities that would exceed highly noise affected criteria during typical case construction must not commence until the measures identified in this condition have been implemented, unless otherwise agreed with the Planning Secretary.</p> <p>Note: Mitigation measures may include path barrier controls such as acoustic sheds and/or noise walls, at-property treatment, or a combination of path and at-property treatment.</p>	Section 8
<p>E50 - For all construction sites where acoustic sheds are installed, the sheds must be designed, constructed and operated to minimise noise emissions. This would include the following considerations:</p> <p>(a) all significant noise producing equipment that would be used during the night-time would be inside the sheds, where feasible and reasonable;</p> <p>(b) noise generating ventilation systems such as compressors, scrubbers, etc, would be located inside the sheds and external air intake/discharge ports would be appropriately acoustically treated; and</p> <p>(c) the doors of acoustic sheds would be kept closed during the night-time period. Where night-time vehicle access is required at sites with nearby residences, the shed entrances would be designed and constructed to minimise noise breakout.</p>	n/a
<p>E51 - Where Condition E49 determines that at-property treatment (temporary or permanent) is the appropriate measure to reduce noise impacts, this at-property treatment must be offered to landowners of residential properties for habitable living spaces, unless other mitigation or management measures are agreed to by the landowner.</p> <p>Landowners must be advised of the range of options that can be installed at or in their property and given a choice as to which of these they agree to have installed.</p> <p>A copy of all guidelines and procedures that will be used to determine at-property treatment at their residence must be provided to the landowner.</p>	n/a
<p>E52 - Any offer for at-property treatment or the application of other noise mitigation measures in accordance with Condition E51, does not expire until the noise impacts specified in Condition E49, affecting that property are completed, even if the landowner initially refuses the offer.</p> <p>Note: If an offer has been made but is not accepted, this does not preclude the commencement of construction under Condition E49.</p>	n/a

Approval Conditions	Where Addressed
<p>E53 - <i>The implementation of at-property treatment does not preclude the application of other noise and vibration mitigation and management measures including temporary and long-term accommodation.</i></p>	Section 8
<p>E54 - Construction Vibration Mitigation – Heritage Items</p> <p><i>Vibration testing must be conducted during vibration generating activities that have the potential to impact on Heritage items to verify minimum working distances to prevent cosmetic damage. In the event that the vibration testing and attended monitoring shows that the preferred values for vibration are likely to be exceeded, the Proponent must review the construction methodology and, if necessary, implement additional mitigation measures. Such measures must include, but not be limited to, review or modification of excavation techniques.</i></p>	Section 9
<p>E55 - <i>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 items.</i></p>	Section 9
<p>E56 - Utility Coordination and Respite</p> <p><i>All 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:</i></p> <ul style="list-style-type: none"> <i>(a) reschedule any work to provide respite to impacted noise sensitive land use(s) so that the respite is achieved in accordance with Condition E57; or</i> <i>(b) consider the provision of alternative respite or mitigation to impacted noise sensitive land use(s); and</i> <i>(c) provide documentary evidence to the ER in support of any decision made by the Proponent in relation to respite or mitigation.</i> <p><i>The consideration of respite must also include all other approved Critical SSI, SSI and SSD projects which may cause cumulative and / or consecutive impacts at receivers affected by the delivery of the CSSI.</i></p> 	Section 8

Approval Conditions	Where Addressed
<p>E57 – Out-of-Hours Works – Community Consultation on Respite</p> <p><i>In order to undertake out-of-hours work outside the work hours specified under Condition E38, appropriate respite periods for the out-of-hours work must be identified 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:</i></p> <ul style="list-style-type: none"> <i>(a) a progressive schedule for periods no less than three (3) months, of likely out-of-hours work;</i> <i>(b) a description of the potential work, location and duration of the out-of-hours work;</i> <i>(c) the noise characteristics and likely noise levels of the work; and</i> <i>(d) likely mitigation and management measures which aim to achieve the relevant NMLs under Condition E43 (including the circumstances of when respite or relocation offers will be available and details about how the affected community can access these offers).</i> <p><i>The outcomes of the community consultation, the identified respite periods and the scheduling of the likely out-of-hour work must be provided to the ER, EPA and the Planning Secretary prior to the out-of-hours work commencing.</i></p> <p><i>Note: Respite periods can be any combination of days or hours where out-of-hours work would not be more than 5 dB(A) above the RBL at any residence.</i></p>	<p>Section 8</p>

5. DESCRIPTION OF PROPOSED CONSTRUCTION WORKS

The St Marys Bus Interchange Enabling Works Project involves predominantly standard hours works within the carpark. Additionally, some works within standard hours and out of hours periods on some road intersections surrounding the car park will be required. The works outside of standard hours are required to be undertaken at these times to limit any conflicts with traffic on the road network.

Staging Plans provided by Ward outlining the works are included in **Appendix B**. These form the basis of this assessment.

5.1. Proposed Works Schedule

The staging plans identify numerous sub-stages. For the purposes of assessment, construction noise predictions have been undertaken for 19 key sub-stages. A summary of the works to be undertaken and the representative 19 key sub-stages considered by this assessment are set out in **Table 8-5**.

5.2. Proposed Construction Hours

Works would predominantly be completed within standard hours, with some extensions as permissible under the CSSI Approval.

The construction hours for the Project are defined by the CSSI planning approval. The standard construction hours of work are defined by Condition E38, consistent with the CNVS, are:

- (a) 7:00am to 6:00pm Mondays to Fridays, inclusive;
- (b) 8:00am to 1:00pm Saturdays; and
- (c) at no time on Sundays or public holidays.

5.3. Out of Hours Works

The CNVS notes the nature of infrastructure projects means evening and night works are likely to be required throughout construction due to various considerations including avoiding sensitive periods for sensitive receivers, delivery of oversized plant or structures, emergency works, or other activities that require the temporary closure of roads.

All out of hours works (except in emergency situations) will be managed under the Sydney Metro Out of Hours Works Protocol as required under CSSI Condition E42, which applies to out of hours work not subject to an EPL. Note that this Protocol was still in development during the development of this DNVIS.

Where works are proposed to be undertaken outside of the standard hours, specific respites and management measures for those works have been considered in consultation with the community as required.

In accordance with the Sydney Metro Out of Hours Work Protocol, an out of hours application will be submitted to Sydney Metro, and independent Environmental Representative for relevant endorsements and approval when out of hours works are planned.

The Community Communication Strategy will also support Ward's application for commencing out of hours work. It will detail how the community will be notified in advance of planned activities, kept informed of works progress and how potential noise impacts will be managed.

6. SENSITIVE RECEIVERS

In accordance with Condition E37, Ward has undertaken a land use survey of the area surrounding the works. The land use survey was undertaken on 7 September 2021. This survey was undertaken to inform this DNVIS. This has identified a mix of commercial and residential uses in the immediate areas surrounding the works areas. No critical working areas such as operating theatres and precision laboratories have been identified.

Figure 6-1 shows the representative residential receivers surrounding the works areas considered by this assessment and **Figure 6-2** shows the representative non-residential (commercial) receivers surrounding the works areas. Receiver addresses are summarised in **Appendix D**.

Figure 6-1 Representative Residential Receivers Surrounding the Works



Figure 6-2 Representative Non-Residential Receivers Surrounding the Works



Note: Receiver C10 is the St Mary's Hotel which includes a residential component on the first floor. For the purposes of assessment, the first floor has been considered a residential use. Receiver C26 is a Childcare Centre located within the Station Plaza building – this has a semi-enclosed play area to the east of the building.

7. EXISTING NOISE ENVIRONMENT

The noise and vibration assessment undertaken as part of the Sydney Metro - Western Sydney Airport Environmental Impact Statement (EIS) is documented in the EIS Technical Paper 2 (*Sydney Metro - Western Sydney Airport Technical Paper 2: Noise and Vibration*).

The EIS study defined Noise Catchment Areas (NCAs) for the wider project. The sensitive receivers potentially affected by the St May's Bus Exchange Early Works are located with NCA3.

Table 7-1 sets out the existing ambient and background noise levels considered by this assessment. The levels for the Day, Evening and Night periods are consistent with the survey results identified by the EIS.

Table 7-1 Summary of NCA3 Unattended Noise Monitoring Results – Determined by EIS

Location	Rating Background Level - RBL (L_{A90} dBA)			Ambient Noise Level (L_{Aeq} dBA)		
	Day	Evening	Night	Day	Evening	Night
NM02	37	37	36	55	59	51

Time periods defined as follows – Day: 7.00am to 6.00pm Monday to Saturday, 8.00am to 6.00pm Sunday; Evening: 6.00pm to 10.00pm; and Night: 10.00pm to 7.00am Monday to Saturday, 10.00pm to 8.00am Sunday.

Consistent with the EIS study, the Rating Background Noise Levels (RBLs) shown have been considered in determining the construction noise criteria, as discussed in **Section 8**.

8. AIRBORNE CONSTRUCTION NOISE

8.1. Airborne Construction Noise Criteria

8.1.1. NSW Interim Construction Noise Guideline (ICNG)

The CNVS notes that Construction Noise Management Levels (NMLs) for all Sydney Metro projects should be determined in accordance with the procedures nominated in the DECCW's "*Interim Construction Noise Guideline*" dated July 2009 (ICNG).

The noise criteria set out in the ICNG have been considered in the assessment of potential impacts from the project works. **Table 8-1** summarises the construction noise criteria recommended by the ICNG for residential receivers and **Table 8-2** summarises the criteria for non-residential receivers. **Table 8 2** additionally includes the construction noise criteria for relevant special use receivers (other sensitive land uses) not identified by the ICNG.

Table 8-1 ICNG Airborne Construction Noise Criteria – Noise at Residences¹

Time of Day	Management Level $L_{Aeq,15min}$	How to Apply
Recommended Standard Hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or Public Holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq,15min}$ is greater than the noise affected level, the proponent would apply all feasible and reasonable work practices to minimise noise. The proponent would also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the proponent would consider very carefully if there is any other feasible and reasonable way to reduce noise to below this level. If no quieter work method is feasible and reasonable, and the works proceed, the proponent would communicate with the impacted residents by clearly explaining the duration and noise level of the works, and by describing any respite periods that will be provided.
Outside recommended standard hours	Noise affected RBL + 5 dB	A strong justification would typically be required for works outside the recommended standard hours. The proponent would apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dBA above the noise affected level, the proponent would negotiate with the community. For guidance on negotiating agreements see Section 7.2.2 of the ICNG
Note 1:	Adopted from the ICNG.	
Note 2:	Noise levels apply at the property boundary that is most exposed to construction noise (or receiver building façade that is most exposed to construction noise, noting that noise levels may be higher at upper floors of the noise affected receiver buildings). 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 8-2 ICNG Airborne Construction Noise Criteria – Other Sensitive Land Uses

Land Use	Management Level $L_{Aeq, 15min}$ (applies when properties are being used)	Reference
Classrooms at schools and other educational	Internal noise level: 45 dBA ¹	ICNG ⁵
Hospital wards and operating theatres	Internal noise level: 45 dBA ²	ICNG ⁵
Places of worship	Internal noise level: 45 dBA ³	ICNG ⁵
Active recreation areas	External noise level: 65 dBA	ICNG ⁵
Passive recreation areas	External noise level: 60 dBA	ICNG ⁵
Commercial premises (offices, etc)	External noise level: 70 dBA	ICNG ⁵
Industrial premises	External noise level: 75 dBA	ICNG ⁵
Childcare Centres (Sleeping areas)	Internal noise level: 35 dBA ⁴	AAAC ⁶
Childcare Centres (External areas)	Internal noise level: 55 dBA ⁴	AAAC ⁶

Notes: 1, 2, 3: External Noise Management Levels (NML) of $L_{Aeq, 15min}$ 55 dBA are considered by this assessment, assuming 10dB attenuation achieved by façades with open window(s);

4: Based on visual inspection of the childcare centre on Station Street, external Noise Management Levels (NML) of $L_{Aeq, 15min}$ 60 dBA are considered by this assessment, assuming 25 dB attenuation achieved by the building elements with closed/fixed window(s) for the indoor sleeping areas and 5 dB attenuation for the external play area;

5: Management Levels specified by Interim Construction Noise Guideline;

6: Management Level based on Australian Acoustical Consultants (AAAC) Technical Guideline on Child Care Centre Noise Assessments.

With consideration to the out of hours periods identified by the Sydney Metro Construction Noise and Vibration Standard, the resultant project specific NMLs set are out in **Table 8-3**.

Table 8-3 Airborne Noise Management Levels (External Levels)

Location	Standard Hours (Day)		OOHW (Day)		OOHW (Evening)		OOHW (Night)	
	RBL	NML	RBL	NML	RBL	NML	RBL	NML
Residential	37	47	37	42	37	42	36	41
School (Classrooms)	n/a	55	n/a	55	n/a	55	n/a	55
Commercial (Offices)	n/a	70	n/a	70	n/a	70	n/a	70
Childcare Centre (External Play Areas)	n/a	60	n/a	60	n/a	60	n/a	60
Childcare Centre (External to Sleeping Areas)	n/a	60	n/a	60	n/a	60	n/a	60

Notes: RBL - Rating Background Noise Level; NML - Noise Management Level; Non-residential criteria only apply when receiver building is in use. Noise levels apply at the property boundary that is most exposed to construction noise (or receiver building façade 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. It is anticipated that the recommended internal noise levels would be readily achieved at the Station Street childcare centre if the identified external levels are achieved.

8.1.2. Sydney Metro Construction Noise & Vibration Standard (CNVS)

In addition to the ICNG, the noise criteria set out in the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (CNVS) have been considered.

The CNVS recognises that works requiring the use of heavy machinery can generate high noise and vibration levels and in urban areas there is often limited setback distance between these noise sources and nearby buildings and receivers. Under such circumstances, typically there is limited opportunity to practicably mitigate the noise and vibration effects in a cost-effective manner. Therefore, potential disturbance impacts are usually minimised as much as practicable through management techniques. For residential receivers, depending on how far the predicted airborne construction noise level is above RBL, the CNVS recommends the adoption of the management measures set out in **Table 8-4**. Full definitions of the identified management measures are set out in the CNVS.

Table 8-4 Additional Airborne Noise Management Measures (Residential)

Time Period		Mitigation Measures			
		Predicted $L_{Aeq,15min}$ Noise Level Above NML			
		0 to 10 dB	10 to 20 dB	20 to 30 dB	> 30 dB
Standard Hours	Mon-Fri (7.00am - 6.00pm)	LB	LB, M	LB, M, SN	LB, M, SN
	Sat (8.00am - 1.00pm)				
	Sun/Pub Hol (Nil)				
OOH (Evening)	Mon-Fri (6.00pm - 10.00pm)	LB, M	LB, M, SN	LB, M, SN, RO	LB, M, SN, IB, PC, RO, SN
	Sat (1.00pm - 10.00pm)				
	Sun/Pub Hol (8.00am - 6.00pm)				
OOH (Night)	Mon-Fri (10.00pm - 7.00am)	LB, M	LB, M, SN, RO	LB, M, SN, IB, PC, RO, AA	LB, M, SN, IB, PC, RO, SN, AA
	Sat (10.00pm - 8.00am)				
	Sun/Pub Hol (6.00pm - 7.00am)				

Notes: AA – Alternative Accommodation; M – Monitoring; IB – Individual Briefings; LB – Letterbox drops; RO – Project Specific Respite Offer; PC – Phone Calls and emails; SN – Specific Notifications. Full definitions of these Additional Mitigation Measures are set out in Table 15 of the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (Ver 4.2, 08/09/2020).

8.1.3. Highly Noise Intensive Work

Condition E39 requires the following regarding highly noise intensive work:

Except as permitted by an EPL or approved in accordance with the Out-of-Hours Works Protocol required by Condition E42, highly noise intensive work that result in an exceedance of the applicable NML at the same receiver must only be undertaken:

- (a) between the hours of 8:00 am to 6:00 pm Monday to Friday;
- (b) between the hours of 8:00 am to 1:00 pm Saturday; and
- (c) if continuously, then not exceeding three (3) hours, with a minimum cessation of work of not less than one (1) hour.

For the purposes of this condition, 'continuously' includes any period during which there is less than one (1) hour between ceasing and recommencing any of the work.

8.1.4. Sleep Disturbance at Residences

Section 4.3 of the ICNG provides the following with respect to sleep disturbance at residences:

Where construction works are planned to extend over more than two consecutive nights, and a quantitative assessment method is used, the analysis should cover the maximum noise level, and the extent and the number of times that the maximum noise level exceeds the RBL. Some guidance indicating the potential for sleep disturbance is in the NSW Environmental Criteria for Road Traffic Noise (EPA 1999) (ECRTN).

Section 2.9 of the CNVS sets out the Sydney Metro sleep disturbance and maximum noise event requirements, as follows:

Maximum noise level events from construction activities during the night-time period can trigger both awakenings and disturbance to sleep stages. The approach to managing events that cause sleep disturbance shall be consistent with the Noise Policy for Industry (EPA, 2017). Where night-time noise levels at a residential location exceed the:

- *$L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, or the*
- *L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,*

a detailed maximum noise level event assessment is to be undertaken.

The detailed assessment will cover the maximum noise level, the extent to which the maximum noise level exceeds the RBL, and the number of times this happens during the night-time period.

Maximum noise level event assessments should be based on the L_{AFmax} descriptor on an event basis under 'fast' time response. The detailed assessment will consider all feasible and reasonable noise mitigation measures with a goal of achieving the above trigger levels for night-time activities.

ACA notes that the EPA has conducted an independent and comprehensive review of the most recent research on sleep disturbance and maximum noise levels and a synopsis of this research is included in the *NSW Road Noise Policy (RNP)* and previously in the ECRTN. The EPA concluded that from the research on sleep disturbance to date:

- *Maximum internal noise levels below 50-55dBA are unlikely to awaken people from sleep;*
- *One or two noise events per night with maximum internal noise levels of 65-70dBA are not likely to affect health and wellbeing significantly.*

The 55 dBA maximum noise level may be considered to be equivalent to an external maximum noise level of 65 dBA, considering the 10 dB attenuation typically achieved through partially open windows.

Based on the above, this DNVIS considers the external screening level of L_{AFmax} 52 dBA in accordance with the CNVS and additionally considers the external noise criterion of L_{AFmax} 65 dBA referenced by the RNP.

8.2. Airborne Construction Noise Assessment

At any particular location, the potential impacts can vary greatly depending on factors such as the relative proximity of sensitive receivers, the overall duration of the construction works, the intensity of the works, the time at which the construction works are undertaken and the character of the emissions.

8.2.1. Construction Stages

Assessment of airborne noise impacts from the construction activities have been determined by modelling the noise sources, receiver locations, topographical features and buildings.

Key details regarding the construction site layouts, the likely plant and equipment and hours of operation were informed by the Design and Construction Teams. This information is presented in **Appendix B** and forms the basis for all modelling assumptions used in this assessment.

Table 8-5 provides a summary of the works to be undertaken and the timeframes at which the works would occur. As shown in **Table 8-5** predominantly the main car park area works would be undertaken during standard hours, with the one exception being potholing that would also be undertaken out-of-hours. It is anticipated that the out-of-hours component of this activity would be completed within two to three night-shifts.

The external works on Nariel, Queen, Phillip and Station Streets would need to be undertaken during the night-time period, however, each of the identified external work sub-stages would be completed within one or two night-shifts and therefore any noise and vibration effects arising from these activities would not be prolonged.

Table 8-5 Key Works Stages and Timeframes

Model ID	Stage	Activity	Standard Hours	Out-of-Hours Day	Out-of-Hours Evening	Out-of-Hours Night
Main Car Park Area Works						
01	SE – Site Establishment	Setup Environmental Controls/Tree Protection Install ATF Fencing	Yes	No	No	No
02	1A	Potholing	Yes	Yes	Yes	Yes
03	1A	Demo Car Park - Removal of asphalt and curb removal	Yes	No	No	No

ST MARY'S TEMPORARY BUS INTERCHANGE EARLY WORKS
DETAILED NOISE & VIBRATION IMPACT STATEMENT (DNVIS)

Model ID	Stage	Activity	Standard Hours	Out-of-Hours Day	Out-of-Hours Evening	Out-of-Hours Night
04	1B	Pavement Box Out	Yes	No	No	No
05	1B	Pavement Box Out Service Installation - Stormwater	Yes	No	No	No
-	1B	Pavement Box Out Service Installation - Electrical Services	Yes	No	No	No
06	2A	Sub base installation Pavement works	Yes	No	No	No
-	2A	Kerb Construction	Yes	No	No	No
-	2B	Pavement Final Trim	Yes	No	No	No
-	2B	Landscape Prep Works	Yes	No	No	No
-	2B	AC Prep Works	Yes	No	No	No
-	2B	Driver Facility Installation	Yes	No	No	No
-	2B	Bus Shelter Installation	Yes	No	No	No
07	2B	Asphalt Works - Mill and Correct in Car Park	Yes	No	No	No
08	3	Stamped Asphalt	Yes	No	No	No
-	3A	Line Marking	Yes	No	No	No
-	3A	Signage Installation	Yes	No	No	No
External Works						
-	1A - Nariel and Queen St	Set up ATF Fencing/Satellite Site Compounds	No	No	No	Yes
09	1A - Nariel and Queen St	Potholing	No	No	No	Yes
10	1A - Nariel and Queen St	Remove Parking Lanes	No	No	No	Yes
11	1A - Nariel and Queen St	Kerb Demolition	No	No	No	Yes

Model ID	Stage	Activity	Standard Hours	Out-of-Hours Day	Out-of-Hours Evening	Out-of-Hours Night
12	1A - Nariel and Queen St	Kerb/Pram Ramp Construction	No	No	No	Yes
13	1A - Nariel and Queen St	Raised Crossing Construction	No	No	No	Yes
14	1A - Nariel and Queen St	Tree Removal	No	No	No	Yes
15	1B - Nariel and Phillip St	Excavate/Box out and Re-instate Footpath Corners	No	No	No	Yes
15	1B - Nariel and Phillip St	Asphalt Works to Corners	No	No	No	Yes
16	2A - Nariel and Phillip St	Line Marking	No	No	No	Yes
17	2C - Nariel and Phillip St	Service Installation - Electrical Services	Yes	No	No	No
18	2C - Nariel and Phillip St	Asphalt Works	Yes	No	No	No
19	3 - Main Car Park and Station St	Main Compound- F Type Barrier Installation, Median on Station St & Stamped Asphalt along East Lane & Main Car Park	Yes	No	No	Yes

8.2.2. Construction Equipment

For the purposes of this assessment, the construction equipment and sound power levels set out in **Appendix C** have been considered across the identified works areas as shown in the Staging Plans provided in **Appendix B** and as summarised in **Table 8-5**. The sound power levels in **Appendix C** have been determined by measurements undertaken by ACA on other similar projects, or have been adopted from other similar CSSI projects. A summary of the construction plant sound power levels is provided in **Table 8-6**.

Table 8-6 Construction Equipment and Sound Power Levels

Construction Equipment	Sound Power Level - SWL (L _{Aeq} dBA)
5t Excavator with Bucket	95
5t Excavator with Hammer	115
7-8t Excavator with Bucket	100
7-8t Excavator with Hammer	115
14t Excavator with Bucket / Ripper	105
14t Excavator with Hammer	118
20t Excavator with Bucket	105
20t Franna	98
2t Tipper	105
8t Smooth Drum Roller	107
All Terrain Forklift	96
CC10 Steam Roller*	109
CC10 Vibratory Roller*	109
Chainsaw*	114
Circular Saw/Grinder*	105
Concrete Agitator	109
Concrete Saw	118
Core Drill	118
Delivery / Hiab / Rigid Truck / Semi / Bogie	105
Dry Vac	103
Hand Tools / Form Work Tools	90
Jackhammer	113
Jumping Jack / Compactor	106
Kerb Placing Machine	109
Line Marking Gernie	90
Line Marking Truck	108
Milling Machine / Profiler	117
Paver	114
Plate Compactor	109
Positrack	90

Construction Equipment	Sound Power Level - SWL (L _{Aeq} dBA)
Traffic Control Utes	90
Water Blaster*	110
Watercart	107
Wet Vac	103

Note: Sources marked with an asterisk (e.g. concrete saws, grinders, hydraulic hammers, profilers, vibratory rollers) can emit noise with special audible (annoying) characteristics. In accordance with the ICNG and the CNVS, predicted noise levels for these stages incur a +5 dB penalty to for account for the additional annoyance that could arise. This penalty has been applied to the predicted levels.

8.2.3. Construction Noise Modelling

Construction noise emissions from the works have been modelled using the SoundPLAN (Version 8-2) environmental noise prediction software. This program is used and recognised internationally and is also recognised by NSW regulatory authorities as a preferred computer noise model. Factors that are addressed in the noise modelling are:

- Construction equipment sound power levels;
- Location of construction equipment;
- Screening from existing structures;
- Receiver locations, including multiple storey receivers;
- Ground topography;
- Noise attenuation due to geometric spreading;
- Ground absorption; and
- Atmospheric absorption.

8.2.4. Construction Noise Predictions

The predicted worst-case construction noise levels at the identified representative receivers for the 19 representative construction sub stages modelled are set out in a series of tables in **Appendix D**. Additionally, the Additional Mitigation Measures that are required to be considered by the CNVS are identified in **Appendix D**.

A series of predicted noise contours is provided in **Appendix E**.

The predictions represent the typical-worst case noise levels that may be expected to arise at the external facades of the receiver buildings when groups of noise sources operate simultaneously. It should be noted that construction noise levels would frequently be lower than the worst-case levels

considered for significant periods of time. This would be apparent as works move around the sites and are therefore more distant/more shielded from receivers and when less noisy activities are being undertaken.

The results show the airborne noise NLMs have potential to be exceeded at various localities and times depending on the works schedule. Given the likelihood of exceedances, the Sydney Metro standard mitigation measures will be applied throughout all of the identified work stages.

8.2.5. CNVS Additional Mitigation Measures – Airborne Construction Noise

Table 8-4 (based on Table 17 of the CNVS) sets out the Additional Mitigation Measures (AMMs) to be considered in the case of exceedances of the airborne noise criteria.

The airborne noise predictions indicate that at the closest residential and non-residential receivers some monitoring, and letterbox drop notifications are required.

Figure 8-1 indicates the area over which the NMLs may be exceeded at various times during the works. All residents and commercial receivers within the area identified will be provided with regular letterbox drop notifications regarding the works, as required by the CNVS.

For the works undertaken within the car park area the modelling indicates the potential for the daytime NML to be exceeded by >10 dB at the closest residential receivers located at:

- R11 - 34-36 Phillip St,
- R22 - 2 Gidley St and 4 Gidley St (Nado),
- R26 - 3 Station St,
- R27 - 2 Station St, 1 Station St, and
- C10 - St Mary's Hotel, 37 Queen St.

In accordance with the CVNS, noise monitoring will be undertaken at these locations to confirm construction noise levels periodically during the car parks works.

Additionally, for the works undertaken on Nariel St and Queen St, the modelling indicates the potential for the daytime NML to be exceeded by >10 dB at the closest residential receivers located on Carinya Avenue, Carmira St, Nariel St and Merinda St. To confirm construction noise levels during the external works, noise monitoring will be undertaken at the potentially worst affected locations, these being:

- R02 - 67 Carinya Avenue,
- R01 - 69 Carinya Avenue, and
- C10 - St Mary's Hotel, 37 Queen St

The nominated monitoring locations are shown on **Figure 8-1**. As noted above noise levels at any particular location would vary according to the location of the works and the work activity. It will not be necessary to monitor at all the identified locations at for all activities. Monitoring will be undertaken at the locations identified on a case-by-case basis, with a focus on the most noise-affected locations, based on on-site subjective evaluation.

The results of the noise monitoring at the identified locations would be reviewed as the works proceed and would be compared against the NML. Where necessary the results would be used to inform the construction team of any notable exceedances, over the levels set out in **Appendix D** and would be used to identify any recommended modifications to work methods or to identify the requirements for additional specific amelioration measures.

Figure 8-1 NML Exceedance Letterbox Drop Area and Nominated Noise Monitoring Locations



The highlighted Additional Mitigation Measure (AMM) triggers shown in tables set out in **Appendix D** are based on the exceedance of the $L_{Aeq,15min}$ NMLs. The tables identify some AMM triggers of Respite Offer and Alternative Accommodation (AA). To determine whether it is justified to provide the identified RO and AA measures, consideration must also be given to the duration of the works, i.e. how long the impact will last.

Given the scheduling of the works, it would be expected that the identified impacts would occur for typically only one or two nights at any one location before they are completed, and therefore the actual duration of impact would not be prolonged at any particular receiver location. On this basis, it is considered that offers of RO and AA are not justified.

It should be noted that the non-residential Additional Mitigation Measures are only applicable when the receiver building is in use.

Ward has and will continue to consult with the potentially affected receivers identified by this assessment, in particular the C10 (St Mary's Hotel) and R11 (34-36 Phillip St) prior to the works to determine if any particular concerns regarding noise impacts may be addresses during the scheduling.

8.2.1. Highly Noise Affected Receivers

The modelling indicates the potential for some relatively high noise levels during the works. The highest levels are anticipated at C10 (St Mary's Hotel at 37 Queen St), R11 (34-36 Phillip St), R22 (2 Gidley St and 4 Gidley St (Nado)), R26 (3 Station St), R27 (2 Station St, 1 Station St), R02 (67 Carinya Avenue), R01 (69 Carinya Avenue). These receivers may be expected to be highly noise affected at times during the works, that is, noise levels may be expected to exceed the NML by > 20 dB externally to these receivers. However, as discussed above, the durations of these high noise levels would be only for relatively short durations, of typically one or two nights in any one location.

During the development of the DNVIS Ward has consulted with the most potentially affected receivers and will continue to consult with the community during the works and consider any community feedback during the works scheduling.

Details of the focussed community consultation undertaken is provided in a Community Consultation report provided in **Appendix H**. Notably, the community consultation report has identified very few community concerns have been raised by the local residents consulted.

The report has, however, identified two concerns as follows:

- One resident at [REDACTED] Nariel Street raised concerns over noise interfering with a baby's sleep. Ward's community engagement consultants will undertake regular follow ups with this resident, prior to and during works that may result in high noise levels at the property and will consider the resident's feedback during programming.
- One resident at [REDACTED] has reported hearing issues (finds sharp and loud noises distressing). Ward's community engagement consultants will undertake regular follow ups with this resident, prior to and during works that may result in high noise levels at the property and will consider the resident's feedback during programming. Additionally, an offer to provide noise-cancelling /white noise earphones to the resident will be made if required.

Additionally, the community consultation has identified that the potentially most affected receivers are understanding with respect to the potential for increased noise levels during the works. It identifies that almost all receivers consulted accepted that construction was taking place and did not object to nightworks, understanding that the works are necessary.

As permissible under Condition 39, highly noise intensive work that results in an exceedance of the applicable NML at the same receiver must be approved in accordance with the Out-of-Hours Works Protocol required by Condition E42.Receiver Consultation in Accordance with E57.

In accordance with Conditions E57, in order to undertake out-of-hours work outside the work hours specified under Condition E38, appropriate respite periods for the out-of-hours work must be identified in consultation with the community at each affected location on a regular basis.

As identified above, Ward has undertaken consultation with the potentially most impacted receivers. This consultation has included provision of the following information regarding the works:

- schedule for periods of likely out-of-hours work;
- description of the potential work, location and duration of the out-of-hours work;
- the noise characteristics and likely noise levels of the work; and
- mitigation and management measures that will be implemented to minimise noise impacts.

The Community Consultation report provided in **Appendix H** has identified very few community concerns regarding noise and in accordance with E57, Ward will consider the outcomes of the community consultation during scheduling.

The outcomes of this community consultation including any identified respite periods will be provided to the ER, EPA and the Planning Secretary prior to the out-of-hours work commencing.

8.3. Sleep Disturbance

Maximum noise level events from construction activities during the night-time period can trigger both awakenings and disturbance to sleep stages. The CNVS approach to managing events that cause sleep disturbance is consistent with the Noise Policy for Industry (EPA, 2017). A detailed maximum noise level event assessment is to be undertaken where night-time noise levels at a residential location exceed the:

- $L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, or the
- L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater.

The CNVS notes the maximum noise level event assessments should be based on the L_{AFmax} descriptor on an event basis under 'fast' time response. The detailed assessment will consider all feasible and reasonable noise mitigation measures with a goal of achieving the above trigger levels for night-time activities.

To assess the likelihood of sleep disturbance, **Table D-11 (Appendix D)** sets out the predicted maximum noise levels for each stage and identifies where exceedances may occur during works undertaken in the night period.

It is noted that the CNVS AMMs are based on the degree to which the $L_{Aeq,15min}$ level exceeds the RBL and not the L_{Amax} level. The AMMs based on the $L_{Aeq,15min}$ assessment, as discussed in **Section 8.2.5** would be expected to adequately address potential sleep disturbance impacts.

As discussed in Section 8.1.4. this DNVIS considers the external screening level of L_{AFmax} 52 dBA in accordance with the CNVS and additionally considers the external noise criterion of L_{AFmax} 65 dBA

referenced by the RNP.

The results in **Table D-11** conservatively consider the use of concrete saws, in the event that a saw cut may be required for contingency during the night works. As discussed, Ward generally proposes to restrict saw use to prior to 10.00pm and therefore the maximum levels identified are unlikely to, or at least would very rarely occur. Typically, the maximum noise levels experienced by receivers would be expected to be at least 5-10 dB less than those reported.

During the out of hours night works within the primary works car park area (potholing works), the greatest potential sleep disturbance impacts may be expected to occur at C10 (St Mary's Hotel at 37 Queen St), R11 (34-36 Phillip St), R22 (2 Gidley St and 4 Gidley St (Nado)), R26 (3 Station St). It is noted, however, that with windows closed, internal noise levels would not be expected to exceed the internal noise levels identified by the RNP at these locations.

During the out of hours night works on Nariel Street, Queen Street, Phillip Street and Station Street, the greatest potential sleep disturbance impacts may be expected to occur at C10 (St Mary's Hotel), Carinya Avenue receivers R01-R05, R10 (14 Nariel Street), Phillip Street receivers R11-R13 / R21, R22 (2 Gidley St and 4 Gidley St (Nado)) and Station Street receivers R26/R27. With windows closed, internal noise levels would not be expected to exceed the internal noise levels identified by the RNP at these locations.

9. GROUNDBORNE CONSTRUCTION NOISE & VIBRATION

9.1. Construction Vibration Criteria

The effects of vibration in buildings can be divided into three main categories; those in which the occupants or users of the building are inconvenienced or possibly disturbed (human comfort), those where the building contents may be affected (effects on building contents) and those in which the integrity of the building or the structure itself may be prejudiced (structural damage).

9.1.1. Human Comfort

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

British Standard 6472-1992 "Guide to evaluation of human exposure to vibration in building" nominates guideline values for various categories of disturbance, the most stringent of which are the levels of building vibration associated with a "low probability of adverse comment" from occupants.

BS 6472-1992 provides guideline values for continuous, transient and intermittent events that are based on a Vibration Dose Value (VDV), rather than a continuous vibration level. The vibration dose value is dependent upon the level and duration of the short-term vibration event, as well as the number of events occurring during the daytime or night-time period.

The vibration dose values recommended in BS 6472-1992 for which various levels of adverse comment from occupants may be expected are presented in **Table 9 -1** (based on CNVS Table 4).

Table 9-1 Vibration Dose Values re Expected Adverse Comment in Residential Buildings

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	0.13	0.26	0.51

With respect to VDV, ACA notes that there can be practical difficulties in the prediction and measurement of this parameter, particularly given the limited available measured data. ACA considers the Peak Particle Velocity (PPV) levels as recognised by AVTG is an acceptable substitution (as per table C1.1 of the AVTG – i.e. Residential Daytime: 0.28 to 0.56 mm/s PPV; Residential Night: 0.2 to 0.4 mm/s PPV; Commercial: 0.56 to 1.1 mm/s PPV).

This is a common approach in the industry and allows alignment with structural damage vibration guide values and provides an opportunity for the same vibration equipment to measure for comfort and damage.

9.1.2. Effects on Building Contents

People can perceive floor vibration at levels well below those likely to cause damage to building contents or affect the operation of typical equipment found in most buildings that is not particularly vibration sensitive.

For most receivers, the controlling vibration criterion is the human comfort criterion, and it is therefore not normally required to set separate criteria in relation to the effect of construction vibration on typical building contents.

Where appropriate, objectives for the satisfactory operation of vibration sensitive critical instruments or manufacturing processes should be sourced from manufacturer's data and/or other published objectives.

9.1.3. Structural Damage

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.

There are currently no Australian Standards or guidelines to provide guidance on assessing the potential for building damage from vibration. It is common practice to derive goal levels from international standards. British Standard BS7385:1993 and German Standard DIN4150:1999 both provide goal levels, below which vibration is considered insufficient to cause building damage.

It is noted that the CNVS references the British Standard BS7385:1993, however, the Conditions of Approval also specifies German Standard DIN 4150-3: *Structural vibration – Effects of vibration on structures* (DIN 4150). Of these, DIN4150 is the more stringent and has therefore been considered by this DNVIS.

Table 9-2 summarises the recommended limits outlined in DIN 4150 to ensure minimal risk of cosmetic damage to residential and industrial buildings. Achieving the DIN 4150 vibration levels would also result in compliance with the British Standard BS7385:1993.

Table 9-2 Recommended Vibration Limits for Minimal Risk of Cosmetic Damage

Type of Building	Guideline Values for Velocity, v_i , in mm/s Vibration at the Foundation at a Frequency of			Plane of Floor of Uppermost Storey
	1 Hz to 10 Hz	10 Hz to 50Hz	50 Hz to 100 Hz	Frequency Mixture
Buildings used for commercial purposes, industrial buildings, and buildings of similar design	20	20 - 40	40 - 50	40
Dwellings and buildings of similar design and/or occupancy	5	5 - 15	15 - 20	15
Structures that, because of their particular sensitivity to vibration, cannot be classified and are of great intrinsic value (e.g. listed buildings under preservation order)	3	3 - 8	8 - 10	8

On this basis, conservative general vibration screening levels (Peak Particle Velocity (PPV)) are provided for intermittent vibration sources as follows:

- reinforced or framed structures: 20 mm/s
- unreinforced or light framed structures 5 mm/s.

At locations where the predicted and/or measured vibration levels are greater than shown above, monitoring should be performed during construction. A more detailed analysis of the building structure, vibration source, dominant frequencies and dynamic characteristics of the structure would also be performed to determine the applicable safe vibration level.

Additionally, Condition E84 requires that before commencement of construction, all buildings identified as being at risk of damage must be inspected and a building condition survey undertaken by a suitably qualified and experienced person.

Due to the current difficulties in conducting internal building inspections due to Covid-19 restrictions, Ward generally proposes to minimise any building inspection requirements by minimising the potential for cosmetic damage effects. This is discussed further in **Section 9-3**.

9.1.4. Guidelines for Heritage Structures

Heritage buildings and structures would be assessed as per the screening criteria as they should not be assumed to be more sensitive to vibration unless they are found to be structurally unsound. If a heritage building or structure is found to be structurally unsound (following inspection) the more conservative cosmetic damage criteria of 2.5 mm/s peak component particle velocity (from DIN 4150) would be considered.

Table 9-3 outlines the heritage listed items within the vicinity of the project, none of which have been assessed as being structurally unsound.

Table 9-3 Heritage Items

Heritage Item / Location	Register Listings	Significance	Location
St Marys Railway Station	State Heritage Register and State Rail S170 register under the Heritage Act	State	North of Site
St Marys Railway Station Parcel Office	Penrith City Council LEP (01249)	Local	North of Site

9.1.5. Guidelines for Sensitive Scientific & Medical Equipment

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

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 Table 6 and Figure 3 of the CNVS.

The land use survey undertaken by ward has not identified any uses that may be expected to include sensitive scientific or medical equipment.

9.1.6. Other Vibration Sensitive Structures & Utilities

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 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 with the structure or utility's owner in order to determine acceptable vibration levels.

In lieu of specific vibration criteria being provided by the asset owner, screening criteria would be adopted from guidance provided in DIN 4150-3 for buried pipework. The screening criteria is outlined in **Table 9-4**.

Table 9-4 Guideline Values for Vibration Velocity to be used when Evaluating the Effects of Vibration on Buried Pipework

Pipe Material	Guideline Values for Velocity Measured on the Pipe, v_i , in mm/s
Steel (including welded pipes)	100
Clay, concrete, reinforced concrete, pre-stressed concrete, metal (with or without flange)	80
Masonry, plastic	50

9.1.7. CNVS Additional Mitigation Measures – Groundborne Construction Vibration

In addition to the vibration criteria discussed above, the CNVS requires the consideration of Additional Mitigation Measures, in the case of appreciable levels of vibration occurring at sensitive receivers.

Table 9-5 (based on Table 17 of the CNVS) sets out the Additional Mitigation Measures (AMMs) to be applied in the case of exceedances of the groundborne vibration management levels.

Table 9-5 Additional Mitigation Measures - Ground-Borne Vibration

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

Notes: AA – Alternative Accommodation; M – Monitoring; IB – Individual Briefings; LB – Letterbox drops; RO – Project Specific Respite Offer; PC – Phone Calls and emails; SN – Specific Notifications. Full definitions of these Additional Mitigation Measures are set out in Table 15 of the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (Ver 4.2, 08/09/2020). The 'maximum' vibration value is taken as the 'Maximum Peak Velocity (mm/s)' value identified in Table C1.1 in the Assessing Vibration: A technical guideline (DEC 2006).

9.2. Groundborne Construction Noise Criteria

9.2.1. ICNG Groundborne Construction Noise Criteria

Groundborne (regenerated) noise is noise generated by vibration transmitted through the ground into a structure. Groundborne noise caused, for example by underground works such as tunnelling, can be more noticeable than airborne noise. The following groundborne noise levels for residences are nominated in the ICNG and indicate when management actions would be implemented. These levels recognise the temporary nature of construction and are only applicable when groundborne noise levels are higher than airborne noise levels.

The groundborne noise management levels considered by this assessment are shown in **Table 9-6**.

Table 9-6 Ground-Borne Noise Management Levels

Receiver Type	Standard Hours (Day)	OOHW (Day)	OOHW (Evening)	OOHW (Night)
	$L_{Aeq,15min}$ dBA	$L_{Aeq,15min}$ dBA	$L_{Aeq,15min}$ dBA	$L_{Aeq,15min}$ dBA
Residential	45	40	40	35
Commercial	50 when in use			
Childcare	40 when in use			
School	45 when in use			

Note: The Groundborne Noise Management Levels for non-residential uses only apply when the building is in use.

The daytime criteria are applicable to both residential and commercial receivers, whereas the evening and night-time criteria are only applicable to residential receivers. The Groundborne Noise Management Levels for non-residential uses only apply when the receiver building is in use.

The internal noise levels are to be assessed at the centre of the most-affected habitable room.

With respect to groundborne noise, Condition E44 requires the following:

All reasonable and feasible mitigation measures must be applied when the following residential ground-borne noise levels are exceeded:

(a) evening (6:00 pm to 10:00 pm) — internal $L_{Aeq(15\text{ minute})}$: 40 dB(A); and

(b) night (10:00 pm to 7:00 am) — internal $L_{Aeq(15\text{ minute})}$: 35 dB(A).

The mitigation measures must be outlined in the Noise and Vibration CEMP Sub-plan, including in any Out-of-Hours Work Protocol, required by Condition E42.

9.2.2. CNVS Additional Mitigation Measures – Groundborne Construction Noise

Table 9-7 (based on Table 15 of the CNVS) sets out the AAMs to be applied in the case of exceedances of the groundborne noise management levels.

Table 9-7 Additional Groundborne Noise Management Measures (Residential)

Time Period		Mitigation Measures			
		Predicted $L_{Aeq,15min}$ Noise Level Above NML			
		0 to 10 dB	10 to 20 dB	20 to 30 dB	> 30 dB
Standard Hours	Mon-Fri (7.00am - 6.00pm)	LB	LB, M	LB, M, SN	LB, M, SN
	Sat (8.00am - 1.00pm)				
	Sun/Pub Hol (Nil)				
OOH (Evening)	Mon-Fri (6.00pm - 10.00pm)	LB, M	LB, M, SN	LB, M, SN, RO	LB, M, SN, IB, PC, RO, SN
	Sat (1.00pm - 10.00pm)				
	Sun/Pub Hol (8.00am - 6.00pm)				
OOH (Night)	Mon-Fri (10.00pm - 7.00am)	LB, M	LB, M, SN, RO	LB, M, SN, IB, PC, RO, AA	LB, M, SN, IB, PC, RO, SN, AA
	Sat (10.00pm - 8.00am)				
	Sun/Pub Hol (6.00pm - 7.00am)				

Notes: AA – Alternative Accommodation; M – Monitoring; IB – Individual Briefings; LB – Letterbox drops; RO – Project Specific Respite Offer; PC – Phone Calls and emails; SN – Specific Notifications. Full definitions of these Additional Mitigation Measures are set out in Table 15 of the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (Ver 4.2, 08/09/2020).

9.3. Groundborne Construction Noise & Vibration Assessment

Certain construction activities require the use of vibration intensive equipment that have potential to adversely impact the closest sensitive receivers.

With respect to groundborne noise, ACA notes that for the proposed surface works airborne noise levels would dominate over groundborne noise. It is considered that management of airborne noise impacts in addition to management of vibration impacts would satisfactorily manage any groundborne noise effects. Accordingly, this assessment does not consider groundborne noise effects any further.

Minimum working distances to sensitive receivers for cosmetic building damage and human response have been identified for vibration generating plant that may be used during the works. If equipment operates closer to a sensitive receiver, vibration from construction works may potentially exceed the vibration guidelines provided in **Sections 9.1.3 and 9.1.1**. It should be noted, however, the minimum working distances are conservative and indicative. Actual distances may be expected to vary depending on the activity/operator, equipment particularities, local ground conditions and receiver conditions (e.g. building footings).

Table 9-8 shows the vibration generating plant that would be used and the associated minimum working distances. The setback distances are noted to be generally consistent with those recognised by TfNSW. The TfNSW guidelines do not include reference distances for plate compactors or jumping

jacks. The distances identified for these items are based on measurements undertaken by the University of Western Australia which are consistent with ACA's experience.

Vibration monitoring trials would be undertaken on site at the commencement of the works to confirm vibration levels and safe working distances for all vibration generating equipment.

Table 9-8 Recommended Minimum Working Distances for Vibration Intensive Equipment

Plant Item	Minimum Distance – Cosmetic Damage (BS 7385)	Cosmetic damage (DIN 4150) Heritage and other Sensitive Structures	Minimum Distance – Human Response (OE&H Vibration Guideline)
5t Excavator with Small (300kg) Hydraulic Hammer	2	5	7
14t Excavator with Medium (900kg) Hydraulic Hammer	7	19	23
Vibratory Roller (7 tonne)	15	41	100
CC10 Vibratory Roller (2 tonne)	5	14	15 to 20
60kg Plate Compactor	2	4	7
Jumping Jack	2	4	7
Jackhammer	1 m (nominal)	2	3

Note 1: Hydraulic hammer & vibratory roller distances are consistent with the TfNSW Construction Noise and Vibration Strategy (V 4.1).
Note 2: Plate compactor distances are based on measurements undertaken by University of Western Australia.

As previously discussed, due to the current difficulties in undertaking internal building inspections / dilapidation surveys owing to current Covid-19 restrictions, Ward proposes to minimise internal building inspections as far as is practicable. For this purpose, it is proposed to limit the use of all vibration generating plant to outside of the minimum working distances for cosmetic damage indicated by **Table 9-8**. In particular the following controls will be implemented.

Vibratory Rollers - Cosmetic Damage

Within the carpark, the minimum safe working distance for cosmetic damage for vibratory rolling will be verified by measurements and this distance will be maintained between the plant and all surrounding buildings. At the southernmost part of the car park area, static rolling methods will be used in lieu of vibratory methods within the critical safe distance, as required.

For the asphalted areas on Phillip Street, Queen Street and Station Street that require rolling, only static rollers would be used.

Vibratory Rollers – Human Comfort

The vibratory roller used within the carpark would operate within the within the minimum human response working distance identified by **Table 9-8**, with the closest residential receivers at 34-36 Phillip Street located approximately 60 m away from the southern boundary of the car park.

The identified human response distances are considered to be quite conservative. Based on vibration measurements undertaken for a 10-tonne vibratory roller, ACA estimates a VDV at the closest residence of $<0.2 \text{ m/s}^{1.75}$, which is below the Low Probability of Adverse Comment threshold identified in **Table 9-1**. On this basis it is considered that there would be minimal risk of human comfort vibration impacts on residents from the use of vibratory rolling within the car park area.

The CNVS does not specify VDV ranges to be considered for offices, however the AVTG notes that there would be a Low Probability of Adverse Comment when VDV remains below 0.4 to 0.8 $\text{m/s}^{1.75}$ in offices. Given the roller is a mobile source that would move around the site, it is estimated that the upper range VDV (0.8 $\text{m/s}^{1.75}$) would be generally met when a distance of approximately 15-20 m is maintained between the vibratory roller and the surrounding buildings. Within this distance it is proposed to use static rolling methods.

Vibration monitoring trials would be undertaken on the car park site at the commencement of the works to confirm vibration levels and safe working distances for the vibratory roller.

Hydraulic Hammers

During the service installation works on Station Street a 5-tonne excavator with small hydraulic hammer would be used. The construction footprint shows that these hammering works would not occur within approximately 7 m from the closest commercial building (91 Station Street, which is currently vacant) or within approximately 20 m from the St Marys Railway Station Parcel Office (Heritage Receiver). At these distances vibration levels from a small hydraulic hammer are predicted to not exceed 1 mm/s PPV. Therefore, no material risk of exceedance of the screening criteria for cosmetic building damage for commercial or heritage receivers is predicted for the identified hydraulic hammering works.

Additionally, it is considered there would be no material risk of human comfort vibration exceedances from the identified hammering works.

9.3.1. CNVS Additional Mitigation Measures – Groundborne Noise & Vibration

Given Ward's proposed vibration controls, further specific additional mitigation measures relating to groundborne noise or vibration are not considered necessary, beyond the standard measures defined by the CNVS. Application of the standard measures (outlined in **Section 11**) in addition to the controls discussed above would be expected to be sufficient to ensure vibration effects on the occupants of nearby buildings are satisfactorily managed.

Based on the use of a 7-tonne vibratory roller within the car park area, Ward has provided notifications to the receivers that fall within the potential building damage setback distance recognised by TfNSW, as indicated by **Figure 9-1**.

Figure 9-1 Vibratory Roller Building Damage Risk – Yellow Line Indicates 15 m Buffer for Commercial Buildings; Pink Line Indicates 41 m Buffer for Heritage Items



Note: The Heritage distance buffer has been calculated based off the distance required to meet the respective vibration level for standard buildings. This is provided for information purposes only. As discussed in Section 9.1.5 the identified heritage structures have not been assessed as being structurally unsound and therefore are not considered particularly vibration sensitive on account of their heritage classifications. Anticipated vibration levels are significantly lower than any threshold or criteria for commercial buildings. As such, no specific vibration risk for the heritage items has been identified.

The receivers identified by **Figure 9-1** have been notified by Ward regarding potential vibration effects and have been provided offers of dilapidation surveys in accordance with Condition E84. These receivers are:

- 47-49 Phillip Street (Centrelink)
- 51A Phillip Street (Bridging the Gap)
- 53 Phillip Street (Commercial)
- 36-38 Queen Street (Commercial)
- 34 Queen Street (Commercial)
- 30-32 Queen Street (Commercial)
- 24-26 Queen Street (Commercial)
- 4 Queen Street (Commercial)
- 8 Station Street (Coles Supermarket)

Additionally, whilst not considered to be at any particular risk of damage, the St Marys Railway Station Group has been notified regarding the potential for vibration effects on the St Marys Railway Station Parcel Office, as this Heritage building falls within the 41 m buffer calculated for potential heritage building damage.

10. CONSTRUCTION ROAD TRAFFIC NOISE

10.1. Construction Road Traffic Noise Guidelines

Criteria for off-site road traffic noise applicable to existing residences affected by additional traffic on existing local roads generated by land use developments are specified in the NSW Road Noise Policy (RNP). Whilst these criteria do not specifically apply to construction traffic movements, they have been conservatively considered and are summarised in **Table 10-1**.

Table 10-1 RNP Criteria for Road Traffic Noise

Type of Development	Daytime (07:00-22:00)	Night (22:00-07:00)
Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	L _{Aeq,15 hour} 60 (external)	L _{Aeq,9 hour} 55 (external)
Existing residences affected by additional traffic on existing local roads generated by land use developments	L _{Aeq,1 hour} 55 (external)	L _{Aeq,1 hour} 50 (external)

Note: The identified criteria do not apply to vehicle movements within the Project Site. For the purpose of assessment, any noise generated by on-site vehicle movements is considered as construction noise and assessed holistically with on-site mobile plant in accordance with the ICNG.

As required by the RNP, an initial screening test should first be applied by evaluating whether noise levels would increase by more than 2 dB (an increase in the number vehicles of approximately 60%) due to construction traffic or a temporary reroute due to a road closure.

Where noise levels increase by more than 2 dB further assessment is required using the criteria presented in the RNP, as shown in **Table 10-1**. A 2 dB increase is typically considered not noticeable.

10.2. Construction Road Traffic Assessment

Ward estimates that a maximum of 10 heavy vehicle movements per hour would be required during the peak construction phase.

Considering the high existing volume of traffic on the adjacent roads, the noise impact generated by construction delivery vehicles arriving and leaving the site would be expected to result in an increase in road traffic noise levels of significantly less than 2 dB which is in compliance with the established criteria.

On this basis, no material construction traffic noise impacts are expected.

11. CONSTRUCTION NOISE & VIBRATION MITIGATION MEASURES

11.1. CNVS Additional Mitigation Measures

The CNVS sets out standard construction noise and vibration mitigation measures to be implemented on all Sydney Metro projects by default in order to minimise the potential noise and vibration impacts at the surrounding Noise Sensitive Receivers. These will be implemented by Ward where feasible and reasonable and are summarised in **Table 11-1**. A summary of roles and responsibilities is provided in **Table 11-2**.

Table 11-1 Standard Mitigation Measures to Reduce Construction Noise and Vibration

Action Required	Applies To	Details
Management Measures		
Implementation of any project specific mitigation measures required	Airborne noise Ground-borne noise and vibration	In addition to the measures set out in this table, any project specific mitigation measures identified in the environmental assessment documentation (e.g. EA, REF, submissions or report) or approval or licence conditions must be implemented.
Implement community consultation measures	Airborne noise Ground-borne noise and vibration	A register of all noise and vibration sensitive receivers (NSRs) would be kept on site. The register would include the following details for each NSR: <ul style="list-style-type: none"> • Address of receiver • Category of receiver (e.g. Residential, Commercial etc.) • Contact name and phone number
Site Inductions	Airborne noise Ground-borne noise and vibration	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: <ul style="list-style-type: none"> • All relevant project specific and standard noise and vibration mitigation measures • Relevant licence and approval conditions • Permissible hours of work • Any limitations on high noise generating activities • Location of nearest sensitive receivers • Construction employee parking areas • Designated loading/unloading areas and procedures • Site opening/closing times (including deliveries) • Environmental incident procedures

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Behavioural practices	Airborne noise	No swearing or unnecessary shouting or loud stereos/radios; on site. No dropping of materials from height; throwing of metal items; and slamming of doors. No excessive revving of plant and vehicle engines Controlled release of compressed air.
Monitoring	Airborne noise Ground-borne noise and vibration	A noise monitoring program is to be carried out for the duration of the works in accordance with the Construction Noise and Vibration Management Plan and any approval and licence conditions.
Attended vibration measurements	Ground-borne vibration	Attended vibration measurements are required at the commencement of vibration generating activities to confirm that vibration levels satisfy the criteria for that vibration generating activity. Where there is potential for exceedances of the criteria further vibration site law investigations would be undertaken to determine the site-specific safe working distances for that vibration generating activity. Continuous vibration monitoring with audible and visible alarms would be conducted at the nearest sensitive receivers whenever vibration generating activities need to take place inside the applicable safe-working distances.
Source Controls		
Construction hours and scheduling	Airborne noise Ground-borne noise and vibration	Where feasible and reasonable, construction would be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels would be scheduled during less sensitive time periods.
Construction respite period	Ground-borne noise and vibration Airborne noise	High noise and vibration generating activities ² may only be carried out in continuous blocks, not exceeding 3 hours each, with a minimum respite period of one hour between each block ³ .
Equipment selection	Airborne noise Ground-borne noise and vibration	Use quieter and less vibration emitting construction methods where feasible and reasonable. For example, when piling is required, bored piles rather than impact-driven piles will minimise noise and vibration impacts. Similarly, diaphragm wall construction techniques, in lieu of sheet piling, will have significant noise and vibration benefits.
Maximum noise levels	Airborne-noise	The noise levels of plant and equipment must have operating Sound Power Levels compliant with the criteria in Table 13 (of the CNVS).
Rental plant and equipment	Airborne-noise	The noise levels of plant and equipment items are to be considered in rental decisions and in any case cannot be used on site unless compliant with the criteria in Table 13 (of the CNVS).

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Plan worksites and activities to minimise noise and vibration	Airborne noise Ground-borne vibration	Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.
Non-tonal reversing alarms	Airborne noise	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.
Minimise disturbance arising from delivery of goods to construction sites	Airborne-noise	<p>Loading and unloading of materials/deliveries is to occur as far as possible from NSRs</p> <p>Select site access points and roads as far as possible away from NSRs</p> <p>Dedicated loading/unloading areas to be shielded if close to NSRs</p> <p>Delivery vehicles to be fitted with straps rather than chains for unloading, wherever feasible and reasonable</p>
Path Controls		
Shield stationary noise sources such as pumps, compressors, fans etc	Airborne-noise	<p>Stationary noise sources would be enclosed or shielded whilst ensuring that the occupational health and safety of workers is maintained.</p> <p>Appendix F of AS 2436: 1981 lists materials suitable for shielding.</p>
Shield sensitive receivers from noisy activities	Airborne-noise	<p>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 siting plant.</p>

Table 11-2 Roles and Responsibilities

Role	Definition and Responsibilities
Project Environment Manager	<ul style="list-style-type: none"> Oversee the implementation of all noise and vibration management initiatives including coordinating responses to noise and vibration complaints. Manage review and continual improvement of the DNVIS/CNVMP. Ensure that sufficient resources are allocated for the implementation of the DNVIS/CNVMP. Consider and advise senior management on compliance obligations regarding noise and vibration. 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.
Site Supervisor	<ul style="list-style-type: none"> Ensure that all requirements of the DNVIS/CNVMP are effectively implemented. Ensure all appropriate noise and vibration mitigation measures are implemented.
EHS Coordinators	<ul style="list-style-type: none"> Assist the Project Environment Manager and Construction Managers in implementing the DNVIS/CNVMP. Oversee noise and vibration training including inductions, toolbox talks and specific technical training on monitoring equipment. Ensure all appropriate noise and vibration mitigation measures are implemented. Monitoring and reporting on compliance.
Site Engineers	<ul style="list-style-type: none"> Assist the Construction Manager in implementing the DNVIS/CNVMP.
Project Noise and Vibration Consultant	<ul style="list-style-type: none"> Provide Ward with specialist noise and vibration input and advice including development of the CNVMP, DNVIS and discussions regarding progressive construction works. Undertaking noise and vibration monitoring when required. Assisting in community consultation when required.
Construction Manager	<ul style="list-style-type: none"> Manage the delivery of the construction process, in relation to noise and vibration management across the site together with the Environment Manager. Ensure that all requirements of the DNVIS/CNVMP are effectively implemented, including all subcontractors
Stakeholder and Community Relations Manager	<ul style="list-style-type: none"> Manage notifications and consultation for noise and vibration and liaise with the Environment Manager about management of noise and vibration complaints. Assist in coordinating responses to noise and vibration complaints.

11.2. CNVS Additional Mitigation Measures

Based on the predictions, all reasonable and feasible mitigation measures to minimise noise and vibration from construction will be implemented. This includes the Standard Mitigation Measures (SMM) set out in **Table 11-1** and the Additional Mitigation Measures (AMM) required by the CNVS, as set out in **Section 8.2.5** and **Appendix D**.

11.3. Construction Noise & Vibration Monitoring Program

Conditions C13 - C15 specify in detail requirements for monitoring. These matters are addressed in the Construction Noise & Vibration Monitoring Program provided in **Appendix F**.

12. NOISE IMPACT SUBJECTIVE CLASSIFICATION

Standard Hours Works within Primary Works Area (Main Carpark)

With respect to the standard hours works within the main carpark area, residential receivers are generally well removed and shielded from the works and the residential NML exceedances are generally less than 10-20 dB. There is potential for the NML to be exceeded by >20 dB at R11 (34-36 Phillip Street), but the construction noise at this receiver would be expected to be no greater than the traffic levels from existing vehicle movements on Phillip Street.

The closest commercial receiver NML exceedances are less than 10-20 dB and these levels may be expected to arise at the rear building facades only, which from inspection may be expected to be less noise sensitive than their street facing facades.

The potentially affected receivers have been consulted regarding the forthcoming works, with Ward's community engagements consultants undertaking door knocking and briefings at the most affected addresses. The community consultation report (included in Appendix H) summarises the receiver notifications. This identifies that no particular concerns regarding noise from the early works were received from the potentially most affected local residents.

Considering the above, the standard hours works within the main carpark area are generally considered **low impact**.

Notwithstanding this, the standard and additional mitigation measures identified by this DNVIS will be provided.

Out-of-Hours Works within Primary Works Area (Main Carpark)

Within the main carpark area, the only works to be undertaken outside standard hours is potholing. This is predicted to have potential for exceedances above the NML by >20 dB at R11 (34-36 Phillip Street), R22 (2 Gidley Street) and C10 (St Marys Hotel) but the construction noise at these receivers would be expected to be no greater than occasional traffic noise levels from existing vehicle movements on the local roads. At these receivers predicted maximum construction noise levels may also exceed the sleep disturbance levels, however similar levels may be expected from occasional traffic noise levels from existing vehicle movements on the local roads. To mitigate the potential impacts, the use of concrete saws will be limited to prior to 10.00pm.

The closest commercial receivers would not be expected to be operational during the potholing works.

The potentially most affected receivers have been consulted regarding the forthcoming works, with Ward's community engagements consultants undertaking door knocking and briefings at the most affected addresses. The community consultation report (included in Appendix H) summarises the receiver notifications. This identifies that no particular concerns regarding noise from the early works was received from the potentially most affected local residents.

Considering the above, the out of hours works within the main carpark area are generally considered **low impact**.

The standard and additional mitigation measures identified by this DNVIS will be provided.

Standard Hours Works – External Works Areas

With respect to the standard hours works on Nariel Street, Queen Street, Phillip Street and Station Street, the residential NML exceedances are generally less than 10-20 dB. There is potential for the NML to be exceeded by >20 dB at times at R2 (65-67 Carinya Avenue), R11 (34-36 Phillip Street), R12 (36A Phillip Street), R22 (2 Gidley Street) and C10 (St Marys Hotel). However, the construction noise levels would naturally fluctuate during the works being undertaken, the works would not be prolonged and for most of the time the levels would be significantly lower than reported.

The closest commercial receivers would also experience elevated noise levels as the works progress, however, given the nature of the works, the impacts would not be prolonged and for most of the time the levels would be significantly lower than reported.

The potentially affected receivers have been consulted regarding the forthcoming works, with Ward's community engagements consultants undertaking door knocking and briefings at the most affected addresses. The community consultation report (included in Appendix H) summarises the receiver notifications. This identifies that no particular concerns regarding noise from the early works was received from the potentially most affected local residents.

Considering the above, the standard hours works within the main carpark area are generally considered **low impact**.

The standard and additional mitigation measures identified by this DNVIS will be provided.

Out-of-Hours Works – External Works Areas

The out of hours works on Nariel Street, Queen Street, Phillip Street and Station Street, may be expected to result in residential NML exceedances at times >20dB at R1 (69 Carinya Avenue), R2 (65-67 Carinya Avenue), R3 (59 Carinya Avenue), R11 (34-36 Phillip Street), R12 (36A Phillip Street), R22 (2 Gidley Street), R26 (3 Station Street) and C10 (St Marys Hotel). However, the construction noise levels would naturally fluctuate during the works being undertaken, the works would not be prolonged and for most of the time the levels would be significantly lower than reported.

At these receivers predicted maximum construction noise levels may also exceed the sleep disturbance levels. To mitigate the potential impacts, the use of concrete saws will be limited to prior to 10.00pm. Additionally, the standard and additional mitigation measures identified by this DNVIS will be provided.

The closest commercial receivers would also experience elevated noise levels as the works progress, however, most of the commercial receivers, with the exception of the St Marys Hotel, would not be operational during the out of hours works.

The potentially affected receivers have been consulted regarding the forthcoming works, with Ward's community engagements consultants undertaking door knocking and briefings at the most affected

addresses. The community consultation report (included in Appendix H) summarises the receiver notifications. This identifies that no particular concerns regarding noise from the early works was received from the potentially most affected local residents.

Considering the above, the standard hours works within the main carpark area are generally considered **moderate impact**.

The standard and additional mitigation measures identified by this DNVIS will be provided.

As a result of noise classification and/or the noise level exceedances at sensitive receivers provided by this DNVIS, appropriate reasonable and feasible noise mitigation is to be adopted and implemented during the works. For sites where works are predicted to significantly exceed noise goals and impact on receivers for a significant period of time, additional reasonable and feasible noise mitigation measures such as those outlined in Appendix D would be implemented to reduce the noise levels and impact on sensitive receivers.

The following key controls will be implemented:

- High noise works will be restricted to daytime hours as far as practicable.
- Where concrete sawing is required to be undertaken out-of-hours, this activity will be restricted to prior to 10.00pm.
- As far as practicable and safe to do so, sound curtains will be used around works sites to reduce construction noise emissions.
- Noise monitoring will be undertaken throughout the works to verify construction noise levels and inform the construction team where, if necessary, construction methods require modification to reduce noise levels.
- Vibration monitoring will be undertaken at the commencement of work involving vibration generating equipment to confirm safe working distances and compliance with German Standard DIN4150:1999.
- Static rollers will be used in lieu of vibratory rollers on the external roads to minimise any vibration impacts.
- Periodic letterbox notifications will be provided to update local residents and business owners regarding the progress of the works
- Community Consultation in accordance with the CNVS and the Out of Hours Works Protocol (SM-21-00306108) will be undertaken at potentially affected receivers and feedback from the receivers will be considered during scheduling of the works.

13. CONCLUSION

Acoustics Consultants Australia (ACA) has prepared on behalf of Ward Civil & Engineering Pty Ltd (Ward) this Detailed Noise and Vibration Impact Statement (DNVIS) for the St Mary's Bus Exchange Early Works (SMBE-EW), which form part of the Sydney Metro Western Sydney Airport (SMWSA) Project (SSI 10051).

Primarily, this document has been prepared to fulfil the requirements of the Critical State Significant Infrastructure (CSSI) Approval Condition E47(a) that requires a DNVIS and Condition C13(a) that requires a Construction Noise and Vibration Monitoring Program. This DNVIS forms part of the Construction Environmental Management Plan (CEMP), or equivalent document, in accordance with the Sydney Metro Construction Environmental Management Framework (CEMF).

The included assessments have been undertaken in accordance with the provisions of the NSW Interim Construction Noise Guideline – (ICNG), the Sydney Metro – Western Sydney Airport Construction Noise & Vibration Strategy (Ver 4.2, 8 September 2020) – (CNVS) and relevant Conditions of Approval as set out in the Department of Planning, Industry and Environment's Critical State Significant Infrastructure Approval for Sydney Metro – Western Sydney Airport (SSI 10051).

The SMBE-EW is not subject to an Environment Protection Licence (EPL).

The SMBE-EW works are proposed to generally occur within standard construction hours, however, the planning approval allows for alternate working hours for the works that cannot be completed during standard hours, provided the works are managed appropriately.

This document details Noise Management Level (NML) exceedances and mitigation requirements for the standard hours works and the proposed out-of-hours works. The extent of works undertaken outside of standard hours would be dependent on relevant approvals and be subject to specific negotiated respite measures, as permissible under the CSSI Approval.

The main objectives of this DNVIS are to minimise unreasonable noise and vibration impacts on residents and businesses, and to avoid structural damage to buildings or heritage items as a result of construction vibration. This DNVIS aims to support active community communication and maintain positive, cooperative relationships with local residents, businesses and building owners. It is noted that ongoing community engagement and management of such relationships is primarily managed via the Sydney Metro – Western Sydney Airport Community Communications Strategy.

During the development of the DNVIS Ward has undertaken focussed community consultation with the most potentially affected receivers and has considered their feedback. Notably, as identified by the community consultation report, no notable concerns have been raised by the local residents consulted. The community consultation has identified that the potentially most affected receivers are understanding with respect to the potential for increased noise levels during the works.

It is expected that noise and vibration impacts can be effectively managed through the adoption of the measures identified by this DNVIS.

The key conclusions are as follows:

- Construction traffic noise is expected to be no more than 2 dB above current traffic noise levels.
- With the incorporation of specific controls, construction vibration is expected to comply with human comfort values nominated in this assessment and on this basis the risk of building damage (even cosmetic) is negligible to all building structures including heritage.
- Given Ward's proposed vibration controls, no specific additional mitigation measures relating to groundborne noise or vibration are considered necessary, beyond the standard measures defined by the CNVS. Application of the measures outlined by this DNVIS would be expected to be sufficient to ensure vibration effects on the occupants of nearby buildings are satisfactorily managed.
- Airborne noise levels may be expected to exceed criteria at times at several receivers. These exceedances may be effectively managed through a combination of standard mitigation measures and additional mitigation measures required by the CNVS, principally through letterbox notifications, and verification monitoring. The following key controls will be implemented:
 - High noise works will be restricted to daytime hours as far as practicable.
 - Where concrete sawing is required to be undertaken out-of-hours, this activity will be restricted to prior to 10.00pm.
 - As far as practicable and safe to do so, sound curtains will be used around works sites to reduce construction noise emissions.
 - Noise monitoring will be undertaken throughout the works to verify construction noise levels and inform the construction team where, if necessary, construction methods require modification to reduce noise levels.
 - Vibration monitoring will be undertaken at the commencement of work involving vibration generating equipment to confirm safe working distances and compliance with German Standard DIN4150:1999.
 - Static rollers will be used in lieu of vibratory rollers on the external roads to minimise any vibration impacts.
 - Periodic letterbox notifications will be provided to update local residents and business owners regarding the progress of the works
 - Community Consultation in accordance with the CNVS and the Out of Hours Works Protocol (SM-21-00306108) will be undertaken at potentially affected receivers and feedback from the receivers will be considered during scheduling of the works.

APPENDIX A: Glossary of Noise & Vibration Terms

1 Sound Level (or Noise Level)

Sound may be defined as any pressure variation that the human ear can detect. The human ear responds to a wide range of changes in sound pressure. As the greatest sound pressures to which the human ear responds are 10,000,000 times greater than the lowest, the decibel (dB) scale, by the use of logarithms is used to express sound pressure levels more conveniently.

The standard reference sound pressure used to define a Sound Pressure Level is 2×10^{-5} Pascals (Pa).

The decibel is defined as ten times the logarithmic ratio of two pressures. The smallest perceptible change is approximately 1 dB.

Sound Pressure Level is typically abbreviated as SPL, L_p , or L.

2 “A” Weighted Sound Pressure Level

The most common frequency rating is ‘A-Weighting’. The A-weighting frequency response curve is designed to approximate the sensitivity of the human ear. The symbol L_A represents A-weighted Sound Pressure Level - The overall broadband level of a sound/noise is typically expressed as a dB(A) level.

Human hearing is most sensitive mid frequencies sounds (500 Hz to 4000 Hz), and less sensitive at higher and lower frequencies. Therefore, the level expressed in dB(A) correlates strongly with the perceived loudness of the sound/noise.

A change in sound pressure level of 1-2 dB is barely noticeable to most people, whilst a 3-5 dB change is perceived as a small but noticeable change in loudness. A 10 dB change is perceived as an approximate doubling or halving in loudness. The table below present the sound pressure levels of some common sources.

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

In addition to A-weighting, other less commonly applied frequency weightings include B, C and D weightings. Unweighted or Linear levels are sound levels measured without any weighting. These are expressed as simply dB, or dB(lin) or dB(Z).

3 Sound Power Level

The rate at which a noise source emits acoustic energy is defined by its Sound Power Level. Sound Power Levels are also expressed in decibel units (dB or dB(A)). Sound Power is typically identified as SWL or LW. The standard reference sound power used to define a Sound Power Level is 1×10^{-12} Watts (W).

4 Statistical Noise Levels

Environmental noise levels from various sources in the environment will vary in level over time. Statistical exceedance levels are typically expressed as L_{AN} levels (i.e. the A-weighted sound pressure level exceeded for N% of a specific measurement period).

The most commonly used statistical noise levels are as follows:

L_{Amax}	Maximum noise level over a sample period (typically measured on fast time-weighting response).
L_{A1}	Noise level exceeded for 1% of a sample period (typically 15-minute interval).
L_{A10}	Noise level exceeded for 10% of a sample period (typically 15-minute interval).
L_{A90}	Noise level exceeded for 90% of a sample period. This noise level is commonly used to describe the background noise level (in the absence of the source under investigation).
L_{Aeq}	A-weighted equivalent noise level. This is equivalent to the steady sound level containing the same amount of acoustical energy as the time-varying sound. Often referred to as the average noise level.
ABL	Assessment Background Level. This is the single figure background level representing each assessment period (day, evening and night) for each day. It is determined by calculating the lowest 10th percentile background noise level (L_{A90}) for each period.
RBL	Rating Background Level. This is the median value of the ABL values for each period (day, evening, night), determined over several days of measurements.

Common Vibration Terms

Hertz (Hz) – Units in which frequency is expressed. Synonymous with cycles per second.

Decibel – Ratios of identical quantities are expressed in decibel or dB units. The number of dB is “ratio” against some standard or reference value in terms of the base 10 logarithm of that ratio. In measuring acoustic or vibration power (as in PSD or ASD of random vibration), the number of dB = $10 \text{ Log}_{10} (P/P_0)$. P_0 , the reference level, equals 0 dB. In measuring the more common voltage-like quantities such as acceleration, the number of dB = $20 \text{ Log}_{10} (E/E_0)$ E_0 , the reference level, equals 0 dB.-

Displacement – A vector quantity that specifies the change of position of a body or particle with respect to a reference frame.

Velocity – A vector quantity that specifies the time derivative of displacement.

Acceleration – Acceleration is rate of change of velocity with time usually along a specified axis, usually expressed in m/s^2

Peak – Extreme value of a varying quantity, measured from the zero or mean value. Also, a maximum spectral value.

Peak-to-peak value – The algebraic difference between extreme values (as $D = 2X$).

Duration of a shock pulse is how long it lasts. Time is usually measured between instants when the amplitude is greater than 10% of the peak value.

Amplitude – The magnitude of variation (in a changing quantity) from its zero value. Always modify it with an adjective such as **peak, RMS, average**, etc. May refer to displacement, velocity, acceleration.

Crest factor – Of an oscillating quantity. The ratio of the peak value to the r.m.s. value.

VDV – The Vibration Dose Value is the accumulation of energy measured over a given time period, proportional to the root mean quad of acceleration. This is usually measured in each of the three axes of motion. In most cases, vibration tends to be higher in the Z (vertical) axis. This is measured with units of $m/s^{1.75}$.

PPV – Peak Particle Velocity is the instantaneous peak of the resultant vector sum of all three axes of motion. Results are expressed in terms of velocity normally mm/s.

Peak Acceleration – This is the peak acceleration level measured in each of the three axes of motion. In some cases, this can also be combined in a vector sum. This is measured in m/s^2 .

Accelerometer – A sensor or transducer or pickup for converting acceleration to an electrical signal. Two common types are piezoresistive and piezoelectric.

Charge amplifier – An amplifier which converts a charge input signal (as from an accelerometer) into an output voltage; a charge-to-voltage converter.

Geophone – A sensor or transducer or pickup for converting velocity to an electrical signal.



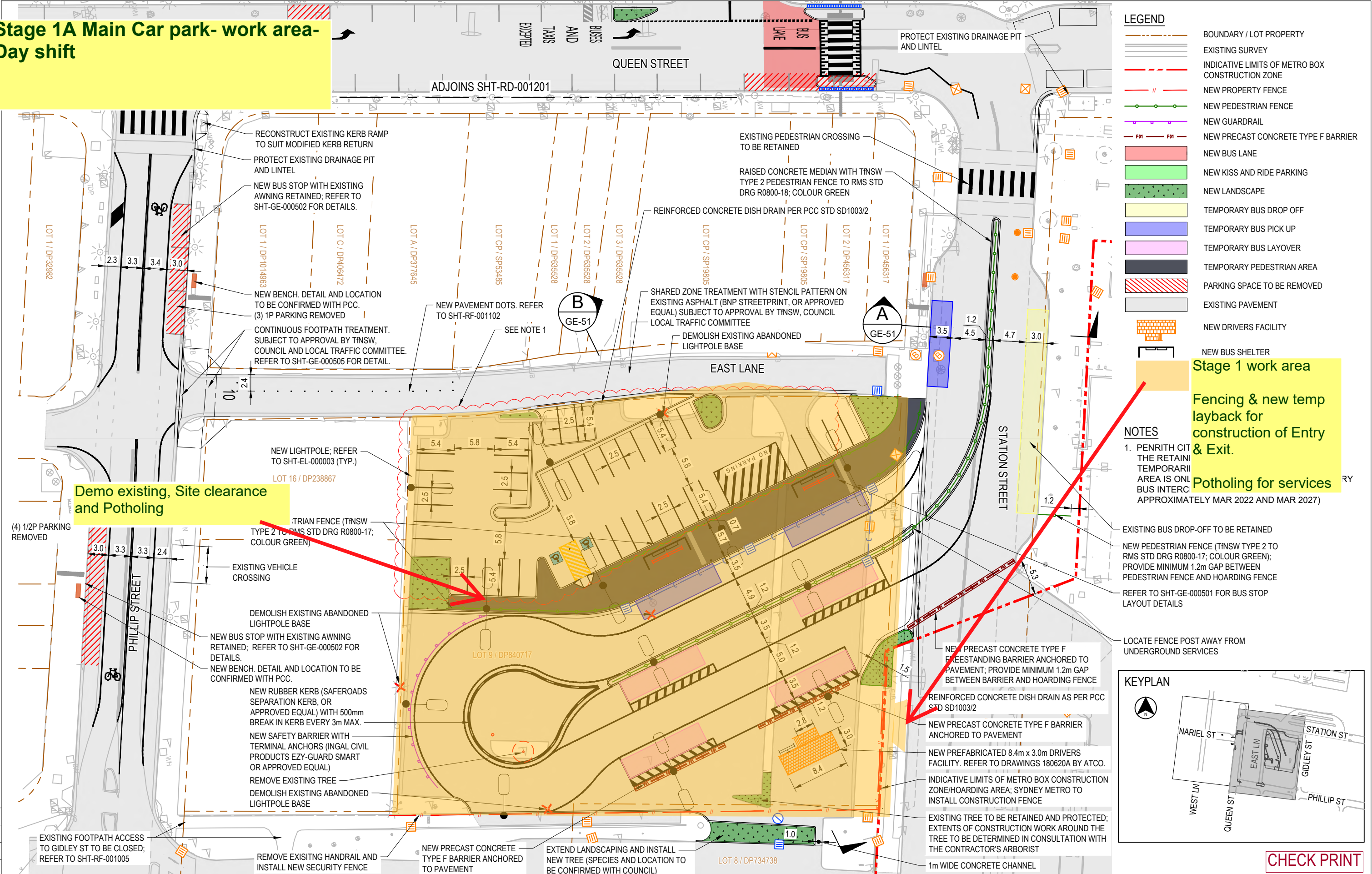
APPENDIX B

St Mary's Bus Exchange Early Works Staging Plans
(Provided by Ward Civil Engineering Pty Ltd)



Stage 1A Main Car park- work area- Day shift

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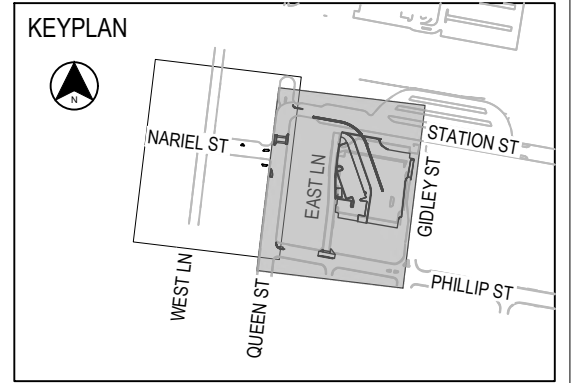
LEGEND

- BOUNDARY / LOT PROPERTY
- EXISTING SURVEY
- INDICATIVE LIMITS OF METRO BOX CONSTRUCTION ZONE
- NEW PROPERTY FENCE
- NEW PEDESTRIAN FENCE
- NEW GUARDRAIL
- NEW PRECAST CONCRETE TYPE F BARRIER
- NEW BUS LANE
- NEW KISS AND RIDE PARKING
- NEW LANDSCAPE
- TEMPORARY BUS DROP OFF
- TEMPORARY BUS PICK UP
- TEMPORARY BUS LAYOVER
- TEMPORARY PEDESTRIAN AREA
- PARKING SPACE TO BE REMOVED
- EXISTING PAVEMENT
- NEW DRIVERS FACILITY
- NEW BUS SHELTER

NOTES

1. PENRITH CITY COUNCIL TO RETAIN TEMPORARY AREA IS ONLY BUS INTERCHANGE APPROXIMATELY MAR 2022 AND MAR 2027)

Stage 1 work area
Fencing & new temp layback for construction of Entry & Exit.
Potholing for services



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DRAWING FILE LOCATION / NAME PW/P0054029-SHT-RD-001202.DWG		DESIGN LOT CODE		DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING		PLOT DATE / TIME 26-May-21 / 9:34:36 PM		PLOT BY MICHAEL.PANCITO		CLIENT PENRITH CITY COUNCIL STATION STREET ST MARYS CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION GENERAL ARRANGEMENT PLAN		A3	
EXTERNAL REFERENCE FILES		REV	DATE	AMENDMENT / REVISION DESCRIPTION		WVR No.	APPROVAL	SCALES ON A3 SIZE DRAWING		DRAWINGS / DESIGN PREPARED BY		TNSW REGISTRATION No. DS2021/000076	
		0	13.11.20	ISSUED FOR STRATEGIC DESIGN			S. CHAVA	1:500 FULL SIZE A3		M. PANCITO		PART 1	
		1	03.03.21	ISSUED FOR 80% DETAILED DESIGN			S. CHAVA			V. ECCLES		SHEET No. SHT-RD-001202	
		2	22.04.21	IFT			S. CHAVA			V. ECCLES		ISSUE 2	
										C. VAVOULAS		© Transport for NSW	
										S. CHAVA			

REVISION IN PROGRESS

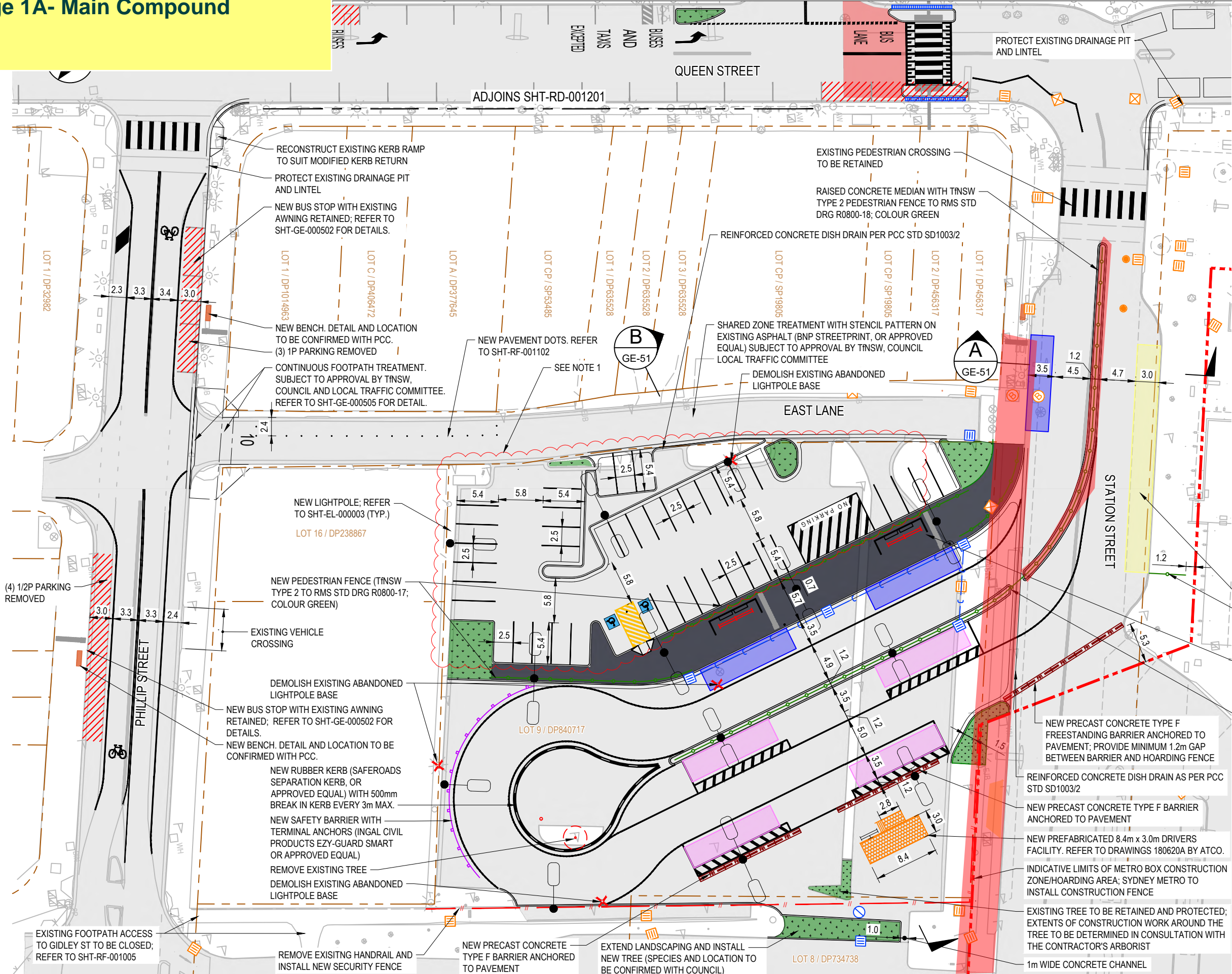


PREPARED FOR
GREATER SYDNEY DIVISION
ON BEHALF OF
SYDNEY METRO WEST, SYDNEY AIRPORT

ISSUE STATUS: DETAILED DESIGN
EDMS No.:
SHEET No.: SHT-RD-001202

Stage 1A- Main Compound

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LEGEND

- BOUNDARY / LOT PROPERTY
- EXISTING SURVEY
- INDICATIVE LIMITS OF METRO BOX CONSTRUCTION ZONE
- NEW PROPERTY FENCE
- NEW PEDESTRIAN FENCE
- NEW GUARDRAIL
- NEW PRECAST CONCRETE TYPE F BARRIER
- NEW BUS LANE
- NEW KISS AND RIDE PARKING
- NEW LANDSCAPE
- TEMPORARY BUS DROP OFF
- TEMPORARY BUS PICK UP
- TEMPORARY BUS LAYOVER
- TEMPORARY PEDESTRIAN AREA
- PARKING SPACE TO BE REMOVED
- EXISTING PAVEMENT
- NEW DRIVERS FACILITY
- NEW BUS SHELTER
- Potholing for services

NOTES

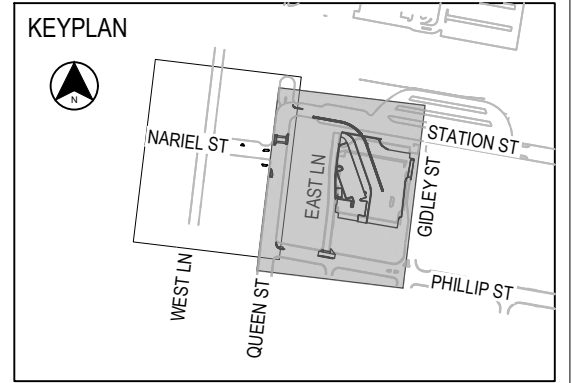
1. PENRITH CITY COUNCIL MAY MANAGE AND USE THE RETAINED VENESS PLACE CAR PARK AREA TEMPORARILY FOR PUBLIC CAR PARKING. THIS AREA IS ONLY AVAILABLE WHILE THE TEMPORARY BUS INTERCHANGE IS IN OPERATION (BETWEEN APPROXIMATELY MAR 2022 AND MAR 2027)

EXISTING BUS DROP-OFF TO BE RETAINED

NEW PEDESTRIAN FENCE (TNSW TYPE 2 TO RMS STD DRG R0800-17; COLOUR GREEN); PROVIDE MINIMUM 1.2m GAP BETWEEN PEDESTRIAN FENCE AND HOARDING FENCE

REFER TO SHT-GE-000501 FOR BUS STOP LAYOUT DETAILS

LOCATE FENCE POST AWAY FROM UNDERGROUND SERVICES



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EXTERNAL REFERENCE FILES		REV	DATE	AMENDMENT / REVISION DESCRIPTION		WVR No.	APPROVAL	SCALES ON A3 SIZE DRAWING		DRAWINGS / DESIGN PREPARED BY	
		0	13.11.20	ISSUED FOR STRATEGIC DESIGN			S. CHAVA	1: 500 FULL SIZE A3		DISCIPLINE M. PANCITO PRELIM INITIAL DATE	
		1	03.03.21	ISSUED FOR 80% DETAILED DESIGN			S. CHAVA			DISCIPLINE V. ECCLES 22.04.21	
		2	22.04.21	IFT			S. CHAVA			DISCIPLINE S. ANDREWS 22.04.21	
										DISCIPLINE V. ECCLES 22.04.21	
										DISCIPLINE C. MAVOULAS 22.04.21	
										BACKDRAFTED/CORRECTED 22.04.21	
										CONFIRMED S. CHAVA 22.04.21	
										PREPARED FOR GREATER SYDNEY DIVISION ON BEHALF OF SYDNEY METRO WEST. SYDNEY AIRPORT	
										PENRITH CITY COUNCIL STATION STREET ST MARYS CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION GENERAL ARRANGEMENT PLAN	
										TNSW REGISTRATION No. DS2021/000076	
										SHEET No. SHT-RD-001202	
										ISSUE No. 2	
										© Transport for NSW	

REVISION IN PROGRESS

A3

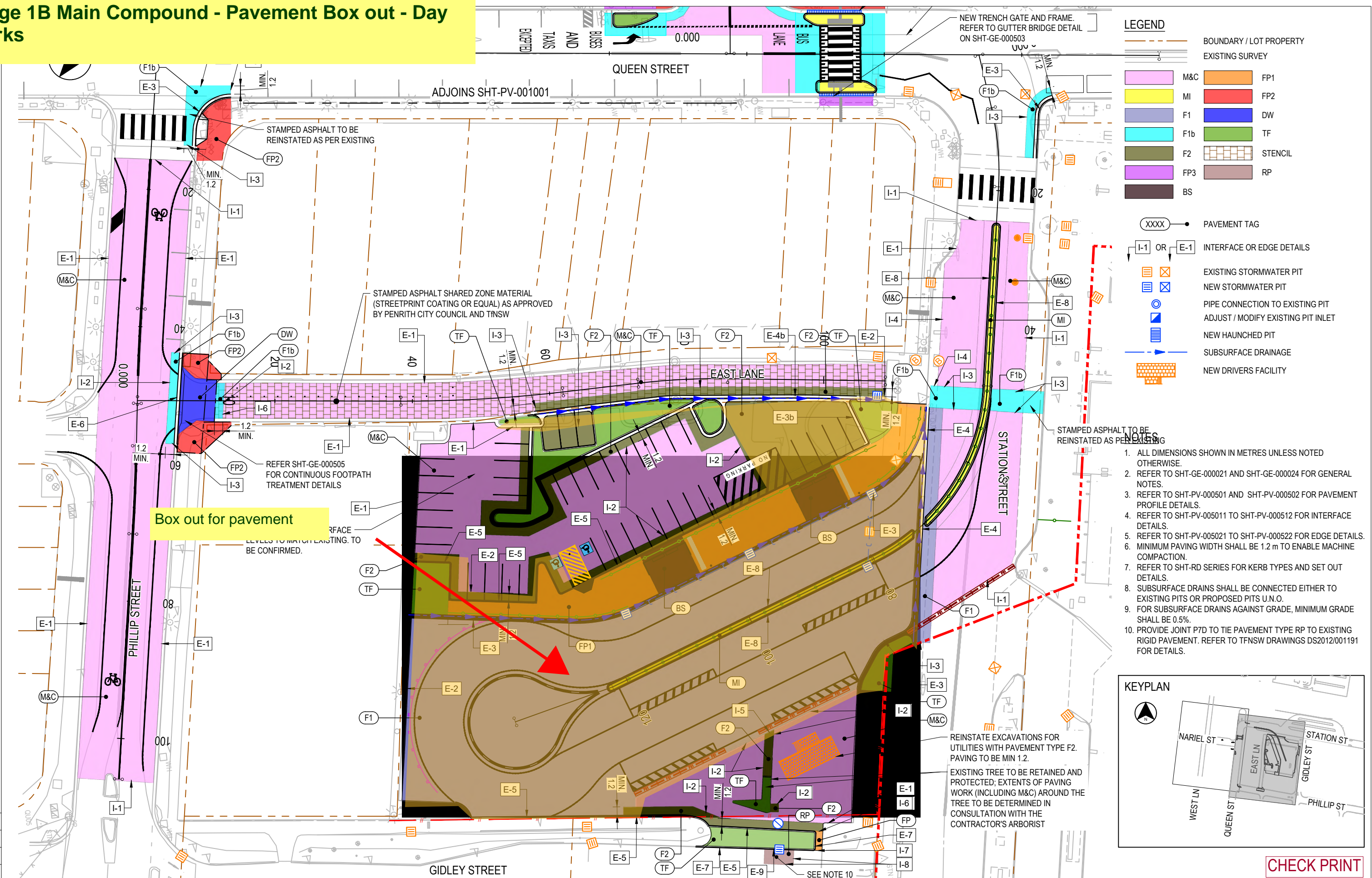
SHEET 2 OF 2

PART 1

ISSUE 2

Stage 1B Main Compound - Pavement Box out - Day works

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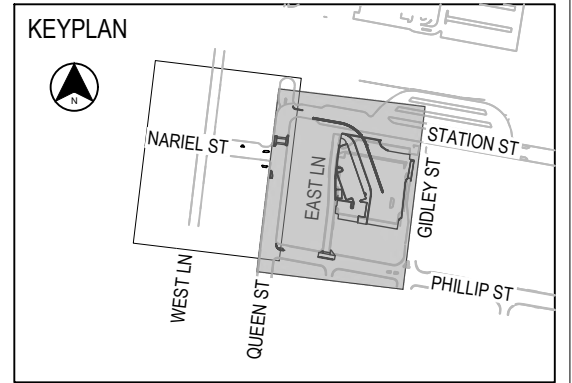


LEGEND

	BOUNDARY / LOT PROPERTY		M&C		FP1
	EXISTING SURVEY		MI		FP2
			F1		DW
			F1b		TF
			F2		STENCIL
			FP3		RP
			BS		

	PAVEMENT TAG
	INTERFACE OR EDGE DETAILS
	EXISTING STORMWATER PIT
	NEW STORMWATER PIT
	PIPE CONNECTION TO EXISTING PIT
	ADJUST / MODIFY EXISTING PIT INLET
	NEW HAUNCHED PIT
	SUBSURFACE DRAINAGE
	NEW DRIVERS FACILITY

- ALL DIMENSIONS SHOWN IN METRES UNLESS NOTED OTHERWISE.
- REFER TO SHT-GE-00021 AND SHT-GE-00024 FOR GENERAL NOTES.
- REFER TO SHT-PV-000501 AND SHT-PV-000502 FOR PAVEMENT PROFILE DETAILS.
- REFER TO SHT-PV-0005011 TO SHT-PV-0005012 FOR INTERFACE DETAILS.
- REFER TO SHT-PV-0005021 TO SHT-PV-0005022 FOR EDGE DETAILS.
- MINIMUM PAVING WIDTH SHALL BE 1.2 m TO ENABLE MACHINE COMPACTION.
- REFER TO SHT-RD SERIES FOR KERB TYPES AND SET OUT DETAILS.
- SUBSURFACE DRAINS SHALL BE CONNECTED EITHER TO EXISTING PITS OR PROPOSED PITS U.N.O.
- FOR SUBSURFACE DRAINS AGAINST GRADE, MINIMUM GRADE SHALL BE 0.5%.
- PROVIDE JOINT P7D TO TIE PAVEMENT TYPE RP TO EXISTING RIGID PAVEMENT. REFER TO TFNSW DRAWINGS DS2012/001191 FOR DETAILS.



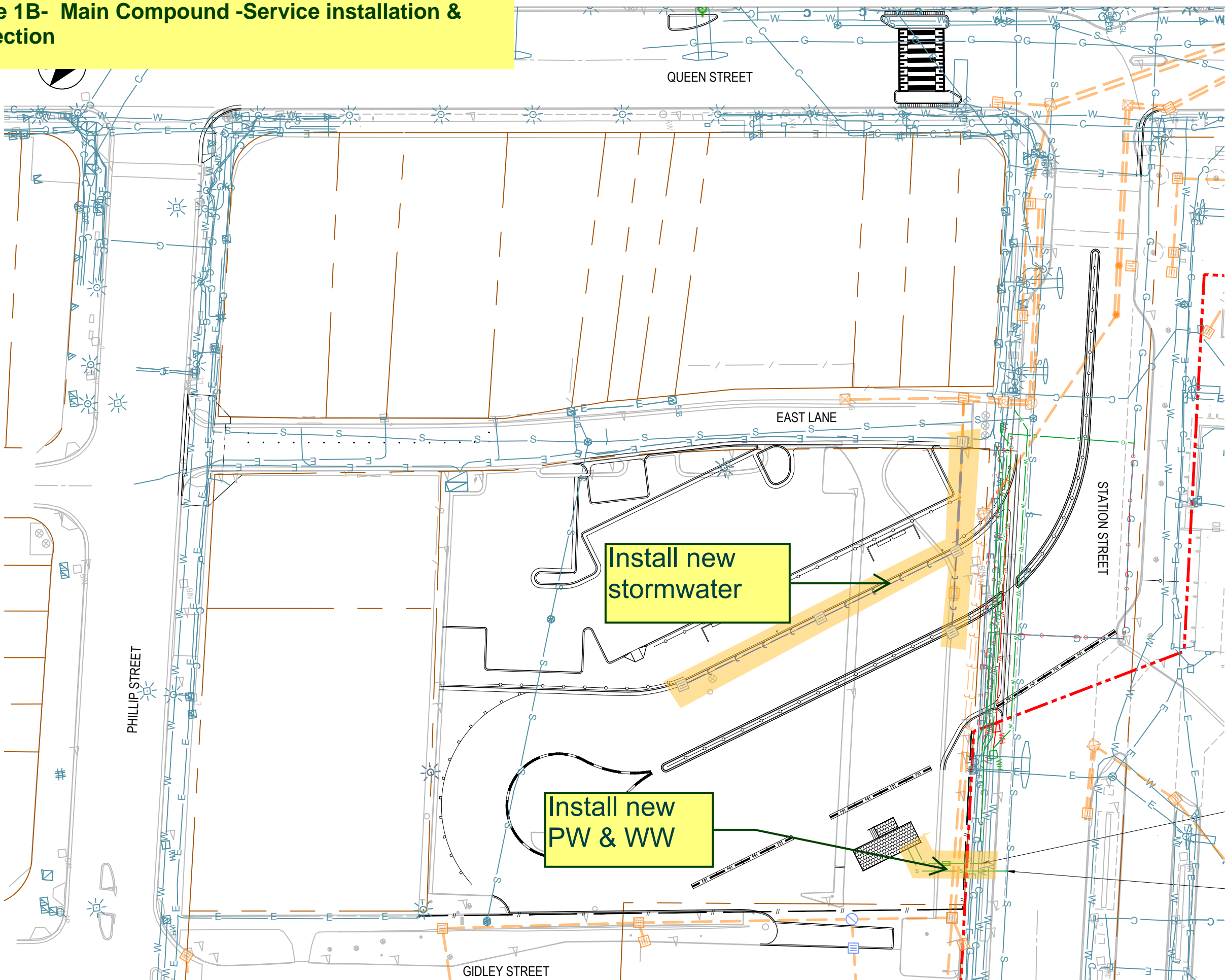
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EXTERNAL REFERENCE FILES	REV 0 1	DATE 03.03.21 22.04.21	AMENDMENT / REVISION DESCRIPTION ISSUED FOR 80% DETAILED DESIGN IFT	WVR No. S. CHAVA S. CHAVA	APPROVAL	SCALES ON A3 SIZE DRAWING 1:500 FULL SIZE A3	DRAWINGS / DESIGN PREPARED BY M. PANCITO V. ECCLES F. RASHID C. NAVARRO C. MAVOULAS S. CHAVA																														
<p style="font-size: 2em; opacity: 0.5; text-align: center;">REVISION IN PROGRESS</p>					<p>CHECK PRINT</p> <table border="1"> <tr> <th>DISCIPLINE</th> <th>PRELIM</th> <th>FINAL</th> <th>DATE</th> </tr> <tr> <td>M. PANCITO</td> <td></td> <td></td> <td>22/04/21</td> </tr> <tr> <td>V. ECCLES</td> <td></td> <td></td> <td>22/04/21</td> </tr> <tr> <td>F. RASHID</td> <td></td> <td></td> <td>22/04/21</td> </tr> <tr> <td>C. NAVARRO</td> <td></td> <td></td> <td>22/04/21</td> </tr> <tr> <td>C. MAVOULAS</td> <td></td> <td></td> <td>22/04/21</td> </tr> <tr> <td>CONFIRMED</td> <td>S. CHAVA</td> <td></td> <td>22/04/21</td> </tr> </table>		DISCIPLINE	PRELIM	FINAL	DATE	M. PANCITO			22/04/21	V. ECCLES			22/04/21	F. RASHID			22/04/21	C. NAVARRO			22/04/21	C. MAVOULAS			22/04/21	CONFIRMED	S. CHAVA		22/04/21	<p>Transport for NSW</p>	<p>TNSW REGISTRATION No. DS2021/000076</p> <p>ISSUE STATUS: DETAILED DESIGN</p> <p>EDMS No. -</p> <p>SHEET No. SHT-PV-001002</p> <p>ISSUE 1</p>	<p>SHEET 2 OF 2</p> <p>© Transport for NSW</p>
DISCIPLINE	PRELIM	FINAL	DATE																																		
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C. MAVOULAS			22/04/21																																		
CONFIRMED	S. CHAVA		22/04/21																																		

Stage 1B- Main Compound -Service installation & Protection

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LEGEND	
	EXISTING PROPERTY BOUNDARY
	INDICATIVE LIMITS OF METRO BOX CONSTRUCTION ZONE
	EXISTING RETAINED
	ABANDON / REMOVED
	NEW DESIGN
	NEW WORKS COMPLETED BY OTHERS
	NEW SANITARY SEWER SERVICE
	NEW WATER SERVICE
	NEW WATER METER
	UTILITY PROTECTION
	EXISTING STORMWATER PIT AND PIPE
	NEW STORMWATER PIT AND PIPE
	CONCRETE ENCASE NEW PIPE
	CONCRETE ENCASE EXISTING PIPE
	DRIVERS FACILITY

- NOTES**
- CONTRACTOR TO UNDERTAKE THEIR OWN DBYD AND POTHOLING INVESTIGATION PRIOR TO CONSTRUCTION ACTIVITIES.
 - PRIVATE SEWER MAIN AND FITTINGS SHALL BE PVC-U, MINIMUM SN8, SERIES 1, COLOUR GREY, AND IN ACCORDANCE WITH AS1260 AND WSA02-2002.
 - PRIVATE WATER MAIN AND FITTINGS SHALL BE POLYETHYLENE PE100 PIPE, MINIMUM PN 16, SERIES 1, COLOUR BLACK WITH BLUE STRIPES, AND IN ACCORDANCE WITH AS4130 AND WSA03-2011.
 - REFER TO SHT-EL-000003 FOR ELECTRICAL SERVICE TO DRIVERS FACILITY AND TEMPORARY BUS INTERCHANGE AREA.
 - CONNECTIONS SHOWN ARE INDICATIVE ONLY. CONTRACTOR TO FILE NECESSARY APPLICATIONS TO RELEVANT AUTHORITIES.

PROVIDE NEW 25mm WATER SUPPLY WITH 600mm MINIMUM COVER. SEE NOTE 3. CONNECT TO EXISTING SYDNEY WATER MAIN WITH SYDNEY WATER APPROVED WATER METER. SEE NOTE 5.

PROVIDE NEW 150mm SEWER MAIN AT 1.65% MINIMUM WITH 600mm MINIMUM COVER. SEE NOTE 2. CONNECT TO EXISTING SYDNEY WATER SEWER MAIN. UTILITY RELOCATIONS MAY BE REQUIRED TO INSTALL NEW SEWER SERVICE. SEE NOTE 5.

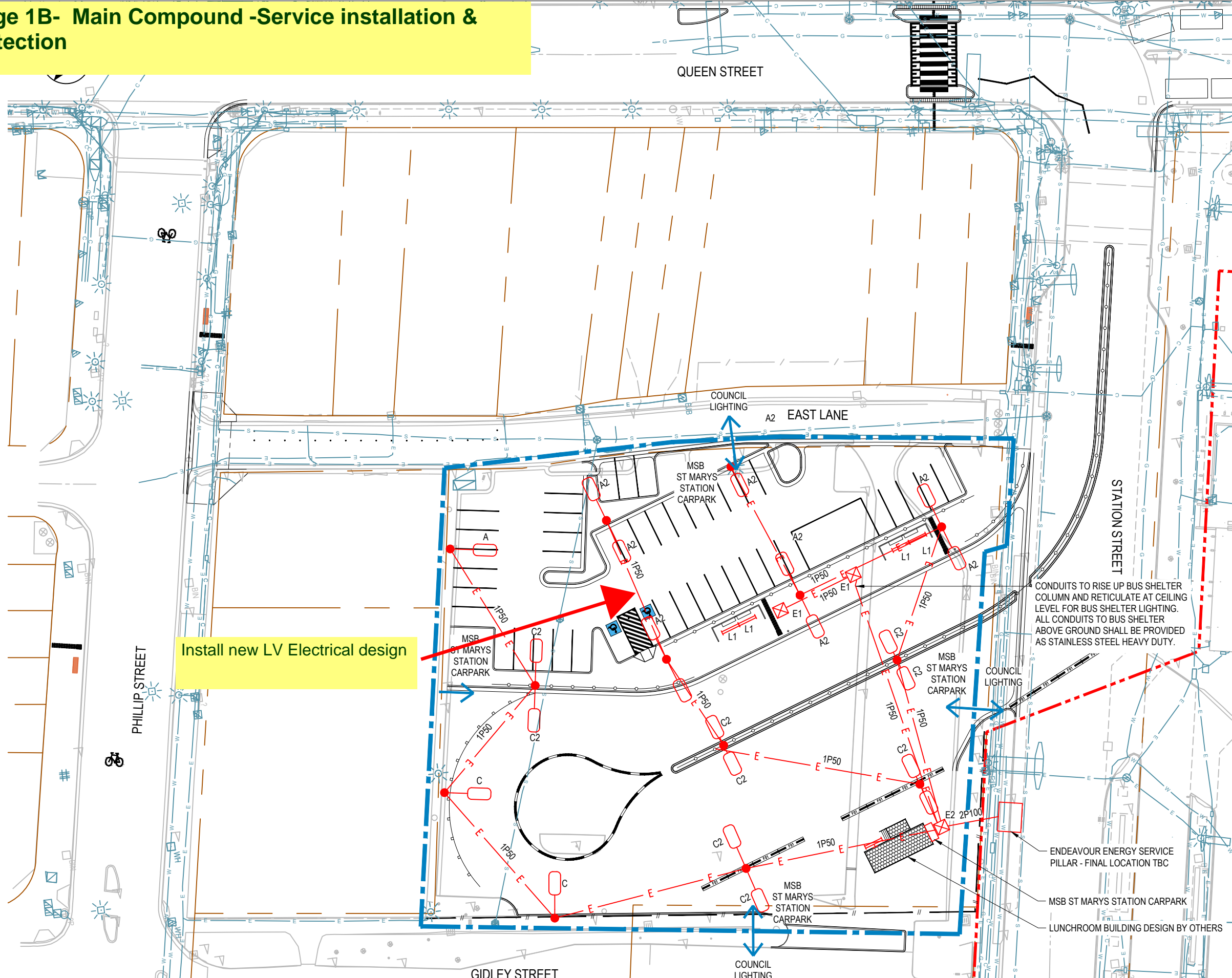
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EXTERNAL REFERENCE FILES	REV 0 1	DATE 03.03.21 22.04.21	AMENDMENT / REVISION DESCRIPTION ISSUED FOR 80% DETAILED DESIGN IFT	WVR No. S. CHAVA S. CHAVA	APPROVAL	SCALES ON A3 SIZE DRAWING 2.5 0 2.5 5 7.5m 1:500 FULL SIZE A3	DRAWINGS / DESIGN PREPARED BY M. PANCITO V. ECCLES C. ZHAO V. ECCLES C. MAVOULAS S. CHAVA
REVISION IN PROGRESS			CO-ORDINATE SYSTEM GDA 94 MGA ZONE 56	HEIGHT DATUM AHD	Transport for NSW PREPARED FOR GREATER SYDNEY DIVISION ON BEHALF OF SYDNEY METRO WEST, SYDNEY AIRPORT		TNSW REGISTRATION No. DS2021/000076 ISSUE STATUS FOR INFORMATION ONLY
						SHEET No. 1 SHT-HY-001001	SHEET 1 OF 1 PART 1 ISSUE 1

Stage 1B- Main Compound -Service installation & Protection

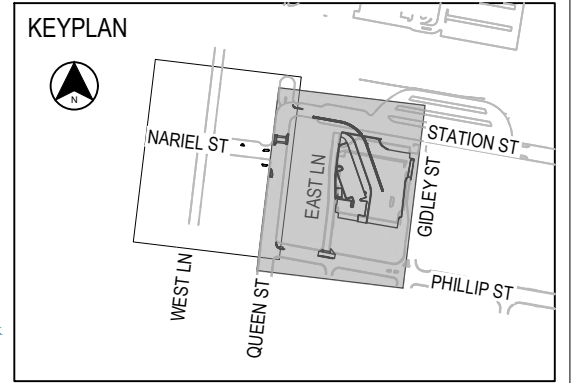
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- LEGEND**
- INDICATIVE LIMITS OF METRO BOX CONSTRUCTION ZONE
 - BOUNDARY / LOT PROPERTY
 - EXISTING SURVEY
 - EXISTING UTILITIES RETAINED
 - NEW LOW VOLTAGE ELECTRICAL CABLE INSTALLED IN HDUPVC ORANGE CONDUITS
 - MSB MAIN SWITCHBOARD
 - DB DISTRIBUTION BOARD
 - SBS SERVICES BOARD BY OTHER TRADES FCXXX DENOTES FIELD CABINET XXXX
 - SP SERVICE PILLAR
 - E1 X CABLE PIT - 300x300x600, CLASS C TYPE
 - E2 X CABLE PIT - 600x600x900, CLASS C TYPE
- NOTES**
- NOTE ON CABLE PITS:
INTERNAL DIMENSIONS (DxWxL mm)
TO AS 3996:209

CONDUITS TO RISE UP BUS SHELTER COLUMN AND RETICULATE AT CEILING LEVEL FOR BUS SHELTER LIGHTING. ALL CONDUITS TO BUS SHELTER ABOVE GROUND SHALL BE PROVIDED AS STAINLESS STEEL HEAVY DUTY.

Install new LV Electrical design



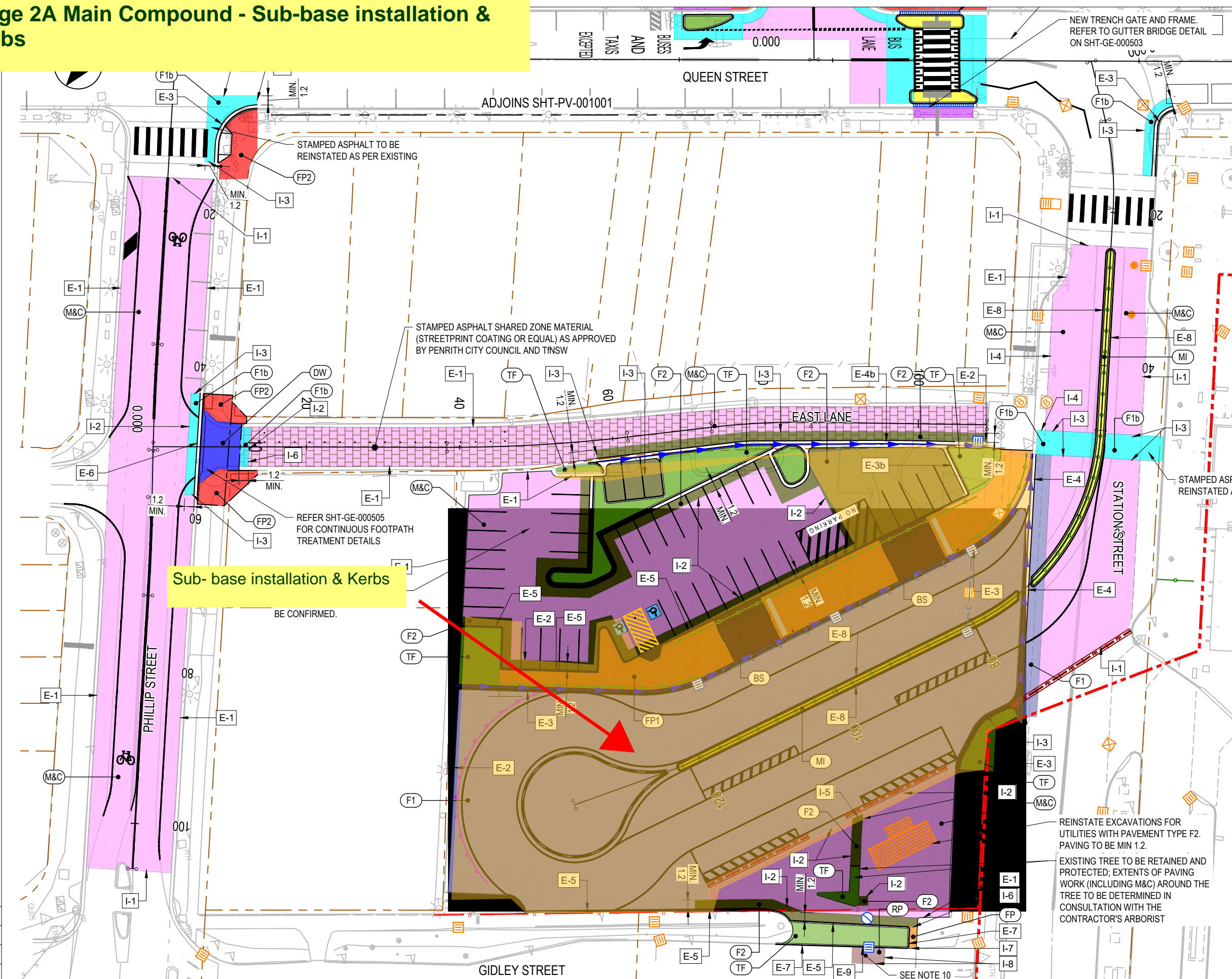
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EXTERNAL REFERENCE FILES	REV 0	DATE 03.03.21 22.04.21	AMENDMENT / REVISION DESCRIPTION ISSUED FOR 80% DETAILED DESIGN IFT	WVR No. S. CHAWA S. CHAWA	APPROVAL S. CHAWA S. CHAWA	SCALES ON A3 SIZE DRAWING 2.5 0 2.5 5 7.5m 1:500 FULL SIZE A3	DRAWINGS / DESIGN PREPARED BY		<div style="display: flex; align-items: center;"> </div>	
			REVISION IN PROGRESS		CO-ORDINATE SYSTEM GDA 94 MGA ZONE 56		HEIGHT DATUM AHD		TNSW REGISTRATION No. DS2021/000076 SHEET No. 1 ISSUE STATUS: FOR INFORMATION ONLY EDMS No. - SHEET No. SHT-EL-000003 ISSUE No. 1	
PREPARED FOR GREATER SYDNEY DIVISION ON BEHALF OF SYDNEY METRO WEST. SYDNEY AIRPORT										

Stage 2A Main Compound - Sub-base installation & Kerbs

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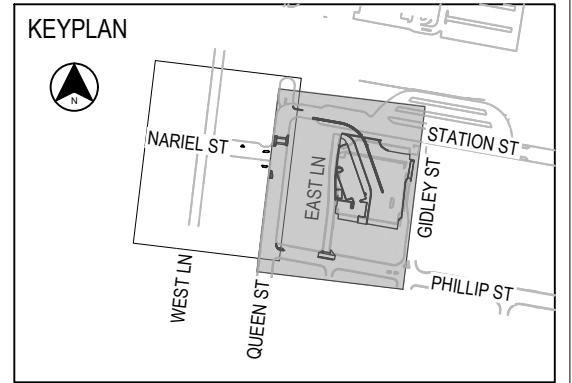


LEGEND

	BOUNDARY / LOT PROPERTY		M&C		FP1
	EXISTING SURVEY		MI		FP2
			F1		DW
			F1b		TF
			F2		STENCIL
			FP3		RP
			BS		

	PAVEMENT TAG
	INTERFACE OR EDGE DETAILS
	EXISTING STORMWATER PIT
	NEW STORMWATER PIT
	PIPE CONNECTION TO EXISTING PIT
	ADJUST / MODIFY EXISTING PIT INLET
	NEW HAUNCHED PIT
	SUBSURFACE DRAINAGE
	NEW DRIVERS FACILITY

- ALL DIMENSIONS SHOWN IN METRES UNLESS NOTED OTHERWISE.
- REFER TO SHT-GE-00021 AND SHT-GE-00024 FOR GENERAL NOTES.
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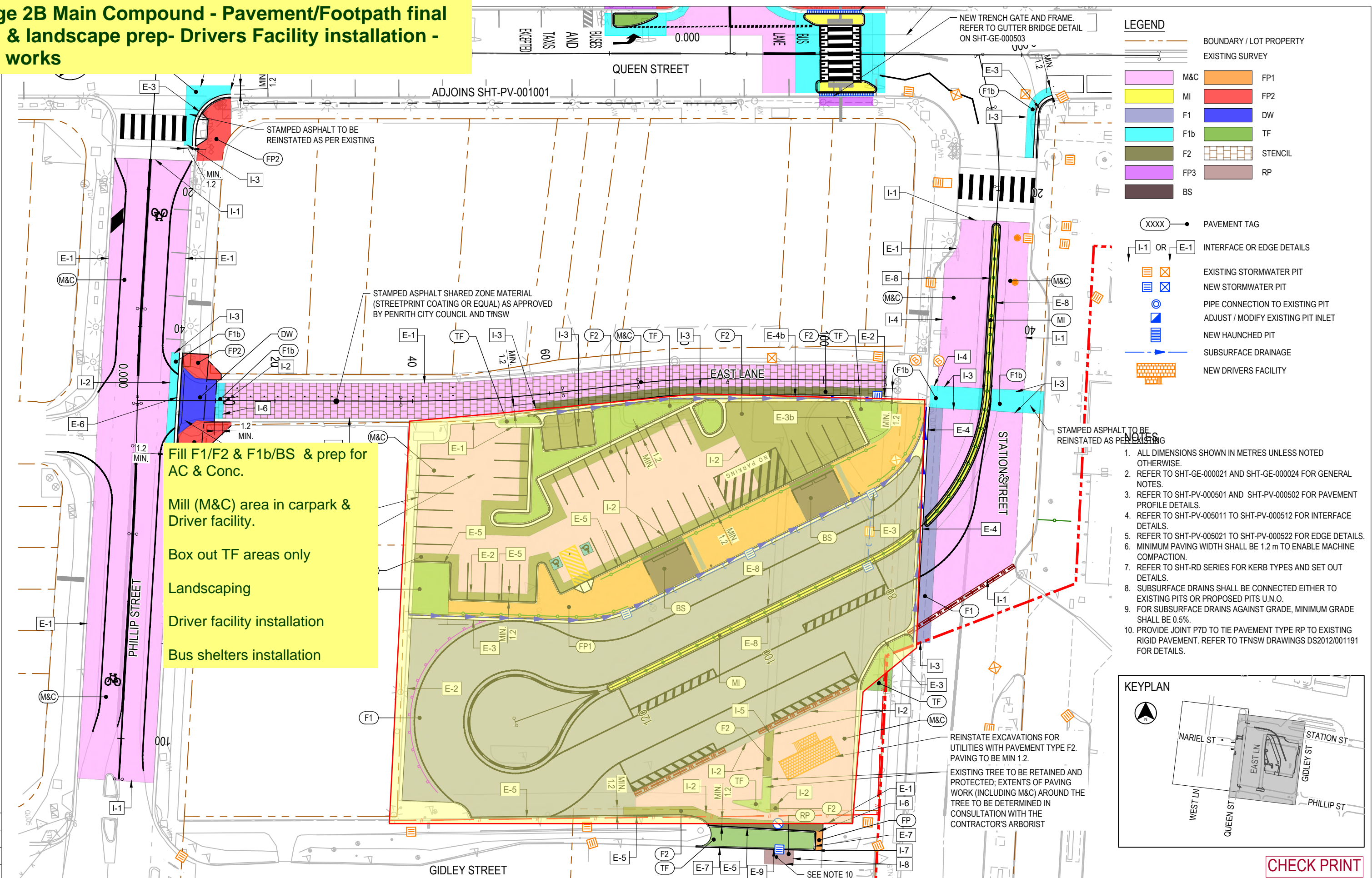
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C. MAVOULAS			22/04/21																																			
CONFIRMED	S. CHAVA		22/04/21																																			

Stage 2B Main Compound - Pavement/Footpath final trim & landscape prep- Drivers Facility installation - Day works

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Fill F1/F2 & F1b/BS & prep for AC & Conc.

Mill (M&C) area in carpark & Driver facility.

Box out TF areas only

Landscaping

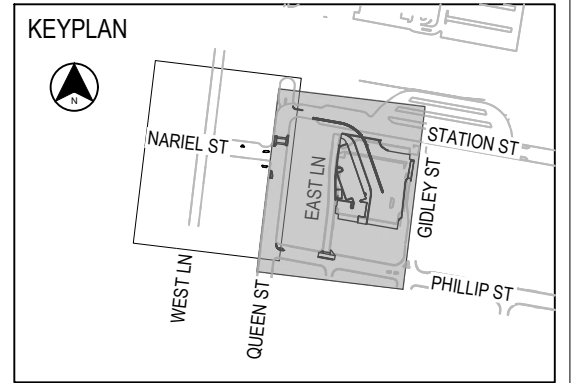
Driver facility installation

Bus shelters installation

LEGEND

- BOUNDARY / LOT PROPERTY
- EXISTING SURVEY
- M&C
- MI
- F1
- F1b
- F2
- FP3
- BS
- FP1
- FP2
- DW
- TF
- STENCIL
- RP
- XXXX - PAVEMENT TAG
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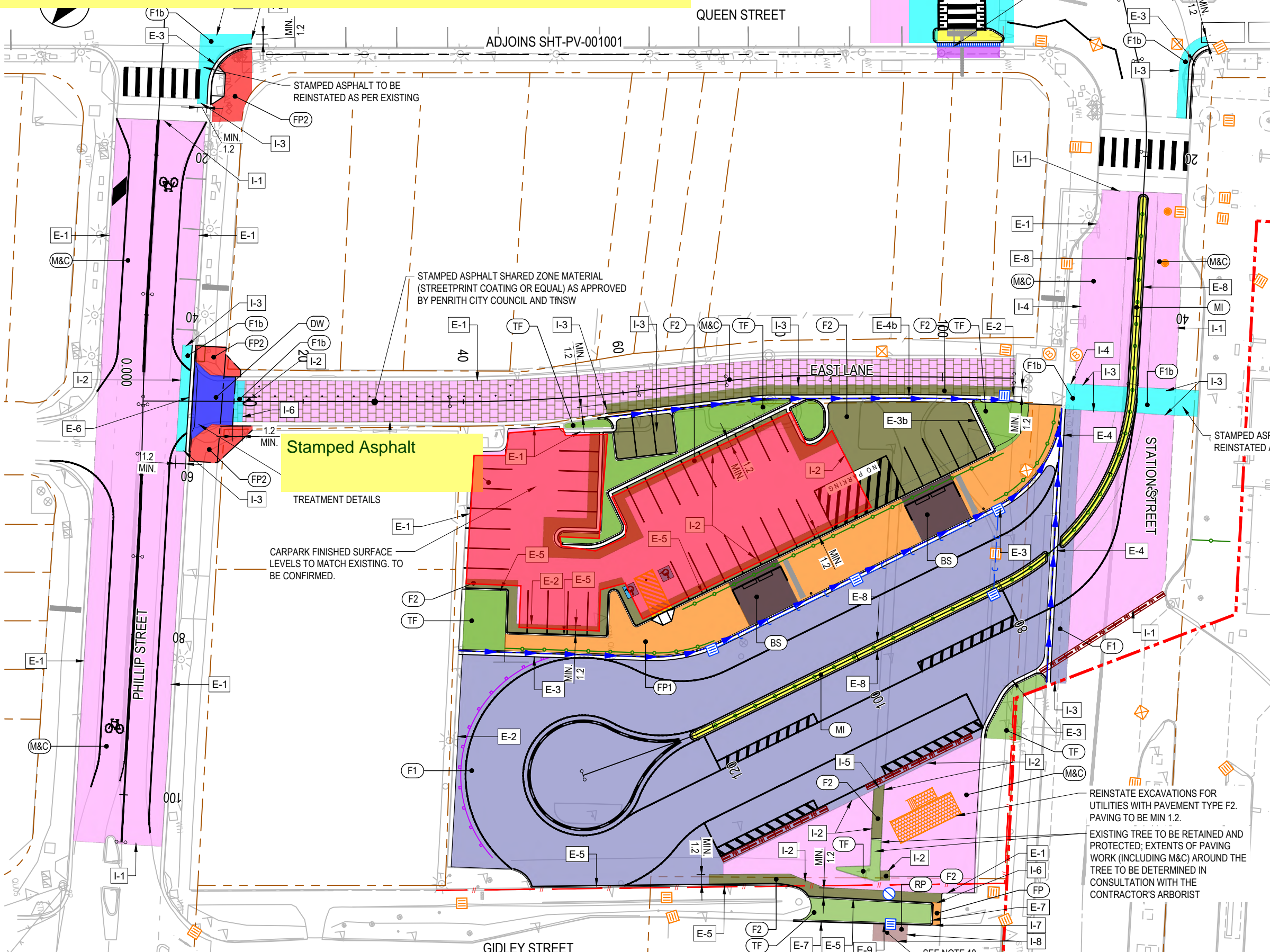
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THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

DRAWING FILE LOCATION / NAME PW/P0054029-SHT-PV-001002.DWG		DESIGN LOT CODE -	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING -	PLOT DATE / TIME 26-May-21 / 9:31:59 PM	PLOT BY MICHAEL PANCITO	CUSTOMER PENRITH CITY COUNCIL STATION STREET ST MARYS CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION PAVEMENT PLAN	A3																												
EXTERNAL REFERENCE FILES	REV 0 1	DATE 03.03.21 22.04.21	AMENDMENT / REVISION DESCRIPTION ISSUED FOR 80% DETAILED DESIGN IFT	WVR No. S. CHAVA S. CHAVA	APPROVAL	SCALES ON A3 SIZE DRAWING 1:500 FULL SIZE A3	DRAWINGS / DESIGN PREPARED BY M. PANCITO V. ECCLES F. RASHID C. NAVARRO C. MAVOULAS S. CHAVA																												
REVISION IN PROGRESS		CO-ORDINATE SYSTEM GDA 94 MGA ZONE 56		HEIGHT DATUM AHD		<p>CHECK PRINT</p> <table border="1"> <thead> <tr> <th>DISCIPLINE</th> <th>PRELIM</th> <th>FINAL</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td>M. PANCITO</td> <td></td> <td></td> <td>22/04/21</td> </tr> <tr> <td>V. ECCLES</td> <td></td> <td></td> <td>22/04/21</td> </tr> <tr> <td>F. RASHID</td> <td></td> <td></td> <td>22/04/21</td> </tr> <tr> <td>C. NAVARRO</td> <td></td> <td></td> <td>22/04/21</td> </tr> <tr> <td>C. MAVOULAS</td> <td></td> <td></td> <td>22/04/21</td> </tr> <tr> <td>S. CHAVA</td> <td></td> <td></td> <td>22/04/21</td> </tr> </tbody> </table>		DISCIPLINE	PRELIM	FINAL	DATE	M. PANCITO			22/04/21	V. ECCLES			22/04/21	F. RASHID			22/04/21	C. NAVARRO			22/04/21	C. MAVOULAS			22/04/21	S. CHAVA			22/04/21
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NSW Transport for NSW		PREPARED FOR GREATER SYDNEY DIVISION ON BEHALF OF SYDNEY METRO WEST, SYDNEY AIRPORT		TNSW REGISTRATION No. DS2021/000076		SHEET No. SHT-PV-001002 PART 1																													
ISSUE STATUS DETAILED DESIGN		EDMS No. -		SHEET No. SHT-PV-001002		PART 1																													

Main Car park Stage 3- Stamped asphalt along on Main car park

QUEEN STREET
ADJOINS SHT-PV-001001



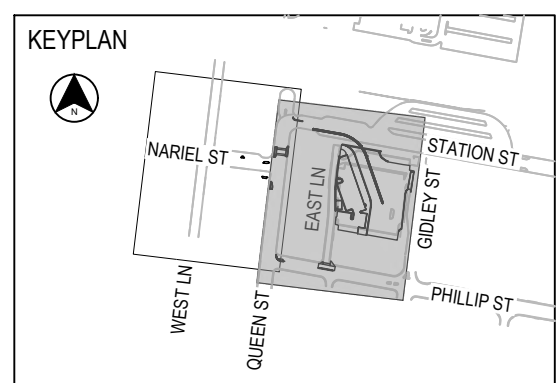
LEGEND

	BOUNDARY / LOT PROPERTY
	EXISTING SURVEY
	M&C
	MI
	F1
	F1b
	F2
	FP3
	BS
	FP1
	FP2
	DW
	TF
	STENCIL
	RP

- PAVEMENT TAG
- INTERFACE OR EDGE DETAILS
- EXISTING STORMWATER PIT
- NEW STORMWATER PIT
- PIPE CONNECTION TO EXISTING PIT
- ADJUST / MODIFY EXISTING PIT INLET
- NEW HAUNCHED PIT
- SUBSURFACE DRAINAGE
- NEW DRIVERS FACILITY

Stamped asphalt at main car park

1. ALL DIMENSIONS SHOWN IN METRES UNLESS NOTED OTHERWISE.
2. REFER TO SHT-GE-000021 AND SHT-GE-000024 FOR GENERAL NOTES.
3. REFER TO SHT-PV-000501 AND SHT-PV-000502 FOR PAVEMENT PROFILE DETAILS.
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CHECK PRINT

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PW/P0054029-SHT-PV-001002.DWG	
EXTERNAL REFERENCE FILES	
REV	DATE
0	03.03.21
1	22.04.21

AMENDMENT / REVISION DESCRIPTION

ISSUED FOR 80% DETAILED DESIGN IFT

REVISION IN PROGRESS

DESIGN LOT CODE	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING
-	-
WVR No.	APPROVAL
	S. CHAVA
	S. CHAVA
SCALES ON A3 SIZE DRAWING	
1 : 500 FULL SIZE A3	
CO-ORDINATE SYSTEM	HEIGHT DATUM
GDA 94 MGA ZONE 56	AHD

PLOT DATE / TIME	PLOT BY
26-May-21 / 9:31:59 PM	MICHAEL PANCITO
CLIENT	
PENRITH CITY COUNCIL	

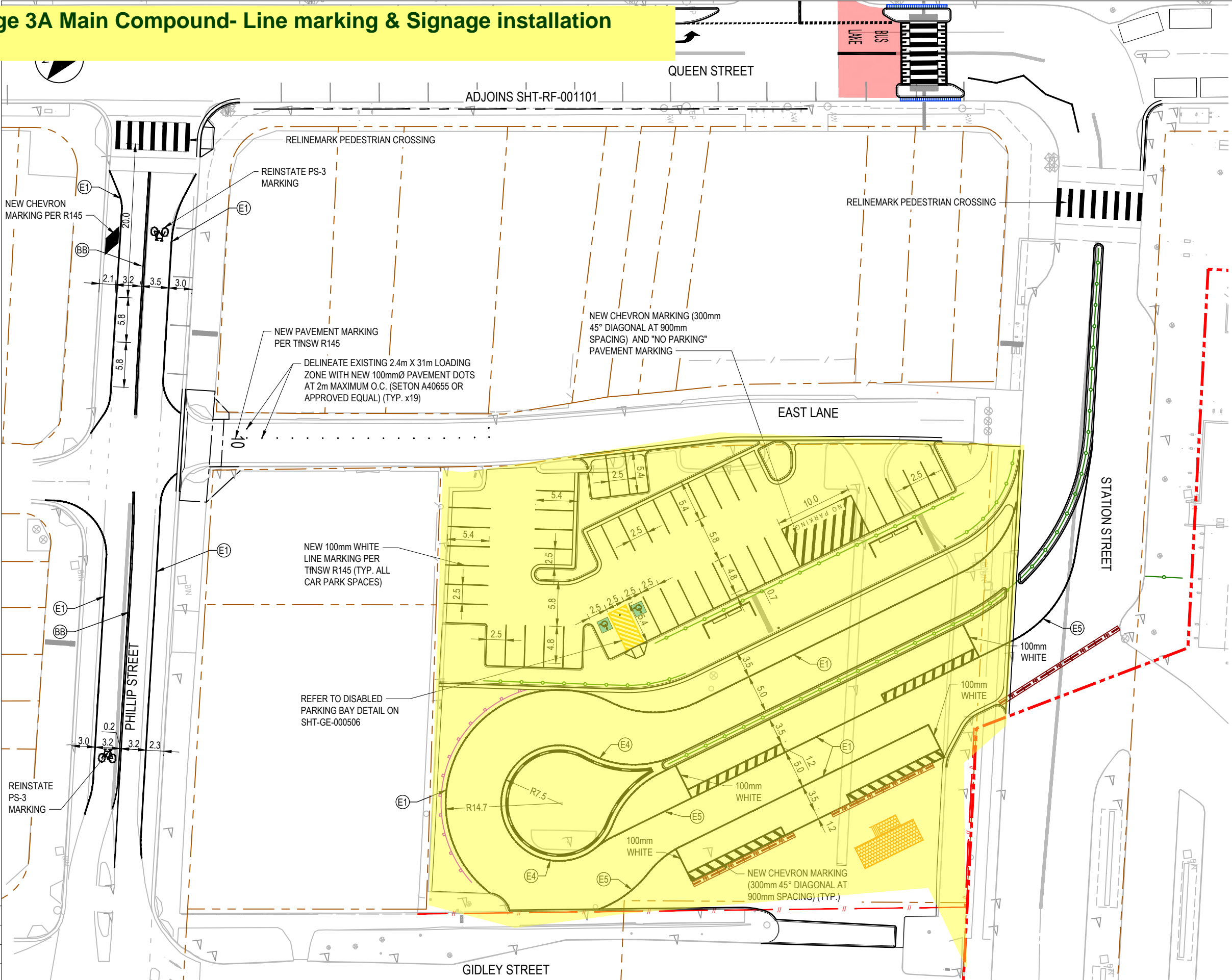
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DISCIPLINE	V. ECCLES
DISCIPLINE	F. RASHID
DISCIPLINE	C. NAVARRO
DISCIPLINE	C. MAVOULAS
BACKDRAFTED/CORRECTED	S. CHAVA
CONFIRMED	S. CHAVA

PREPARED FOR
GREATER SYDNEY DIVISION
ON BEHALF OF
SYDNEY METRO WEST, SYDNEY AIRPORT

PENRITH CITY COUNCIL STATION STREET ST MARYS CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION PAVEMENT PLAN	
TNSW REGISTRATION No.	DS2021/000076
ISSUE STATUS	DETAILED DESIGN
EDMS No.	-
SHEET No.	SHT-PV-001002
ISSUE	1

Stage 3A Main Compound- Line marking & Signage installation

Last saved by: MICHAEL.PANCITO(2021-05-26) Last Plotted: 2021-05-26 15:00:00



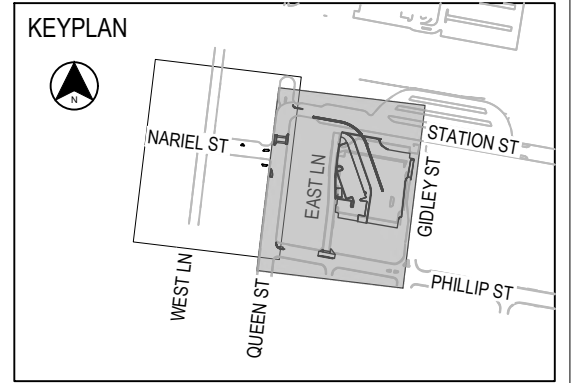
LEGEND

- BOUNDARY / LOT PROPERTY
- EXISTING SURVEY
- INDICATIVE LIMITS OF METRO BOX CONSTRUCTION ZONE
- NEW PROPERTY FENCE
- NEW PEDESTRIAN FENCE
- NEW GUARDRAIL
- NEW PRECAST CONCRETE TYPE F BARRIER
- LINEMARKING TAG
- PAVEMENT ARROW TAG
- NEW BUS SHELTER
- NEW DRIVERS FACILITY
- EXISTING TCS POSTS & MAST ARMS (TO BE MAINTAINED)

NOTES

- ALL REGULATORY SIGNPOSTING AND LINEMARKING SHOWN ON THESE DRAWINGS WILL NEED TO BE APPROVED BY WRITTEN AUTHORISATION FROM AN OFFICER AUTHORISED UNDER SECTION 5.9 OF THE TNSW DELEGATIONS MANUAL.

Line marking on D/S



CHECK PRINT


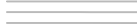








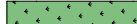
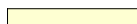






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EXTERNAL REFERENCE FILES	REV 0	DATE 03.03.21 22.04.21	AMENDMENT / REVISION DESCRIPTION ISSUED FOR 80% DETAILED DESIGN IFT	WVR No.	APPROVAL S. CHAVA S. CHAVA	SCALES ON A3 SIZE DRAWING 2.5 0 2.5 5 7.5m 1:500 FULL SIZE A3	DRAWINGS / DESIGN PREPARED BY	PREPARED FOR GREATER SYDNEY DIVISION ON BEHALF OF SYDNEY METRO WEST. SYDNEY AIRPORT	TNSW REGISTRATION No. DS2021/000076																														
<div style="font-size: 2em; opacity: 0.5; transform: rotate(-15deg);">REVISION IN PROGRESS</div>			CO-ORDINATE SYSTEM GDA 94 MGA ZONE 56	HEIGHT DATUM AHD	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2">CHECK PRINT</th> <th>PRELIM</th> <th>FINAL</th> </tr> <tr> <td>DISCIPLINE</td> <td>M. PANCITO</td> <td>INITIAL</td> <td>DATE</td> </tr> <tr> <td>DISCIPLINE</td> <td>V. ECCLES</td> <td></td> <td>22.04.21</td> </tr> <tr> <td>DISCIPLINE</td> <td>S. ANDREWS</td> <td></td> <td>22.04.21</td> </tr> <tr> <td>DISCIPLINE</td> <td>V. ECCLES</td> <td></td> <td>22.04.21</td> </tr> <tr> <td>BACKDRAFTED/CORRECTED BY</td> <td>C. MAVOULAS</td> <td></td> <td>22.04.21</td> </tr> <tr> <td>CONFIRMED</td> <td>S. CHAVA</td> <td></td> <td>22.04.21</td> </tr> </table>		CHECK PRINT		PRELIM	FINAL	DISCIPLINE	M. PANCITO	INITIAL	DATE	DISCIPLINE	V. ECCLES		22.04.21	DISCIPLINE	S. ANDREWS		22.04.21	DISCIPLINE	V. ECCLES		22.04.21	BACKDRAFTED/CORRECTED BY	C. MAVOULAS		22.04.21	CONFIRMED	S. CHAVA		22.04.21	ISSUE STATUS DETAILED DESIGN	EDMS No.	SHEET No. SHT-RF-001102	PART 1	ISSUE 1
			CHECK PRINT				PRELIM	FINAL																															
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Transport for NSW																																							

External Work- Stage 1A Nariel St & Queen St

Last saved by: MICHAEL.PANCITO(2021-05-26) Last Plotted: 2021-05-26





CARINYA AVENUE

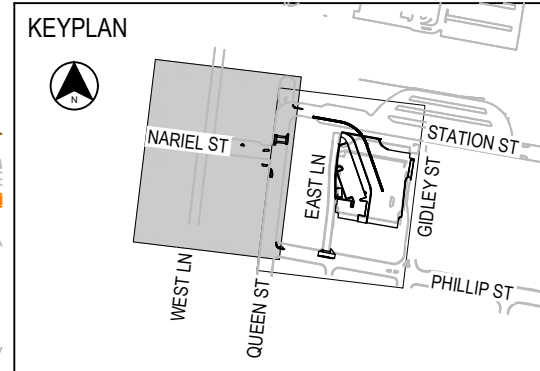
LEGEND

-  BOUNDARY / LOT PROPERTY
-  EXISTING SURVEY
-  INDICATIVE LIMITS OF METRO BOX CONSTRUCTION ZONE
-  NEW PROPERTY FENCE
-  NEW PEDESTRIAN FENCE
-  NEW GUARDRAIL
-  NEW PRECAST CONCRETE TYPE F BARRIER
-  NEW BUS LANE
-  NEW KISS AND RIDE PARKING
-  NEW LANDSCAPE
-  TEMPORARY BUS DROP OFF
-  TEMPORARY BUS PICK UP
-  TEMPORARY BUS LAYOVER
-  TEMPORARY PEDESTRIAN AREA
-  PARKING SPACE TO BE REMOVED
-  EXISTING PAVEMENT
-  NEW DRIVERS FACILITY
-  NEW BUS SHELTER

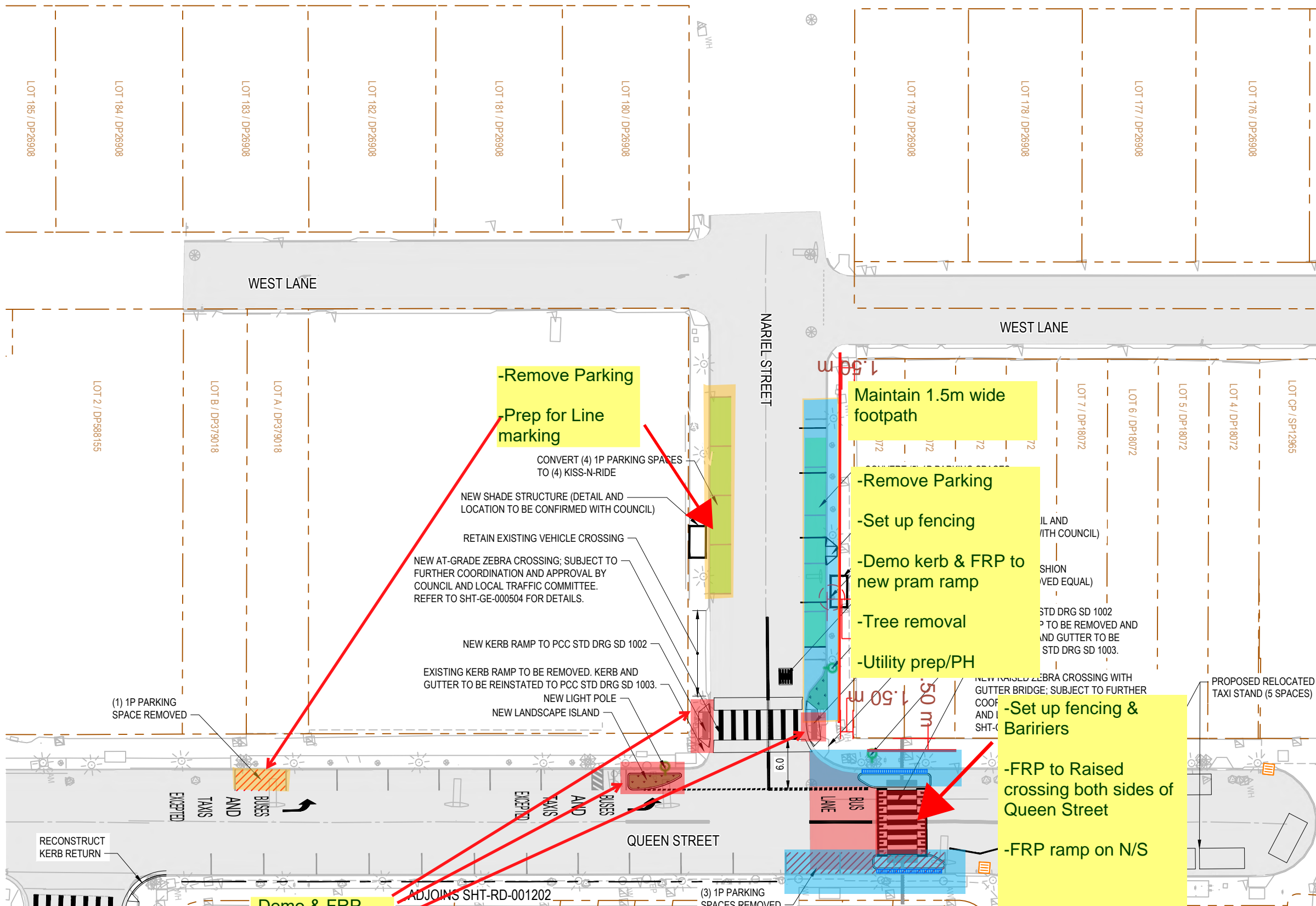
NOTES

1. PENRITH CITY COUNCIL MAY MANAGE AND USE THE RETAINED VENESS PLACE CAR PARK AREA TEMPORARILY FOR PUBLIC CAR PARKING. THIS AREA IS ONLY AVAILABLE WHILE THE TEMPORARY BUS INTERCHANGE IS IN OPERATION (BETWEEN APPROXIMATELY MAR 2022 AND MAR 2027)

-  Parking removal
-  Work compound set up 24hrs
-  Pedestrian walkway (1.5m)
-  N/S areas



CHECK PRINT



-Remove Parking
-Prep for Line marking

Maintain 1.5m wide footpath

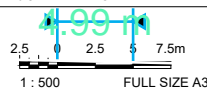
-Remove Parking
-Set up fencing
-Demo kerb & FRP to new pram ramp
-Tree removal
-Utility prep/PH

-Set up fencing & Barriers
-FRP to Raised crossing both sides of Queen Street
-FRP ramp on N/S

-Demo & FRP kerb & pram ramps on N/S
-FRP raised ramp on N/S

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DRAWING FILE LOCATION / NAME PW:/P0054029-SHT-RD-001201.DWG	
EXTERNAL REFERENCE FILES	REV DATE
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	1 03.03.21
	2 22.04.21

DESIGN LOT CODE	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING
WVR No.	APPROVAL
	S. CHAVA S. CHAVA S. CHAVA
 1 : 500 FULL SIZE A3	
CO-ORDINATE SYSTEM	HEIGHT DATUM
GDA 94 MGA ZONE 56	AHD

PLOT DATE / TIME 26-May-21 / 9:34:20 PM	PLOT BY MICHAEL.PANCITO
CHECK PRINT	
DISCIPLINE	M. PANCITO
DISCIPLINE	V. ECCLES
DISCIPLINE	S. ANDREWS
DISCIPLINE	V. ECCLES
DISCIPLINE	C. VAVOULAS
DISCIPLINE	S. CHAVA

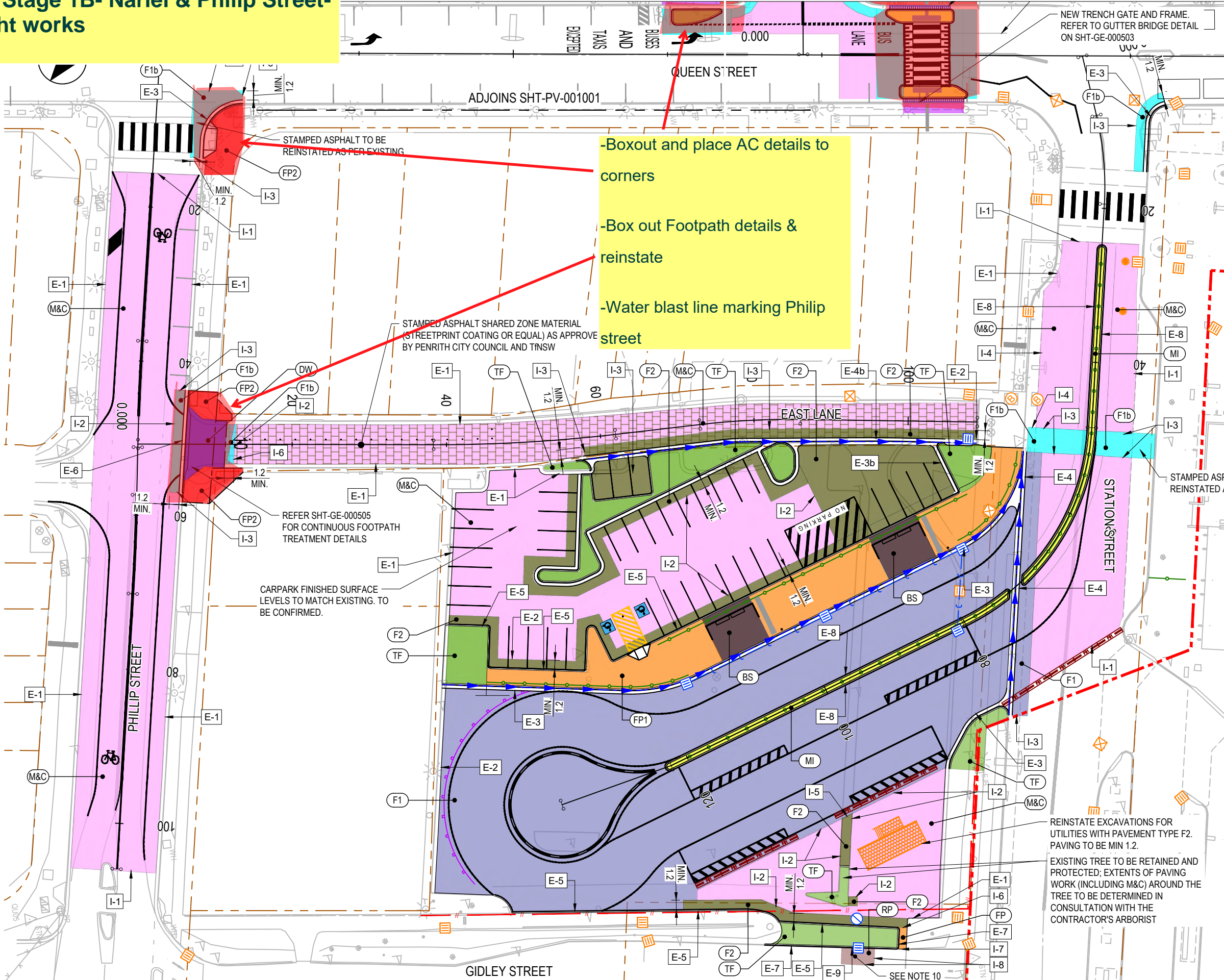



PREPARED FOR
 GREATER SYDNEY DIVISION
 ON BEHALF OF
 SYDNEY METRO WEST. SYDNEY AIRPORT

PENRITH CITY COUNCIL STATION STREET ST MARYS CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION GENERAL ARRANGEMENT PLAN		A3
SHEET 1 OF 2		
TNSW REGISTRATION No.	DS2021/000076	PART 1
ISSUE STATUS	DETAILED DESIGN	SHEET No. SHT-RD-001201
EDMS No.		ISSUE 2

EW Stage 1B- Nariel & Philip Street- Night works

Last saved by: MICHAEL.PANCITO(2021-05-26) Last Plotted: 2021-



-Boxout and place AC details to corners
-Box out Footpath details & reinstate
-Water blast line marking Philip street

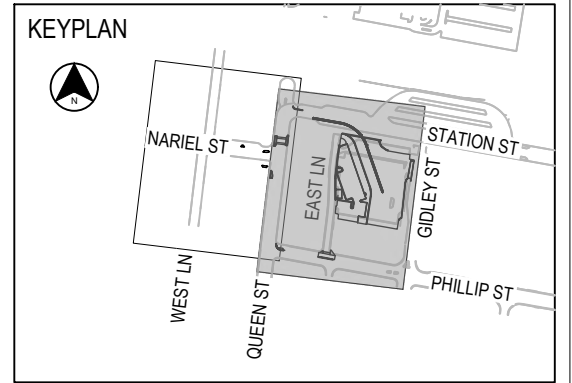
LEGEND

	BOUNDARY / LOT PROPERTY		M&C		FP1
	EXISTING SURVEY		MI		FP2
			F1		DW
			F1b		TF
			F2		STENCIL
			FP3		RP
			BS		

	PAVEMENT TAG
	INTERFACE OR EDGE DETAILS
	EXISTING STORMWATER PIT
	NEW STORMWATER PIT
	PIPE CONNECTION TO EXISTING PIT
	ADJUST / MODIFY EXISTING PIT INLET
	NEW HAUNCHED PIT
	SUBSURFACE DRAINAGE
	NEW DRIVERS FACILITY

N/S areas

- ALL DIMENSIONS SHOWN IN METRES UNLESS NOTED OTHERWISE.
- REFER TO SHT-GE-000021 AND SHT-GE-000024 FOR GENERAL NOTES.
- REFER TO SHT-PV-000501 AND SHT-PV-000502 FOR PAVEMENT PROFILE DETAILS.
- REFER TO SHT-PV-0005011 TO SHT-PV-0005012 FOR INTERFACE DETAILS.
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<p style="font-size: 2em; color: red; opacity: 0.5;">REVISION IN PROGRESS</p>			<p>CHECK PRINT</p> <table border="1"> <tr> <th>DISCIPLINE</th> <th>PRELIM</th> <th>FINAL</th> </tr> <tr> <td>M. PANCITO</td> <td>22.04.21</td> <td>22.04.21</td> </tr> <tr> <td>V. ECCLES</td> <td></td> <td>22.04.21</td> </tr> <tr> <td>F. RASHID</td> <td></td> <td>22.04.21</td> </tr> <tr> <td>C. NAVARRO</td> <td></td> <td>22.04.21</td> </tr> <tr> <td>C. MAVOULAS</td> <td></td> <td>22.04.21</td> </tr> <tr> <td>CONFIRMED</td> <td>S. CHAVA</td> <td>22.04.21</td> </tr> </table>	DISCIPLINE	PRELIM	FINAL	M. PANCITO	22.04.21	22.04.21	V. ECCLES		22.04.21	F. RASHID		22.04.21	C. NAVARRO		22.04.21	C. MAVOULAS		22.04.21	CONFIRMED	S. CHAVA	22.04.21	<p>Transport for NSW</p> <p>PREPARED FOR GREATER SYDNEY DIVISION ON BEHALF OF SYDNEY METRO WEST, SYDNEY AIRPORT</p>
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C. MAVOULAS		22.04.21																							
CONFIRMED	S. CHAVA	22.04.21																							

EW Stage 2A Nariel & Philip Street - Night works

Last saved by: MICHAEL.PANCITO(2021-05-26) Last Plotted: 2021-05-26 10:30:00 AM

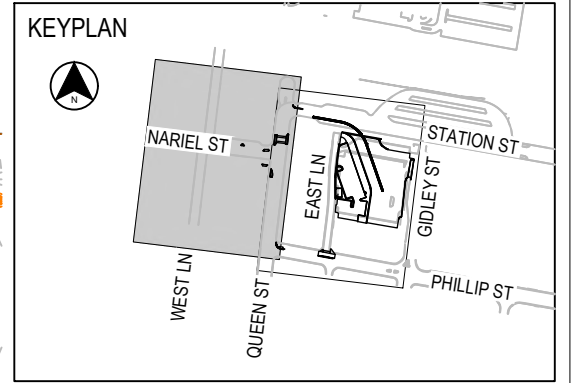
LEGEND

	BOUNDARY / LOT PROPERTY		FP1
	EXISTING SURVEY		FP2
	M&C		DW
	MI		TF
	F1		STENCIL
	F1b		RP
	F2		
	FP3		
	BS		

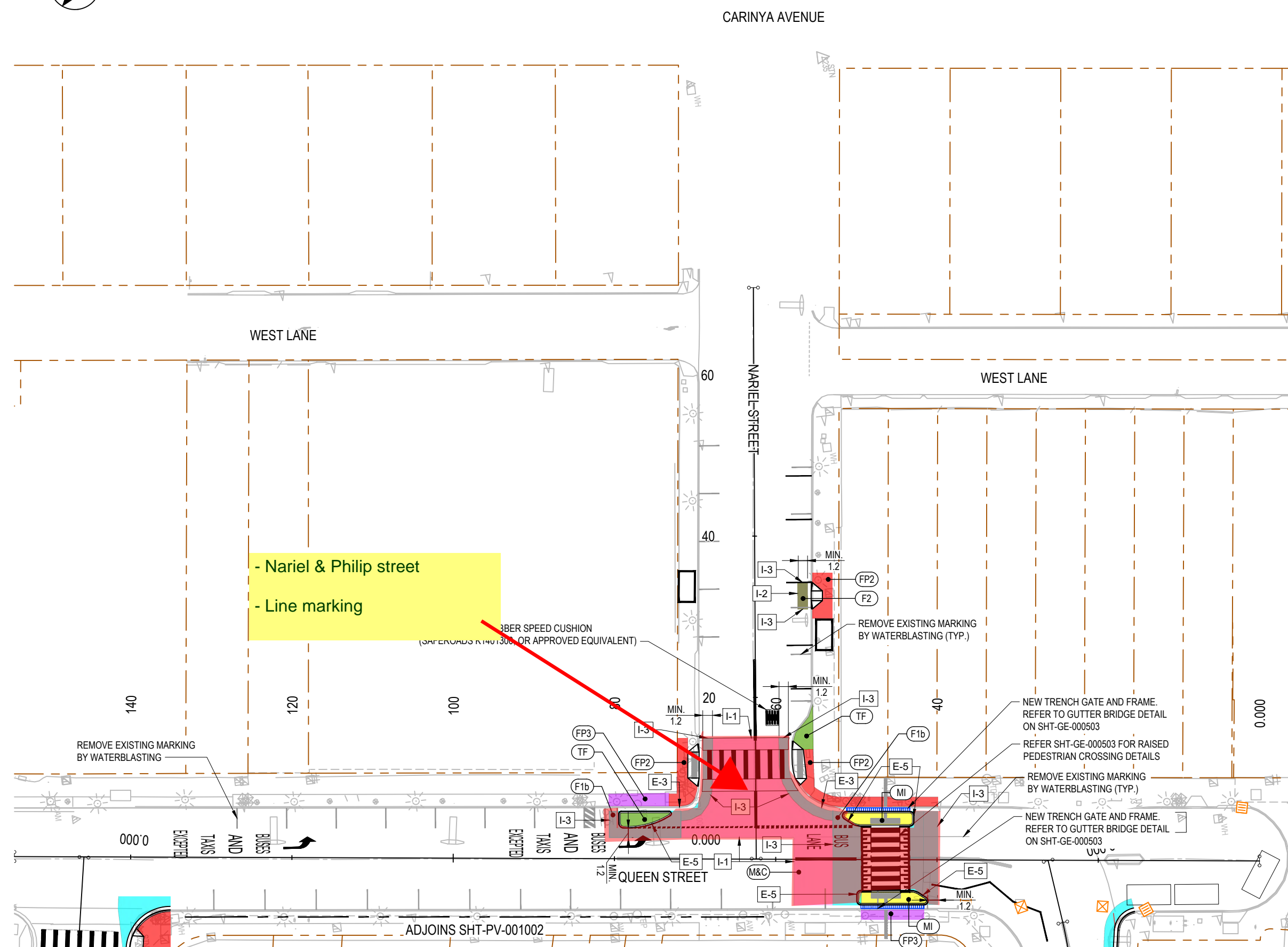
	PAVEMENT TAG
	INTERFACE OR EDGE DETAILS
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N/S areas

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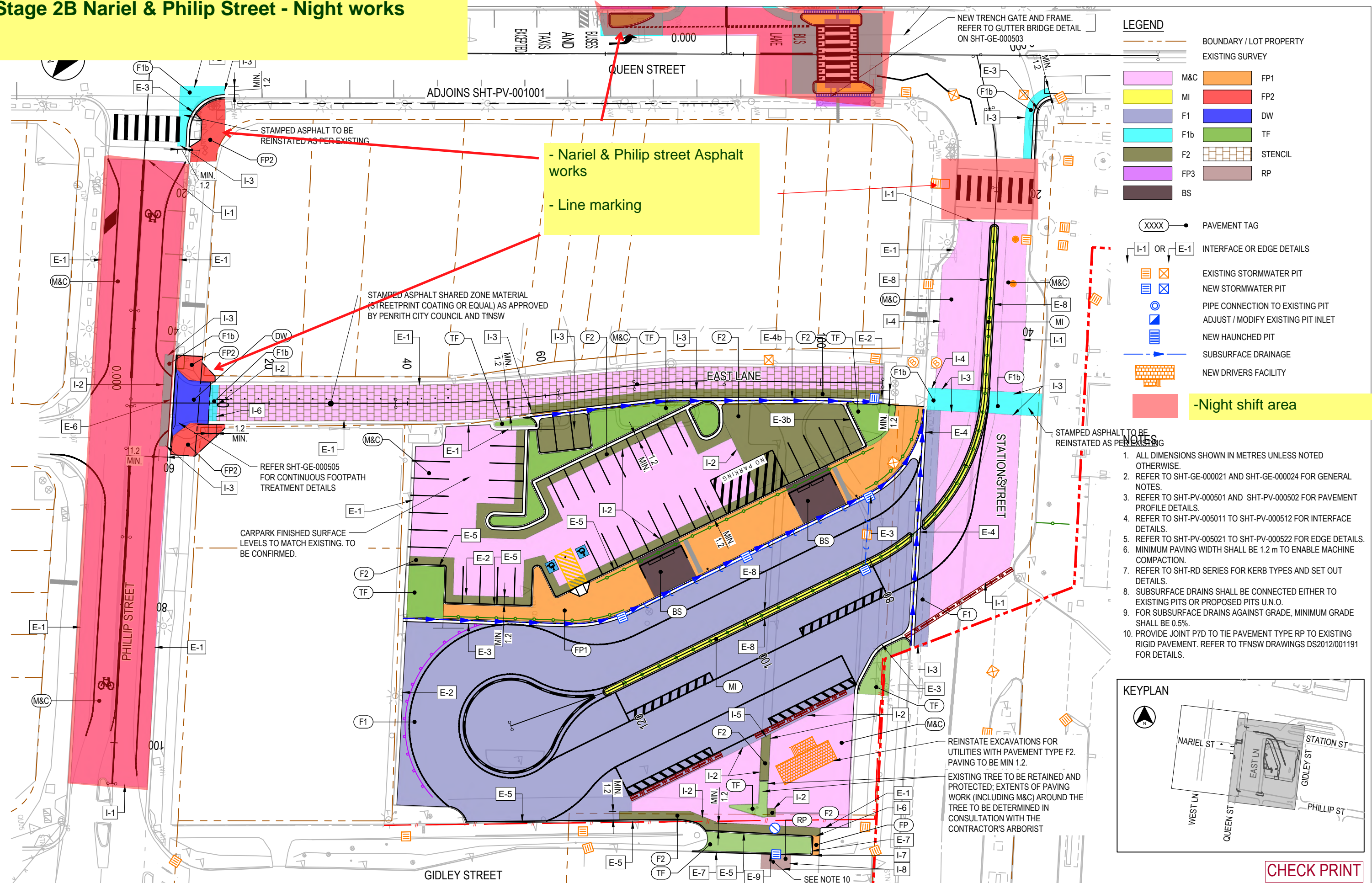


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		CO-ORDINATE SYSTEM GDA 94 MGA ZONE 56		HEIGHT DATUM AHD		SHEET 1 OF 2 © Transport for NSW																																					

EW Stage 2B Nariel & Philip Street - Night works

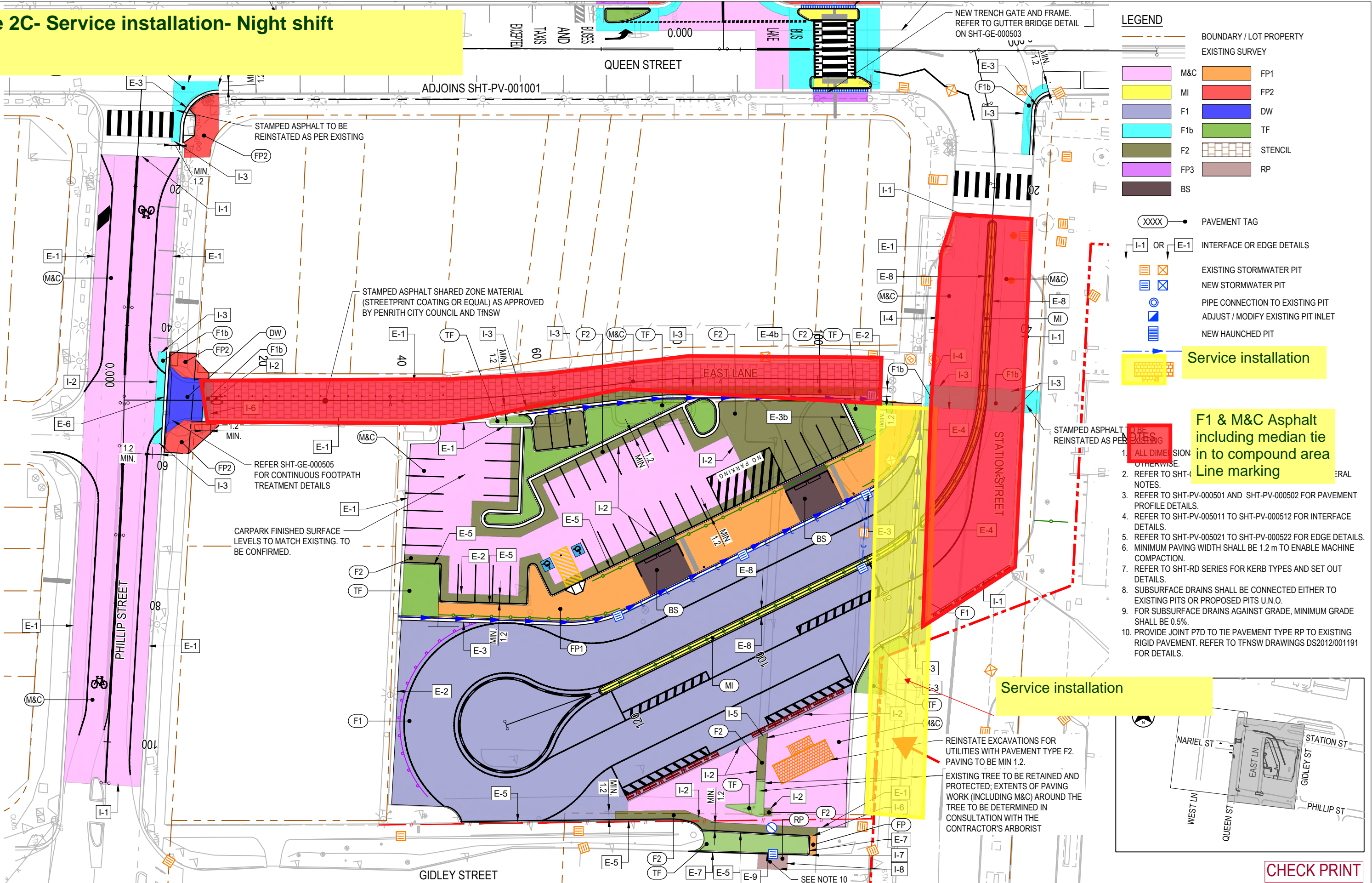
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Stage 2C- Service installation- Night shift



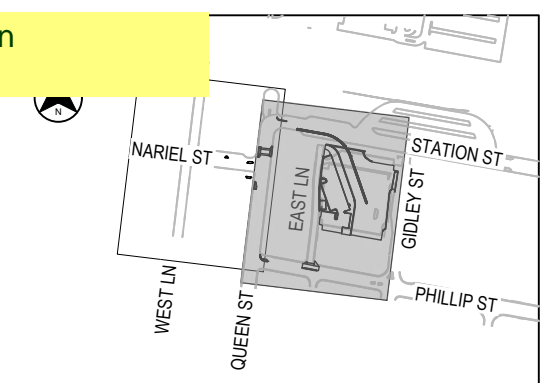
LEGEND	
	BOUNDARY / LOT PROPERTY
	EXISTING SURVEY
	M&C
	MI
	F1
	F1b
	F2
	FP3
	BS
	FP1
	FP2
	DW
	TF
	STENCIL
	RP

- PAVEMENT TAG
- INTERFACE OR EDGE DETAILS
- EXISTING STORMWATER PIT
- NEW STORMWATER PIT
- PIPE CONNECTION TO EXISTING PIT
- ADJUST / MODIFY EXISTING PIT INLET
- NEW HAUNCHED PIT

Service installation

F1 & M&C Asphalt including median tie in to compound area Line marking

1. ALL DIMENSION OTHERWISE.
2. REFER TO SHT-NOTES.
3. REFER TO SHT-PV-000501 AND SHT-PV-000502 FOR PAVEMENT PROFILE DETAILS.
4. REFER TO SHT-PV-0005011 TO SHT-PV-0005012 FOR INTERFACE DETAILS.
5. REFER TO SHT-PV-0005021 TO SHT-PV-0005022 FOR EDGE DETAILS.
6. MINIMUM PAVING WIDTH SHALL BE 1.2 m TO ENABLE MACHINE COMPACTION.
7. REFER TO SHT-RD SERIES FOR KERB TYPES AND SET OUT DETAILS.
8. SUBSURFACE DRAINS SHALL BE CONNECTED EITHER TO EXISTING PITS OR PROPOSED PITS U.N.O.
9. FOR SUBSURFACE DRAINS AGAINST GRADE, MINIMUM GRADE SHALL BE 0.5%.
10. PROVIDE JOINT P7D TO TIE PAVEMENT TYPE RP TO EXISTING RIGID PAVEMENT. REFER TO TFNSW DRAWINGS DS2012/001191 FOR DETAILS.



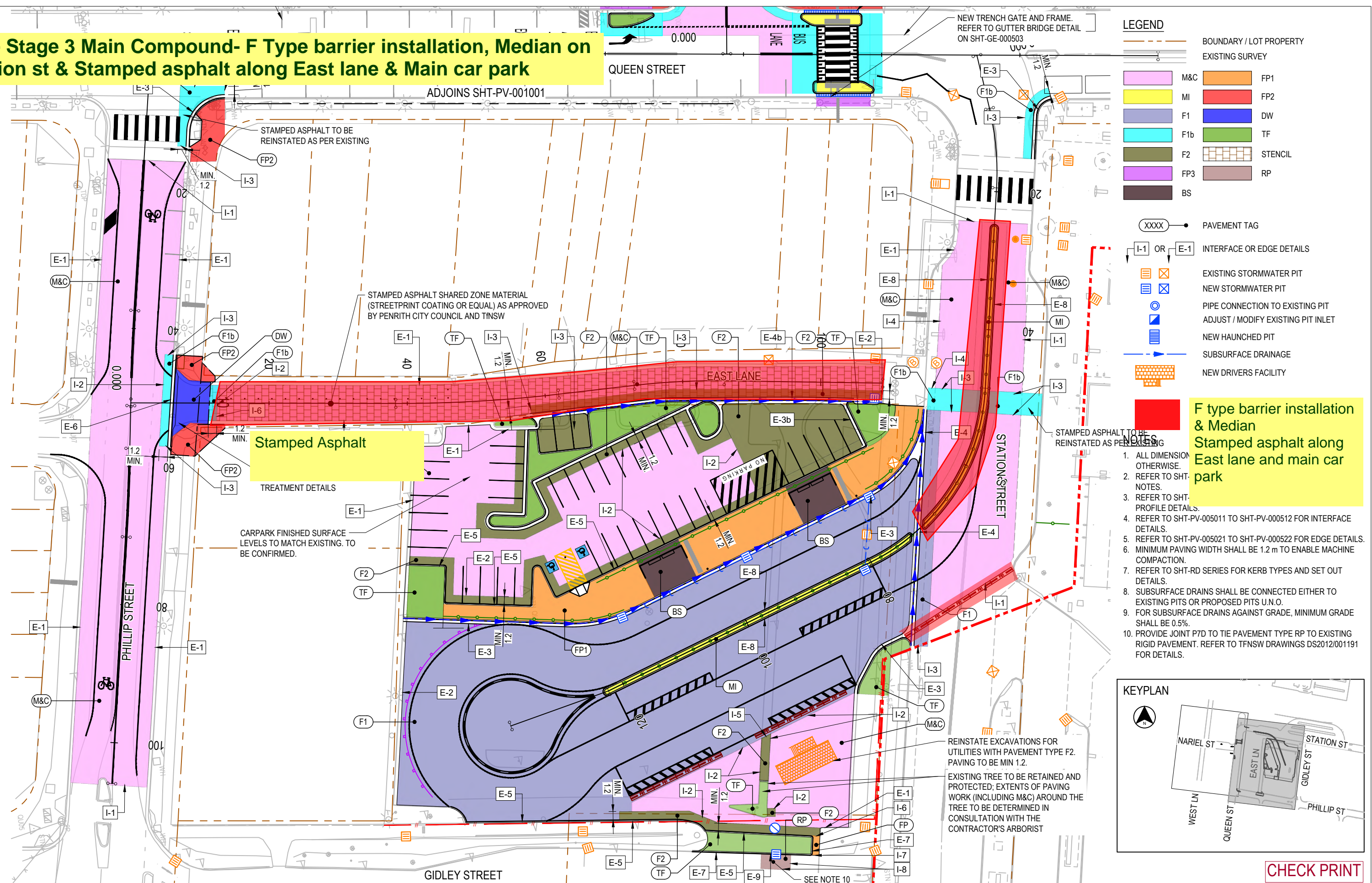
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EW- Stage 3 Main Compound- F Type barrier installation, Median on station st & Stamped asphalt along East lane & Main car park

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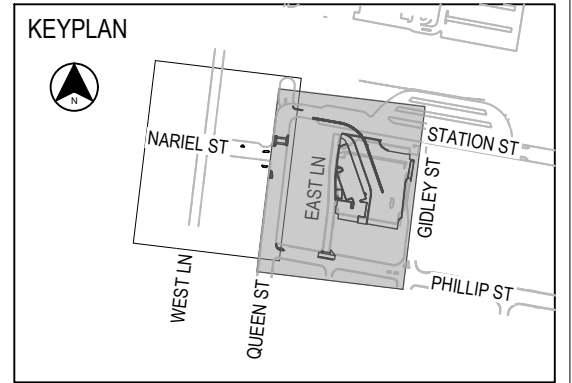
LEGEND

	BOUNDARY / LOT PROPERTY		FP1
	EXISTING SURVEY		FP2
	M&C		DW
	MI		TF
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	F2		
	FP3		
	BS		

- PAVEMENT TAG
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- PIPE CONNECTION TO EXISTING PIT
- ADJUST / MODIFY EXISTING PIT INLET
- NEW HAUNCHED PIT
- SUBSURFACE DRAINAGE
- NEW DRIVERS FACILITY

F type barrier installation & Median
Stamped asphalt along East lane and main car park

1. ALL DIMENSION OTHERWISE.
2. REFER TO SHT-NOTES.
3. REFER TO SHT-PROFILE DETAILS.
4. REFER TO SHT-PV-005011 TO SHT-PV-000512 FOR INTERFACE DETAILS.
5. REFER TO SHT-PV-005021 TO SHT-PV-000522 FOR EDGE DETAILS.
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APPENDIX C

Construction Equipment Schedules and Sound Power Levels

Table B-1 Construction Equipment Schedules and Sound Power Levels

Stage	Activity	Construction Equipment	Sound Power Level - SWL (L_{Aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL ($L_{Aeq,15min}$ dBA)	Activity SWL ($L_{A1,1min}$ dBA)
SE – Site Establishment	Setup Environmental Controls/Tree Protection Install ATF Fencing (Standard Hours)	Semi/Bogie	105	5	100	107	112
		All Terrain Forklift	96	5	91		
		Delivery / Hiab Truck	105	5	100		
		14t Excavator with Bucket	105	5	105		
		Hand Tools	90	5	85		
1A – Main Car Park	Potholing (Standard Hours and Out-of-Hours)	Wet Vac	103	10	101	115	120
		Dry Vac	103	10	101		
		2t Tipper Truck	105	5	100		
		Plate Compactor	109	5	104		
		Jumping Jack	106	5	101		
		Delivery / Hiab Truck	105	5	100		
		Concrete Saw	118	5	113		
		Jackhammer	113	5	108		
		Hand Tools	90	5	85		
1A – Main Car Park	Demo Car Park AC (Standard Hours)	14t Excavator with Bucket / Ripper	105	5	105	114	120
		14t Excavator with Hammer	118	5	113		
		Rigid Truck / Bogie	105	5	100		
		2t Tipper Truck	105	5	100		
		Concrete Saw	118	5	113		

Stage	Activity	Construction Equipment	Sound Power Level - SWL (L _{Aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL (L _{Aeq,15min} dBA)	Activity SWL (L _{A1,1min} dBA)
1B - Main Car Park	Pavement Box Out (Standard Hours)	20t Excavator with Bucket	105	5	100	106	115
		Rigid Truck / Bogie	105	5	100		
		Watercart	107	5	102		
1B - Main Car Park	Pavement Box Out Service Installation - Stormwater (Standard Hours)	14t Excavator with Bucket	105	5	100	114	120
		14t Excavator with Hammer	118	5	113		
		Plate Compactor	109	5	104		
		Jumping Jack	106	5	101		
		Rigid Truck / Bogie	105	5	100		
		2t Tipper Truck	105	5	100		
1B - Main Car Park	Pavement Box Out Service Installation - Electrical Services (Standard Hours)	5t Excavator with Bucket	95	5	105	112	117
		5t Excavator with Hammer	115	5	110		
		Plate Compactor	109	5	104		
		Jumping Jack	106	5	101		
		Rigid Truck / Bogie	105	5	100		
		2t Tipper Truck	105	5	100		
2A - Main Car Park	Sub base installation (Pavement works) (Standard Hours)	14t Excavator with Bucket	105	5	100	110	114
		Positrack	90	5	85		
		Watercart	107	5	102		
		8t Smooth Drum Roller	107	10	105		

Stage	Activity	Construction Equipment	Sound Power Level - SWL (L _{Aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL (L _{Aeq,15min} dBA)	Activity SWL (L _{A1,1min} dBA)
		Rigid Trucks - Bogies/10 Wheelers	105	5	100		
		Concrete Agitator	109	5	104		
		Kerb placing machine	109	5	104		
2A - Main Car Park	Kerb Construction (Standard Hours)	Concrete Agitator	109	5	104	107	114
		Kerb Placing Machine	109	5	104		
		Hand tools	90	5	85		
2B - Main Car Park	Pavement Final Trim Works (Standard Hours)	14t Excavator with Bucket	105	5	100	107	115
		Positrack	90	5	85		
		Watercart	107	5	102		
		CC10 Vibratory Roller*	109	5	104		
2B - Main Car Park	Landscape Prep Works (Standard Hours)	8t Excavator with Bucket	100	5	105	105	115
		Positrack	90	5	85		
2B - Main Car Park	AC Prep Works (Standard Hours)	Milling Machine / Profiler	117	5	112	113	119
		Positrack	90	5	85		
		14t Excavator with Bucket	105	5	100		
		Rigid Trucks - Bogies/10 Wheelers	105	5	100		
2B - Main Car Park	Driver Facility Installation (Standard Hours)	20t Franna	98	15	98	102	110
		Hiab Truck	105	5	100		
2B - Main Car Park	Bus Shelter Installation	20t Franna	98	15	98	102	110
		Hiab Truck	105	5	100		

Stage	Activity	Construction Equipment	Sound Power Level - SWL (L _{Aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL (L _{Aeq,15min} dBA)	Activity SWL (L _{A1,1min} dBA)
	(Standard Hours)						
2B - Main Car Park	Asphalt Works - Mill and Correct in Car Park	Milling Machine / Profiler	117	5	112	113	119
		Positrack	90	5	85		
		Paver	114	10	112		
	(Standard Hours)	Rigid Trucks - Bogies/10 Wheelers	105	5	100		
3 - Main Car Park	Stamped Asphalt	Plate Compactor	109	5	104	104	114
	(Standard Hours)	Positrack	90	5	85		
3A - Main Car Park	Line Marking	Line Marking Truck	108	10	106	106	110
	(Standard Hours)	Line Marking Gernie	90	5	85		
3A - Main Car Park	Signage Installation	Hand Tools	90	5	85	113	120
	(Standard Hours)	Core Drill	118	5	113		
External Works							
Stage	Activity	Construction Equipment	Sound Power Level - SWL (L _{Aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL (L _{Aeq,15min} dBA)	Activity SWL (L _{A1,1min} dBA)
1A - External Works - Nariel and Queen Street	Set up ATF Fencing/Satellite Site Compounds (Night Works)	Hand Tools	90	5	85	100	105
		2t Tipper	105	5	100		
	Potholing	Wet Vac	103	10	101	113	120

Stage	Activity	Construction Equipment	Sound Power Level - SWL (L _{Aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL (L _{Aeq,15min} dBA)	Activity SWL (L _{A1,1min} dBA)
1A - External Works - Nariel and Queen Street	(Night Works)	Dry Vac	103	10	101		
		2t Tipper Truck	105	5	100		
		Plate Compactor	109	5	104		
		Jumping Jack	106	5	101		
		Delivery / Hiab Truck	105	5	100		
		Quick Cut Concrete Saw*	118	3	111		
		Jackhammer	113	5	108		
1A - External Works - Nariel and Queen Street	Remove Parking Lanes (Night Works)	Hand Tools	90	5	85	112	120
		Jackhammer	113	5	108		
		5t Excavator with Bucket	95	5	105		
		2t Tipper Truck	105	5	100		
		Rigid Truck / Bogie	105	5	100		
		Quick Cut Concrete Saw*	118	3	111		
1A - External Works - Nariel and Queen Street	Kerb Demolition (Night Works)	Hand Tools	90	5	85	113	120
		Jackhammer	113	5	108		
		5t Excavator with Bucket	95	5	105		
		2t Tipper Truck	105	5	100		
		Rigid Truck / Bogie	105	5	100		
		Quick Cut Concrete Saw*	118	3	111		
1A - External Works - Nariel and Queen Street	Kerb/Pram Ramp Construction	Concrete Agitator	109	5	104	105	110
		Form Work Tools	90	5	85		
	(Night Works)	Circular Saw/Grinder*	105	5	100		

Stage	Activity	Construction Equipment	Sound Power Level - SWL (L _{Aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL (L _{Aeq,15min} dBA)	Activity SWL (L _{A1,1min} dBA)
1A - External Works - Nariel and Queen Street	Raised Crossing Construction (Night Works)	Concrete Agitator	109	5	104	112	120
		Circular Saw/Grinder*	105	5	100		
		Quick Cut Concrete Saw*	118	3	111		
1A - External Works - Nariel and Queen Street	Tree Removal (Night Works)	Chainsaw*	114	5	109	109	119
		2t Tipper Truck	105	5	100		
1B - External Works - Nariel and Phillip Street	Excavate/Box out and Re-instate Footpath Corners (Night Works)	Hand Tools	90	5	85	110	118
		Jackhammer	113	5	108		
		5t Excavator with Bucket	95	5	105		
		2t Tipper Truck	105	5	100		
		Rigid Truck / Bogie	105	5	100		
1B - External Works - Nariel and Phillip Street	Asphalt Works to Corners (Night Works)	CC10 Vibratory Roller*	109	5	104	113	116
		Positrack	90	5	85		
		Paver	114	10	112		
		Rigid Trucks - Bogies/10 Wheelers	105	5	100		
		5t Excavator with Bucket	95	5	105		
2A - External Works - Nariel and Phillip Street	Line Marking (Night Works)	Line Marking Truck	108	10	106	106	115
		Line Marking Gernie	90	5	85		
		Water Blaster*	110	5	105		
		2t Tipper Truck	105	5	100		
		Traffic Control Utes	90	5	85		

Stage	Activity	Construction Equipment	Sound Power Level - SWL (L _{Aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL (L _{Aeq,15min} dBA)	Activity SWL (L _{A1,1min} dBA)
2C - External Works - Nariel and Phillip Street	Service Installation - Electrical Services (Standard Hours)	5t Excavator with Bucket	95	5	105	110	120
		5t Excavator with Hammer	115	5	110		
		Plate Compactor	109	5	104		
		Jumping Jack	106	5	101		
		Rigid Truck / Bogie	105	5	100		
		2t Tipper Truck	105	5	100		
2C - External Works - Nariel and Phillip Street	Asphalt Works (Standard Hours)	Milling Machine / Profiler	117	5	112	112	119
		Positrack	90	5	85		
		Paver	114	10	112		
		Rigid Trucks - Bogies/10 Wheelers	105	5	100		
		CC10 Non-Vibratory Steam Roller	109	5	104		

Note: Sources marked with an asterisk (e.g. concrete saws, grinders, hydraulic hammers, profilers, vibratory rollers) can emit noise with special audible (annoying) characteristics. In accordance with the ICNG and the CNVS, predicted noise levels for these stages incur a +5 dB penalty to account for the additional annoyance that could arise. This penalty has been applied to the predicted levels. The activity sound power levels for each stage take account of the potential for the coinciding use of plant items – where certain plant items would operate at the same time adjustments have been calculated. Additionally, semi/bogie trucks would not idle whilst on site. For the car park demolition provision has been made for a medium sized hydraulic hammer (max capacity 900 kg) attachment to be used in conjunction with the 14t excavator. Depending on site conditions, lower capacity plant may potentially be used where practicable. For the Stage 1A tree removal works, the trees to be removed are small and will be transported to compound for chipping during standard hours in 2t tipper/bogie. The predicted levels from the identified works are considered to be conservative. In practice, due to the inherent mobilization and planning/safety protocols involved with these type of works, there would be expected to be lengthy periods during which plant would not operate at the capacities assumed by this assessment, Therefore generally lower levels than predicted would be expected for significant durations during the works.



APPENDIX D

Construction Noise Prediction Tables and CNVS Additional Mitigation Measures

Table D-1 L_{Aeq,15min} Construction Noise Predictions for Sub-Stages 1-19 – Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	51	57	56	48	53	52	55	43	73	72	71	63	65	67	78	61	55	66	58
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	51	57	56	48	55	52	55	42	74	73	73	65	69	70	76	63	50	68	54
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	48	54	53	45	54	49	52	41	70	69	64	56	60	66	71	54	48	60	53
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	42	50	49	40	49	44	48	38	57	56	52	44	50	53	61	44	45	55	48
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	43	50	49	41	48	45	48	37	56	55	51	43	50	51	60	44	45	53	48
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	32	39	38	29	36	33	37	23	40	39	40	32	39	35	49	32	32	38	35
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	33	40	39	30	36	34	38	26	42	41	40	32	38	38	49	32	35	41	37
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	39	45	44	36	46	40	43	33	56	55	49	41	48	52	57	42	43	48	45
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	46	51	50	43	49	47	49	36	57	54	57	49	56	51	57	48	44	54	47
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	48	53	52	45	46	49	51	36	62	61	62	54	52	57	69	52	44	57	47
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	63	70	69	62	70	66	68	46	56	56	46	38	42	44	72	37	64	78	67
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	51	58	57	49	57	53	56	47	52	52	43	35	42	42	63	35	54	68	57
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	40	47	46	37	46	41	45	37	48	48	39	31	36	40	60	31	47	64	50
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	34	41	40	31	40	35	39	29	41	41	35	27	33	36	56	27	44	60	47
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	33	40	39	29	36	33	38	29	41	41	34	26	30	35	54	25	42	57	45
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	32	39	38	29	37	33	37	29	41	40	37	29	33	37	52	27	39	54	42
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	30	36	35	26	32	30	34	26	38	37	37	29	34	34	50	28	36	52	39
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	25	32	31	22	31	26	30	20	38	38	36	28	32	27	48	27	36	53	39
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	30	36	35	25	31	29	34	26	40	40	31	23	29	26	50	23	38	54	41
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	33	40	39	30	37	34	38	29	42	42	34	26	31	34	53	25	42	57	45
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	34	41	40	32	38	36	39	30	39	39	37	29	36	33	58	30	46	62	49
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	56	64	62	55	64	59	61	42	54	54	49	41	46	44	57	40	58	70	63
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	51	58	57	49	60	53	56	37	53	53	49	41	44	45	57	38	53	60	59
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	44	50	49	41	54	45	48	30	49	47	49	41	48	44	52	40	46	52	51
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	37	43	41	33	41	37	40	30	46	46	41	33	38	37	49	33	41	47	44
R26	3 Station St	Residential	37	37	36	47	42	42	41	54	61	59	52	65	56	58	42	47	41	47	39	46	38	45	37	61	59	62
R27	1 Station St	Residential	37	37	36	47	42	42	41	52	58	57	49	61	53	56	45	47	46	47	39	46	34	45	38	57	54	60
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	43	49	48	40	51	44	47	38	44	44	41	33	40	28	41	31	46	37	50
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	39	45	41	34	47	38	40	29	40	40	38	30	33	34	39	28	45	45	47
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	39	46	41	35	48	39	40	25	38	38	36	28	35	32	43	29	46	48	49
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41	54	62	61	52	60	56	60	51	86	86	85	77	79	72	94	74	57	80	61

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver.

- 01 - SE - Site Establishment
- 02 - 1A - Main Car Park - Potholing
- 03 - 1A - Main Car Park - Demo Carpark AC
- 04 - 1B - Main Carpark - Pavement Box Out
- 05 - 1B - Main Carpark - Service Installation
- 06 - 2A - Main Carpark - Sub-Base Installation & Kerbs
- 07 - 2B - Main Car Park - Mill & Correct
- 08 - 3 - Stamped Asphalt
- 09 - EW - 1A Nariel St & Queen St - Potholing
- 10 - EW - 1A Nariel St & Queen St - Remove Parking Lanes
- 11 - EW - 1A Nariel St & Queen St - Kerb Demolition
- 12 - EW - 1A Nariel St & Queen St - Kerb-Pram Ramp Construction
- 13 - EW - 1A Nariel St & Queen St - Raised Crossing Construction
- 14 - EW - 1A Nariel St & Queen St - Tree Removal
- 15 - EW - 1B Nariel & Philip St- Night Works
- 16 - EW - 2A Nariel & Philip St - Night Works
- 17 - EW - 2C- Nariel and Phillip St - Service Installation
- 18 - EW - 2C Nariel & Philip St - Ashhailt Works
- 19 - EW- 3 Main Compound- F Type Barrier Installation, Median on Station St & Stamped Asphalt along East Lane & Main Car Park

Table D-2 L_{Aeq,15min} Construction Noise Predictions for Sub-Stages 1-19 – Non-Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
C01	TBC	Commercial	-	-	-	70	70	70	70	80	88	87	74	78	78	86	82	60	59	59	51	56	56	67	51	78	62	81
C02	TBC	Commercial	-	-	-	70	70	70	70	75	83	82	71	77	75	81	75	60	59	56	48	52	56	77	47	87	76	90
C03	TBC	Commercial	-	-	-	70	70	70	70	73	81	80	71	81	75	79	72	57	55	56	48	55	50	68	49	81	67	84
C04	TBC	Commercial	-	-	-	70	70	70	70	75	83	82	75	87	79	81	71	56	52	56	48	55	49	62	48	88	63	91
C05	TBC	Commercial	-	-	-	70	70	70	70	76	84	83	74	84	78	82	68	60	57	60	52	59	54	66	52	77	71	80
C06	TBC	Commercial	-	-	-	70	70	70	70	72	79	78	70	74	74	77	67	61	59	60	52	58	56	66	52	71	73	74
C07	TBC	Commercial	-	-	-	70	70	70	70	60	68	67	61	72	65	66	52	84	76	83	75	82	60	85	75	75	82	78
C08	TBC	Commercial	-	-	-	70	70	70	70	53	60	59	51	63	55	58	49	94	85	94	86	90	82	92	83	64	89	66
C09	TBC	Commercial	-	-	-	70	70	70	70	53	61	60	51	58	55	59	51	91	90	91	83	81	82	98	78	55	84	58
C10#	TBC	Commercial	-	-	-	70	70	70	70	54	62	61	52	60	56	60	51	86	86	85	77	79	72	94	74	57	80	61
C11	TBC	Commercial	-	-	-	70	70	70	70	49	57	56	48	57	52	55	46	89	89	77	69	72	68	85	67	58	80	61
C12	TBC	Commercial	-	-	-	70	70	70	70	47	54	53	45	54	49	52	44	76	76	68	60	67	50	77	61	52	72	56
C13	TBC	Commercial	-	-	-	70	70	70	70	42	49	48	41	50	45	47	38	71	71	66	58	64	46	75	58	48	64	51
C14	TBC	Commercial	-	-	-	70	70	70	70	43	50	49	41	50	45	48	40	67	67	64	56	62	46	72	56	48	62	51
C15	TBC	Commercial	-	-	-	70	70	70	70	36	44	43	35	45	39	42	33	63	63	60	52	59	43	69	53	42	59	45
C16	TBC	Commercial	-	-	-	70	70	70	70	34	42	41	32	39	36	40	31	64	64	62	54	58	47	69	53	37	59	40
C17	TBC	Commercial	-	-	-	70	70	70	70	38	46	45	37	43	41	44	34	69	69	65	57	62	54	73	56	42	62	45
C18	TBC	Commercial	-	-	-	70	70	70	70	42	50	49	40	49	44	48	40	72	72	68	60	63	56	76	58	49	66	52
C19	TBC	Commercial	-	-	-	70	70	70	70	46	54	53	44	52	48	52	43	77	77	70	62	66	60	78	61	54	70	57
C20	TBC	Commercial	-	-	-	70	70	70	70	50	57	56	48	55	52	55	47	82	82	76	68	69	66	86	65	66	87	69
C21	TBC	Commercial	-	-	-	70	70	70	70	61	68	67	58	70	62	66	60	78	78	56	48	53	49	85	47	75	91	78
C22	TBC	Commercial	-	-	-	70	70	70	70	58	65	64	56	63	60	63	56	70	70	50	42	49	47	80	42	68	90	71
C23	TBC	Commercial	-	-	-	70	70	70	70	45	51	50	40	49	44	49	42	45	45	41	33	37	40	63	32	52	68	55
C24	TBC	Commercial	-	-	-	70	70	70	70	51	57	56	48	58	52	55	44	51	51	42	34	41	41	64	35	54	73	57
C25	TBC	Commercial	-	-	-	70	70	70	70	61	68	67	59	61	63	66	56	60	60	51	43	48	47	69	41	62	78	65
C26	TBC	Childcare Centre	-	-	-	60	60	-	-	49	56	54	47	60	51	53	37	42	36	42	34	41	33	40	32	56	54	57

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver.

- 01 - SE - Site Establishment
- 02 - 1A - Main Car Park - Potholing
- 03 - 1A - Main Car Park - Demo Carpark AC
- 04 - 1B - Main Carpark - Pavement Box Out
- 05 - 1B - Main Carpark - Service Installation
- 06 - 2A - Main Carpark - Sub-Base Installation & Kerbs
- 07 - 2B - Main Car Park - Mill & Correct
- 08 - 3 - Stamped Asphalt
- 09 - EW - 1A Nariel St & Queen St - Potholing
- 10 - EW - 1A Nariel St & Queen St - Remove Parking Lanes
- 11 - EW - 1A Nariel St & Queen St - Kerb Demolition
- 12 - EW - 1A Nariel St & Queen St - Kerb-Pram Ramp Construction
- 13 - EW - 1A Nariel St & Queen St - Raised Crossing Construction
- 14 - EW - 1A Nariel St & Queen St - Tree Removal
- 15 - EW - 1B Nariel & Philip St- Night Works
- 16 - EW - 2A Nariel & Philip St - Night Works
- 17 - EW - 2C- Nariel and Phillip St - Service Installation
- 18 - EW - 2C Nariel & Philip St - Ashphalt Works
- 19 - EW- 3 Main Compound- F Type Barrier Installation, Median on Station St & Stamped Asphalt along East Lane & Main Car Park

Table D-3 L_{Aeq,15min} Construction Noise Predictions – Standard Hours NML Exceedances for Sub-Stages 1-19 and Additional Mitigation – Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	4	10	9	1	6	5	8	-	-	-	-	-	-	-	-	-	8	19	11	
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	4	10	9	1	8	5	8	-	-	-	-	-	-	-	-	-	3	21	7	
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	1	7	6	-	7	2	5	-	-	-	-	-	-	-	-	-	1	13	6	
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	3	2	-	2	-	1	-	-	-	-	-	-	-	-	-	-	8	1	
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	3	2	-	1	-	1	-	-	-	-	-	-	-	-	-	-	6	1	
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	4	3	-	2	-	2	-	-	-	-	-	-	-	-	-	-	-	7	0
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	1	6	5	-	-	2	4	-	-	-	-	-	-	-	-	-	-	-	10	0
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	16	23	22	15	23	19	21	-	-	-	-	-	-	-	-	-	17	31	20	
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	4	11	10	2	10	6	9	-	-	-	-	-	-	-	-	-	7	21	10	
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	17	3	
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	-	
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	2	
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	9	17	15	8	17	12	14	-	-	-	-	-	-	-	-	-	11	23	16	
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	4	11	10	2	13	6	9	-	-	-	-	-	-	-	-	-	6	13	12	
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	3	2	-	7	-	1	-	-	-	-	-	-	-	-	-	-	5	4	
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R26	3 Station St	Residential	37	37	36	47	42	42	41	7	14	12	5	18	9	11	-	-	-	-	-	-	-	-	-	14	12	15	
R27	1 Station St	Residential	37	37	36	47	42	42	41	5	11	10	2	14	6	9	-	-	-	-	-	-	-	-	-	10	7	13	
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	-	2	1	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	3	
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	2	
C10 [#]	St Mary's Hotel	Residential	37	37	36	47	42	42	41	7	15	14	5	13	9	13	4	-	-	-	-	-	-	-	-	10	33	14	

Yellow = LB
 Amber = LB, M
 Red = LB, M, SN
 Purple = LB, M, SN

Table D-4 L_{Aeq,15min} Construction Noise Predictions – Out-of-Hours Daytime NML Exceedances for Sub-Stages 1-19 and Additional Mitigation – Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	-	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	-	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	-	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R26	3 Station St	Residential	37	37	36	47	42	42	41	-	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R27	1 Station St	Residential	37	37	36	47	42	42	41	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Yellow = LB, M
 Amber = LN, M, SN
 Red = LB, M, SN, RO
 Purple = LB, M, SN, IB, PC, RO, SN

Note, the highlighted Additional Mitigation triggers are based on the exceedance of the L_{Aeq,15min} NMLs. To determine whether it is justified to provide Respite Offer measures, consideration must also be given to the duration of the works.

Given the scheduling of the works, it would be expected that the identified impacts would occur for only one or two shifts at any one location before they are completed, and therefore the actual duration of impact would not be prolonged at any particular receiver location. On this basis, it is considered that offers of RO would not be justified.

Table D-5 L_{Aeq,15min} Construction Noise Predictions – Out-of-Hours Evening NML Exceedances for Sub-Stages 1-19 and Additional Mitigation – Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	-	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	-	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	-	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R26	3 Station St	Residential	37	37	36	47	42	42	41	-	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R27	1 Station St	Residential	37	37	36	47	42	42	41	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Yellow = LB, M
 Amber = LN, M, SN
 Red = LB, M, SN, RO
 Purple = LB, M, SN, IB, PC, RO, SN

Note, the highlighted Additional Mitigation triggers are based on the exceedance of the L_{Aeq,15min} NMLs. To determine whether it is justified to provide Respite Offer measures, consideration must also be given to the duration of the works.

Given the scheduling of the works, it would be expected that the identified impacts would occur for only one or two evenings at any one location before they are completed, and therefore the actual duration of impact would not be prolonged at any particular receiver location. On this basis, it is considered that offers of RO would not be justified.

Table D-6 L_{Aeq,15min} Construction Noise Predictions – Out-of-Hours Night NML Exceedances for Sub-Stages 1-19 and Additional Mitigation – Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	-	16	-	-	-	-	-	-	32	31	30	22	24	26	37	20	-	-	17
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	-	16	-	-	-	-	-	-	33	32	32	24	28	29	35	22	-	-	13
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	-	13	-	-	-	-	-	-	29	28	23	15	19	25	30	13	-	-	12
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	9	-	-	-	-	-	-	16	15	11	3	9	12	20	3	-	-	7
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	9	-	-	-	-	-	-	15	14	10	2	9	10	19	3	-	-	7
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	1	-	-	-	-	-	8	-	-	-	-
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	4	-	-	-	-	-	-	15	14	8	0	7	11	16	1	-	-	4
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	10	-	-	-	-	-	-	16	13	16	8	15	10	16	7	-	-	6
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	-	12	-	-	-	-	-	-	21	20	21	13	11	16	28	11	-	-	6
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	-	29	-	-	-	-	-	-	15	15	5	-	1	3	31	-	-	-	26
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	-	17	-	-	-	-	-	-	11	11	2	-	1	1	22	-	-	-	16
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	-	6	-	-	-	-	-	-	7	7	-	-	-	-	19	-	-	-	9
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	0	0	-	-	-	-	15	-	-	-	6
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	-	-	-	4
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	-	1
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-	-
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-	0
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	1	1	-	-	-	-	12	-	-	-	4
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	-	-	-	8
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	-	23	-	-	-	-	-	-	13	13	8	0	5	3	16	-	-	-	22
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	-	17	-	-	-	-	-	-	12	12	8	-	3	4	16	-	-	-	18
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	9	-	-	-	-	-	-	8	6	8	0	7	3	11	-	-	-	10
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	2	-	-	-	-	-	-	5	5	-	-	-	-	8	-	-	-	3
R26	3 Station St	Residential	37	37	36	47	42	42	41	-	20	-	-	-	-	-	-	6	-	6	-	5	-	4	-	-	-	21
R27	1 Station St	Residential	37	37	36	47	42	42	41	-	17	-	-	-	-	-	-	6	5	6	-	5	-	4	-	-	-	19
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	-	8	-	-	-	-	-	-	3	3	-	-	-	-	-	-	-	-	9
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	5	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	8
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41	-	21	-	-	-	-	-	-	45	45	44	36	38	31	53	33	-	-	20

- Yellow = LB, M
- Amber = LN, M, SN, RO
- Red = LB, M, SN, IB, PC, RO, AA
- Purple = LB, M, SN, IB, PC, RO, SN, AA

Note, the highlighted Additional Mitigation triggers are based on the exceedance of the L_{Aeq,15min} NMLs. To determine whether it is justified to provide Respite Offers and Alternative Accommodation measures, consideration must also be given to the duration of the works.

Given the scheduling of the works, it would be expected that the identified impacts would occur for only one or two nights at any one location before they are completed, and therefore the actual duration of impact would not be prolonged at any particular receiver location. On this basis, it is considered that offers of RO and AA would not be justified.

Table D-7 L_{Aeq,15min} Construction Noise Predictions – Standard Hours NML Exceedances for Sub-Stages 1-19 and Additional Mitigation – Non-Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
C01	-	Commercial	-	-	-	70	70	70	70	10	18	17	4	8	8	16	12	-	-	-	-	-	-	-	-	8	-	11
C02	-	Commercial	-	-	-	70	70	70	70	5	13	12	1	7	5	11	5	-	-	-	-	-	-	-	-	17	6	20
C03	-	Commercial	-	-	-	70	70	70	70	3	11	10	1	11	5	9	2	-	-	-	-	-	-	-	-	11	-	14
C04	-	Commercial	-	-	-	70	70	70	70	5	13	12	5	17	9	11	1	-	-	-	-	-	-	-	-	18	-	21
C05	-	Commercial	-	-	-	70	70	70	70	6	14	13	4	14	8	12	-	-	-	-	-	-	-	-	-	7	1	10
C06	-	Commercial	-	-	-	70	70	70	70	2	9	8	0	4	4	7	-	-	-	-	-	-	-	-	-	1	3	4
C07	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	5	12	8
C08	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19	-
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-
C10#	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	-
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	21	8
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	1
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-
C26	-	Childcare Centre	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results. Additional Mitigation Measures are only applicable when the receiver building is in use.

- Yellow = LB
- Amber = LB, M
- Red = LB, M, SN
- Purple = LB, M, SN

Table D-8 L_{Aeq,15min} Construction Noise Predictions – Out-of-Hours Daytime NML Exceedances for Sub-Stages 1-19 and Additional Mitigation – Non- Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
C01	-	Commercial	-	-	-	70	70	70	70	-	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C02	-	Commercial	-	-	-	70	70	70	70	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C03	-	Commercial	-	-	-	70	70	70	70	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C04	-	Commercial	-	-	-	70	70	70	70	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C05	-	Commercial	-	-	-	70	70	70	70	-	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C06	-	Commercial	-	-	-	70	70	70	70	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C07	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C08	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C10	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C26	-	Childcare Centre	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results. Additional Mitigation Measures are only applicable when the receiver building is in use.

- Yellow = LB, M
- Amber = LN, M, SN
- Red = LB, M, SN, RO
- Purple = LB, M, SN, IB, PC, RO, SN

Table D-9 L_{Aeq,15min} Construction Noise Predictions – Out-of-Hours Evening NML Exceedances for Sub-Stages 1-19 and Additional Mitigation – Non-Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
C01	-	Commercial	-	-	-	70	70	70	70	-	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C02	-	Commercial	-	-	-	70	70	70	70	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C03	-	Commercial	-	-	-	70	70	70	70	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C04	-	Commercial	-	-	-	70	70	70	70	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C05	-	Commercial	-	-	-	70	70	70	70	-	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C06	-	Commercial	-	-	-	70	70	70	70	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C07	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C08	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C10	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C26	-	Childcare Centre	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results. Additional Mitigation Measures are only applicable when the receiver building is in use.

Yellow = LB, M
Amber = LN, M, SN
Red = LB, M, SN, RO
Purple = LB, M, SN, IB, PC, RO, SN

Table D-10 L_{Aeq,15min} Construction Noise Predictions – Out-of-Hours Night NML Exceedances for Sub-Stages 1-19 and Additional Mitigation – Non-Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
x	-	Commercial	-	-	-	70	70	70	70	-	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
C02	-	Commercial	-	-	-	70	70	70	70	-	13	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	20
C03	-	Commercial	-	-	-	70	70	70	70	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14
C04	-	Commercial	-	-	-	70	70	70	70	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21
C05	-	Commercial	-	-	-	70	70	70	70	-	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
C06	-	Commercial	-	-	-	70	70	70	70	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
C07	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	14	6	13	5	12	-	15	5	-	-	8
C08	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	24	15	24	16	20	12	22	13	-	-	-
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	21	20	21	13	11	12	28	8	-	-	-
C10	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	16	16	15	7	9	2	24	4	-	-	-
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	19	19	7	-	2	-	15	-	-	-	-
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	6	6	-	-	-	-	7	-	-	-	-
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	1	1	-	-	-	-	5	-	-	-	-
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	2	2	-	-	-	-	6	-	-	-	-
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	7	7	-	-	-	-	8	-	-	-	-
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	12	12	6	-	-	-	16	-	-	-	-
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	8	8	-	-	-	-	15	-	-	-	8
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	1
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C26	-	Childcare Centre	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results. Additional Mitigation Measures are only applicable when the receiver building is in use.

Yellow = LB, M
Amber = LN, M, SN, RO
Red = LB, M, SN, IB, PC, RO, AA
Purple = LB, M, SN, IB, PC, RO, SN, AA

Table D-11 LA1,1min Maximum Construction Noise Predictions – Out-of-Hours Night - for Sub-Stages 1-19 – Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	RBL+15 NML	NPfl	RNP	-	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
R01	69 Carinya Ave	Residential	-	-	36	51	52	65	-	-	62	-	-	-	-	-	-	80	80	78	68	73	77	86	70	-	-	66
R02	65-67 Carinya Ave	Residential	-	-	36	51	52	65	-	-	62	-	-	-	-	-	-	81	81	80	70	77	80	84	72	-	-	62
R03	59 Carinya Ave	Residential	-	-	36	51	52	65	-	-	59	-	-	-	-	-	-	77	77	71	61	68	76	79	63	-	-	61
R04	43 Carinya Ave	Residential	-	-	36	51	52	65	-	-	55	-	-	-	-	-	-	64	64	59	49	58	63	69	53	-	-	56
R05	41 Carinya Ave	Residential	-	-	36	51	52	65	-	-	55	-	-	-	-	-	-	63	63	58	48	58	61	68	53	-	-	56
R06	9 Kungala St	Residential	-	-	36	51	52	65	-	-	44	-	-	-	-	-	-	47	47	47	37	47	45	57	41	-	-	43
R07	13 Benalong St	Residential	-	-	36	51	52	65	-	-	45	-	-	-	-	-	-	49	49	47	37	46	48	57	41	-	-	45
R08	7 Waratah St	Residential	-	-	36	51	52	65	-	-	50	-	-	-	-	-	-	63	63	56	46	56	62	65	51	-	-	53
R09	17 Araluen St	Residential	-	-	36	51	52	65	-	-	56	-	-	-	-	-	-	64	62	64	54	64	61	65	57	-	-	55
R10	14 Nariel St	Residential	-	-	36	51	52	65	-	-	58	-	-	-	-	-	-	69	69	69	59	60	67	77	61	-	-	55
R11	34-36 Phillip St	Residential	-	-	36	51	52	65	-	-	75	-	-	-	-	-	-	63	64	53	43	50	54	80	46	-	-	75
R12	36A Phillip St	Residential	-	-	36	51	52	65	-	-	63	-	-	-	-	-	-	59	60	50	40	50	52	71	44	-	-	65
R13	30 Phillip St	Residential	-	-	36	51	52	65	-	-	52	-	-	-	-	-	-	55	56	46	36	44	50	68	40	-	-	58
R14	7 Lethbridge St	Residential	-	-	36	51	52	65	-	-	46	-	-	-	-	-	-	48	49	42	32	41	46	64	36	-	-	55
R15	16 Phillip St	Residential	-	-	36	51	52	65	-	-	45	-	-	-	-	-	-	48	49	41	31	38	45	62	34	-	-	53
R16	8 Phillip St	Residential	-	-	36	51	52	65	-	-	44	-	-	-	-	-	-	48	48	44	34	41	47	60	36	-	-	50
R17	109 Glossop St	Residential	-	-	36	51	52	65	-	-	41	-	-	-	-	-	-	45	45	44	34	42	44	58	37	-	-	47
R18	1 Phillip St	Residential	-	-	36	51	52	65	-	-	37	-	-	-	-	-	-	45	46	43	33	40	37	56	36	-	-	47
R19	9 Phillip St	Residential	-	-	36	51	52	65	-	-	41	-	-	-	-	-	-	47	48	38	28	37	36	58	32	-	-	49
R20	19A Phillip St	Residential	-	-	36	51	52	65	-	-	45	-	-	-	-	-	-	49	50	41	31	39	44	61	34	-	-	53
R21	29 Phillip St	Residential	-	-	36	51	52	65	-	-	46	-	-	-	-	-	-	46	47	44	34	44	43	66	39	-	-	57
R22	2 Gidley St	Residential	-	-	36	51	52	65	-	-	69	-	-	-	-	-	-	61	62	56	46	54	54	65	49	-	-	71
R23	1 Ross Pl	Residential	-	-	36	51	52	65	-	-	63	-	-	-	-	-	-	60	61	56	46	52	55	65	47	-	-	67
R24	43 Little Chapel St	Residential	-	-	36	51	52	65	-	-	55	-	-	-	-	-	-	56	55	56	46	56	54	60	49	-	-	59
R25	20 Blair Ave	Residential	-	-	36	51	52	65	-	-	48	-	-	-	-	-	-	53	54	48	38	46	47	57	42	-	-	52
R26	3 Station St	Residential	-	-	36	51	52	65	-	-	66	-	-	-	-	-	-	54	49	54	44	54	48	53	46	-	-	70
R27	1 Station St	Residential	-	-	36	51	52	65	-	-	63	-	-	-	-	-	-	54	54	54	44	54	44	53	47	-	-	68
R28	1A Chesham St	Residential	-	-	36	51	52	65	-	-	54	-	-	-	-	-	-	51	52	48	38	48	38	49	40	-	-	58
R29	6 Chesham St	Residential	-	-	36	51	52	65	-	-	50	-	-	-	-	-	-	47	48	45	35	41	44	47	37	-	-	55
R30	10A Chesham St	Residential	-	-	36	51	52	65	-	-	51	-	-	-	-	-	-	45	46	43	33	43	42	51	38	-	-	57
C10 ^f	St Mary's Hotel	Residential	-	-	36	51	52	65	-	-	67	-	-	-	-	-	-	91	91	90	82	84	77	99	79	-	-	66

The predicted LA1,1min levels shown are considered to be approximately equivalent to LAmax levels.

The amber shaded cells indicate exceedances of LAmax 52 dBA recognised by the NPfl

The red shaded cells indicate levels in excess of the LAmax 65 dBA level recognised by the NSW Road Noise Policy, based on a synopsis of research on sleep disturbance and awakenings.



APPENDIX E

Predicted Construction Noise Contours

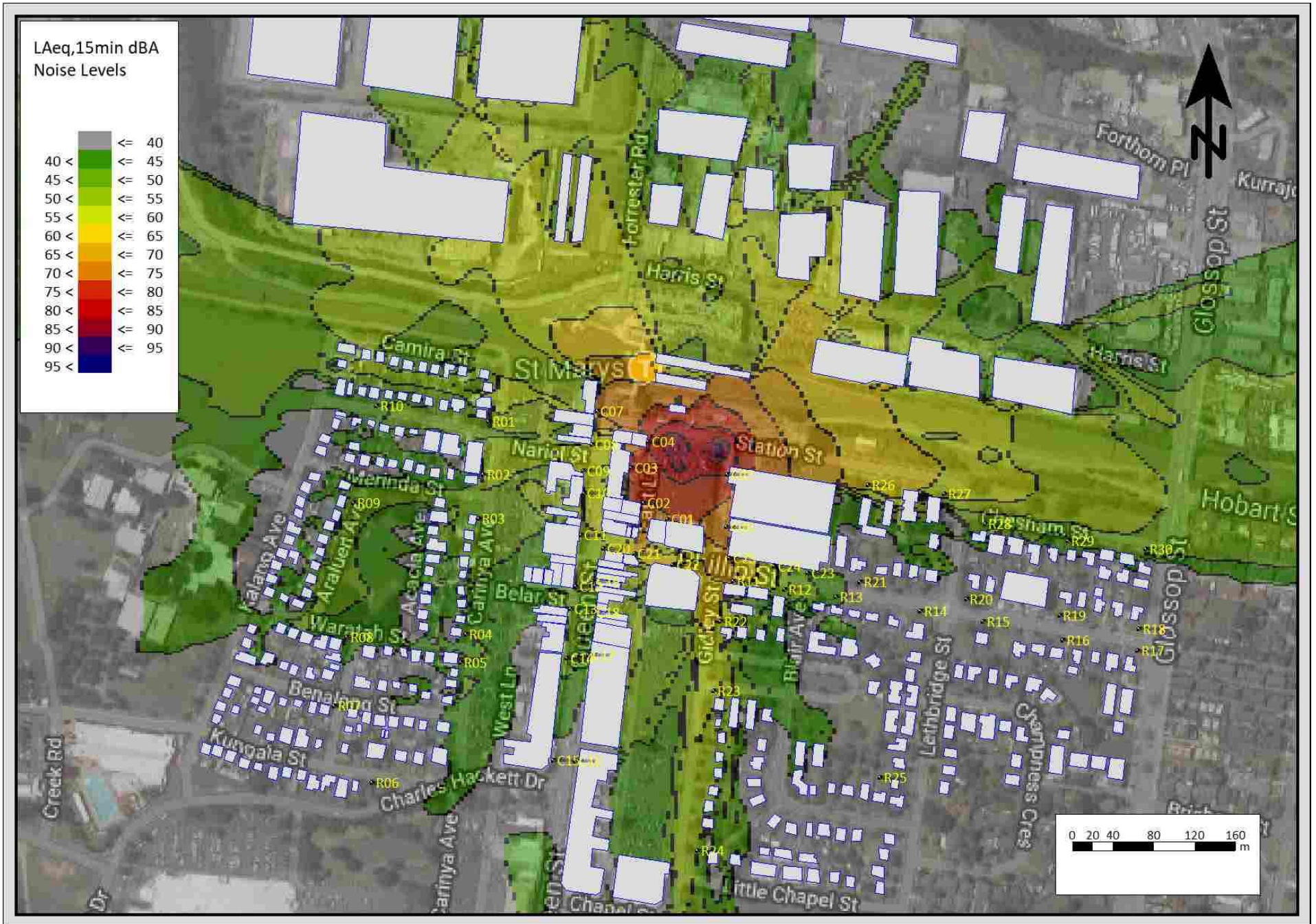
Noise Model Scenario 02 - 1A - Main Car Park – Potholing



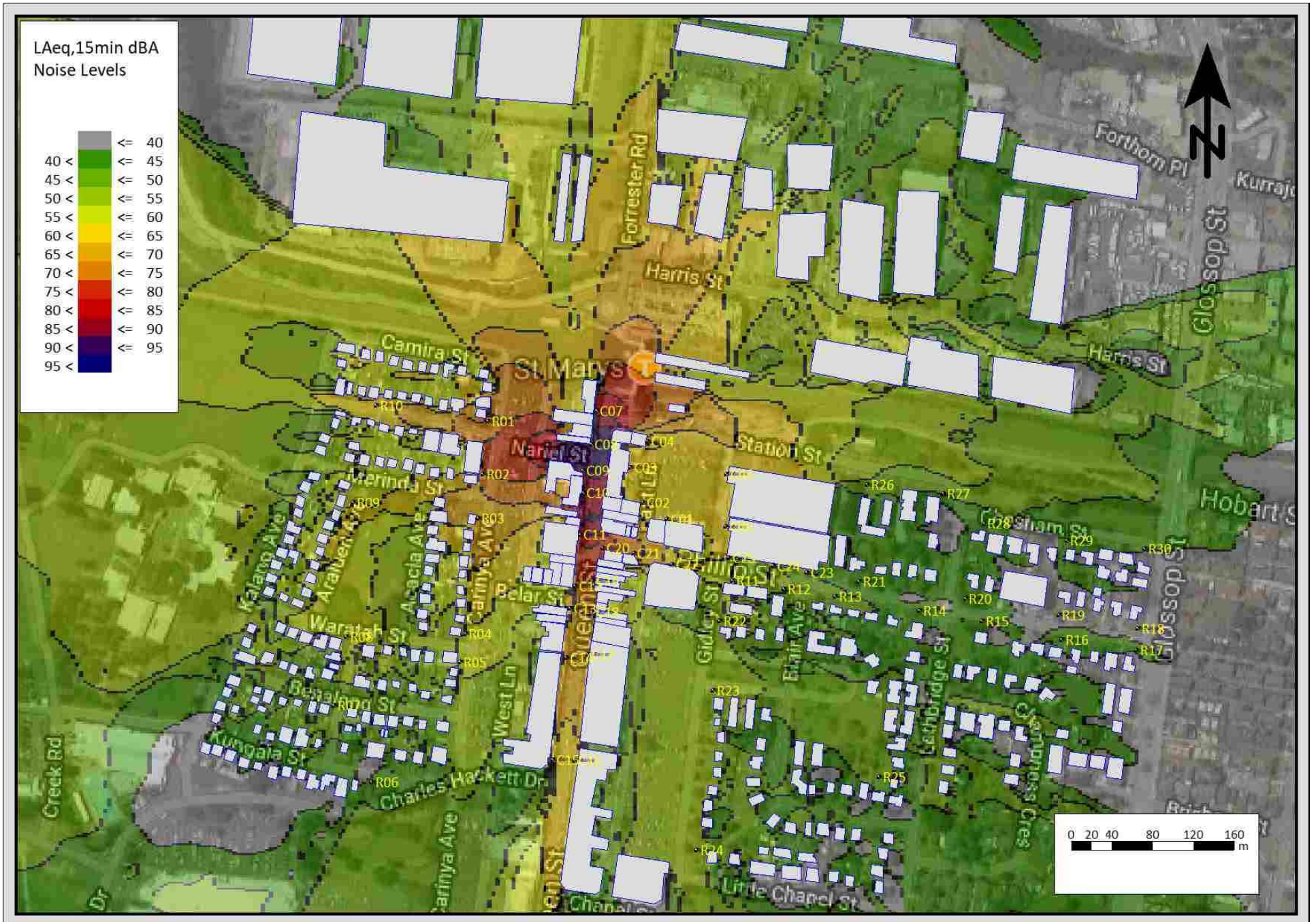
Noise Model Scenario 03 - 1A - Main Car Park - Demo Carpark AC



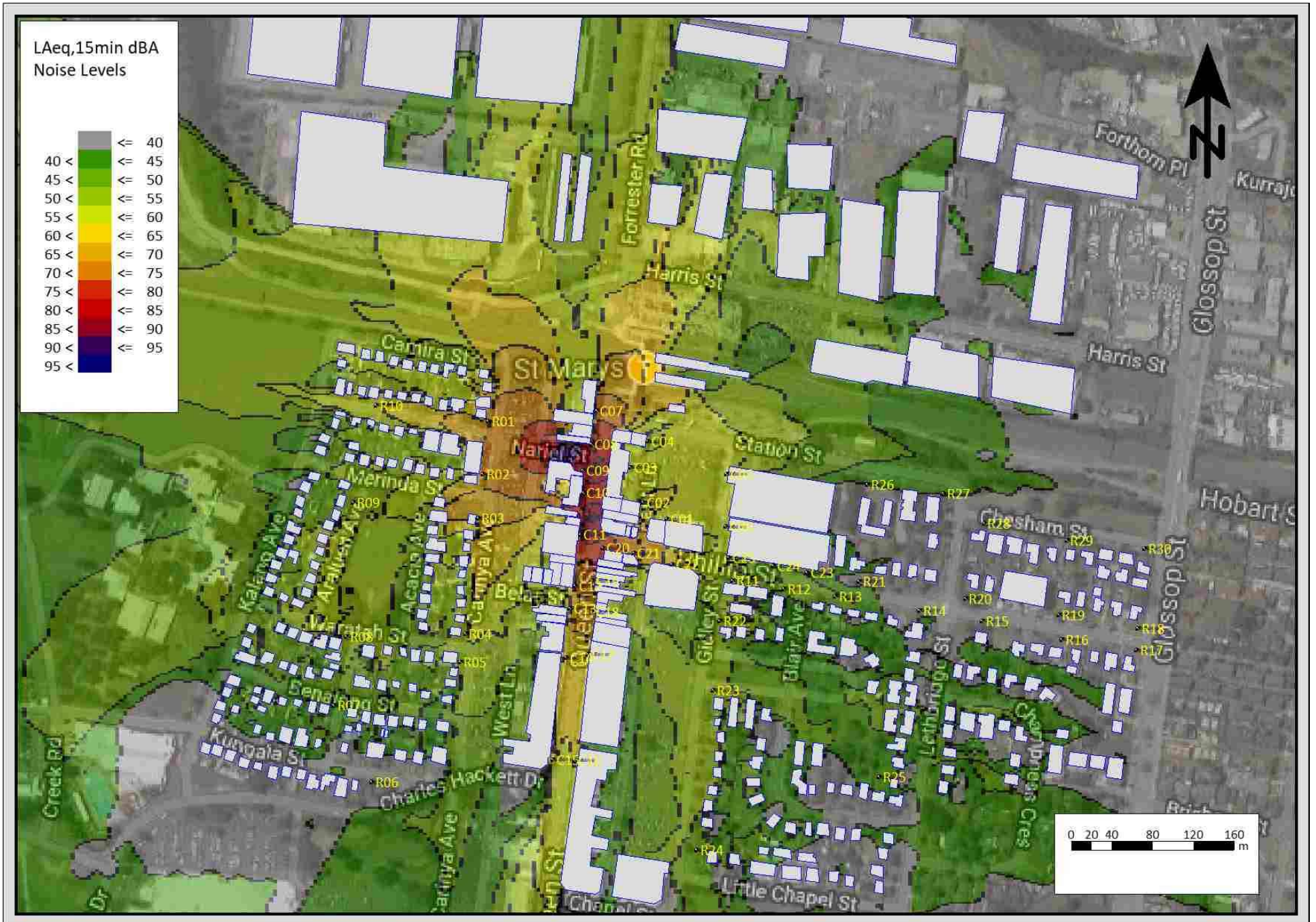
Noise Model Scenario 05 - 1B - Main Carpark - Service Installation



Noise Model Scenario 09 - EW - 1A Nariel St & Queen St – Potholing



Noise Model Scenario 10 - EW - 1A Nariel St & Queen St - Remove Parking Lanes



Noise Model Scenario 11 - EW - 1A Nariel St & Queen St - Kerb Demolition



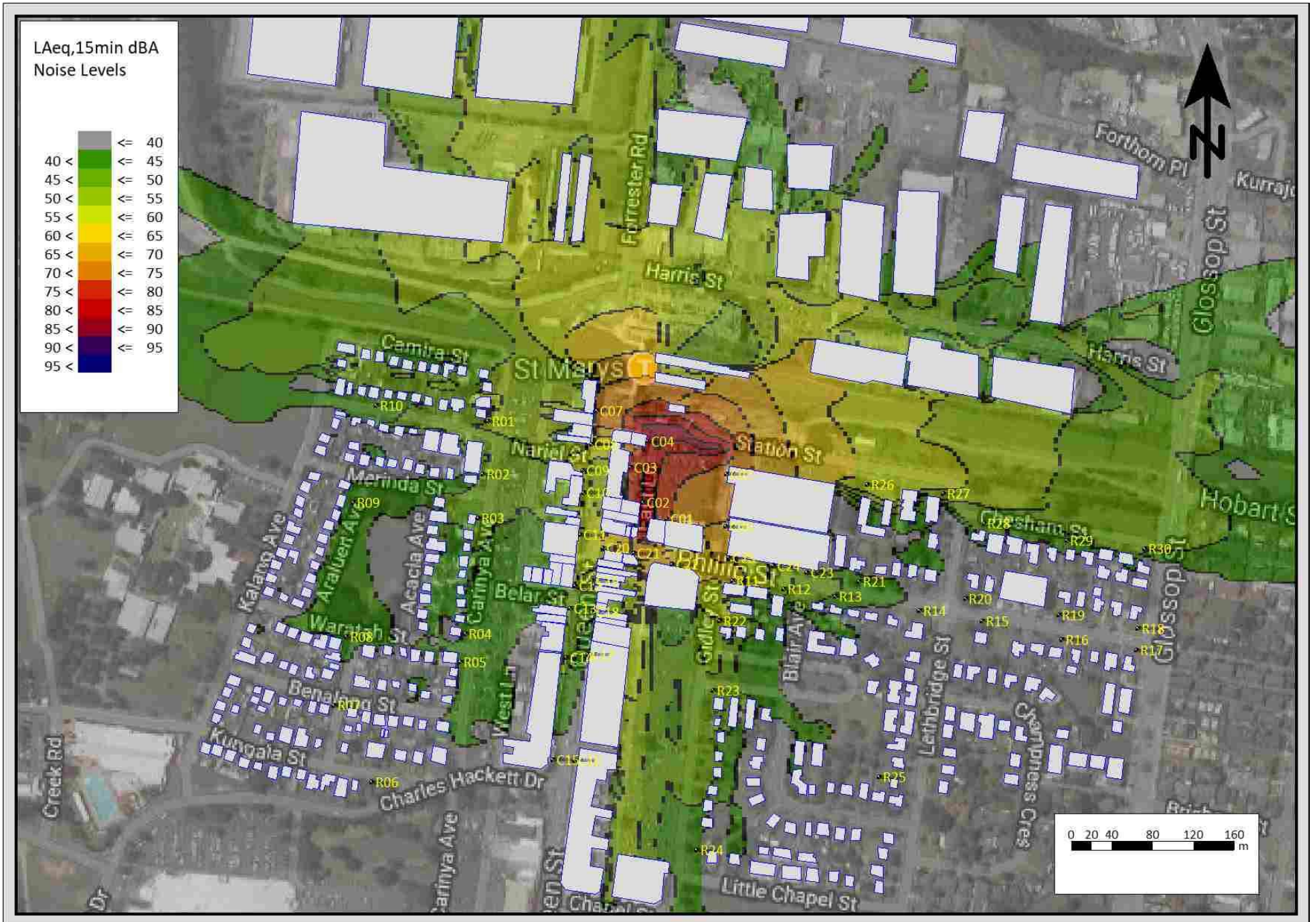
Noise Model Scenario 14 - EW - 1A Nariel St & Queen St - Tree Removal



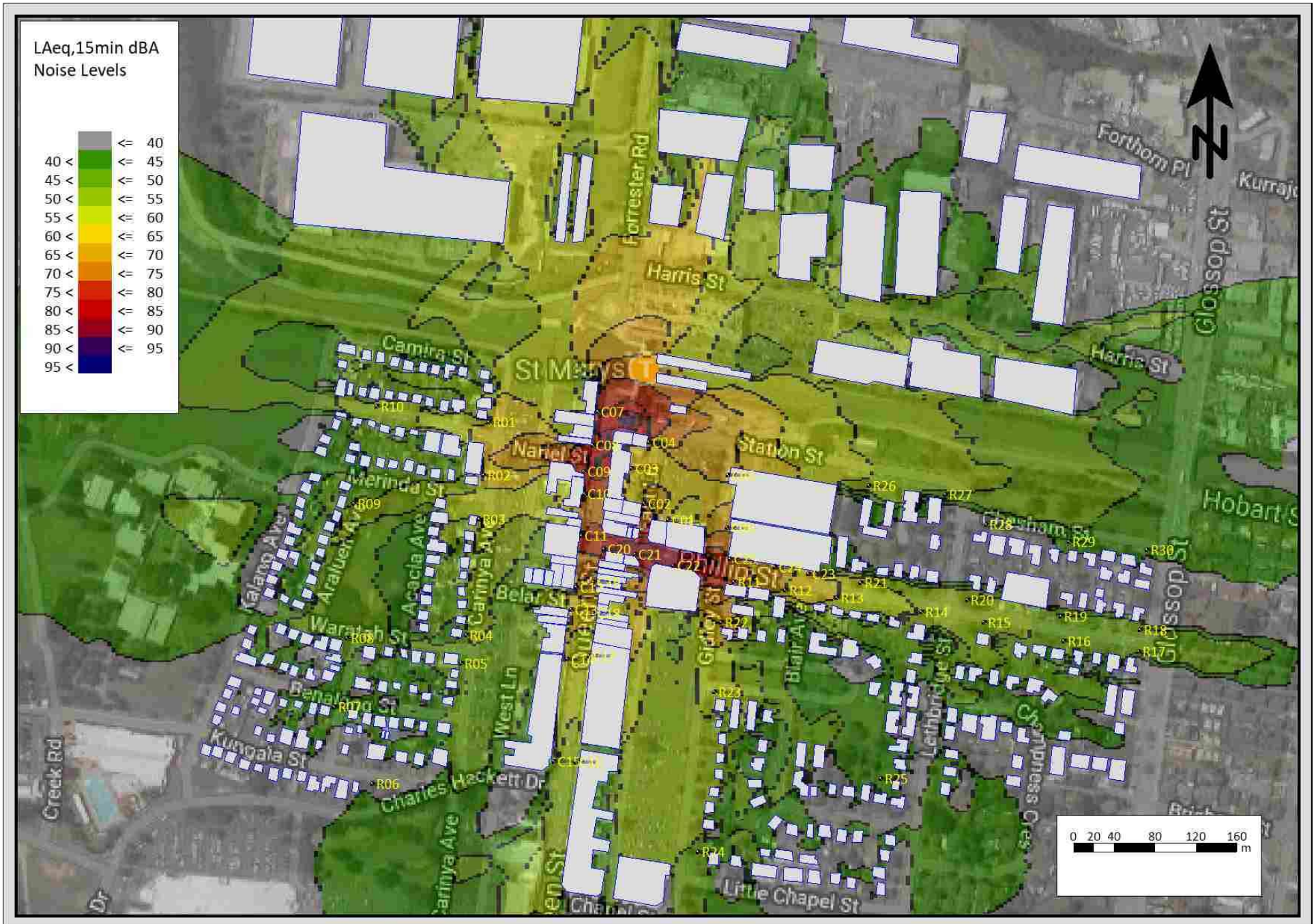
Noise Model Scenario 15 - EW - 1B Nariel & Philip Street- Night Works



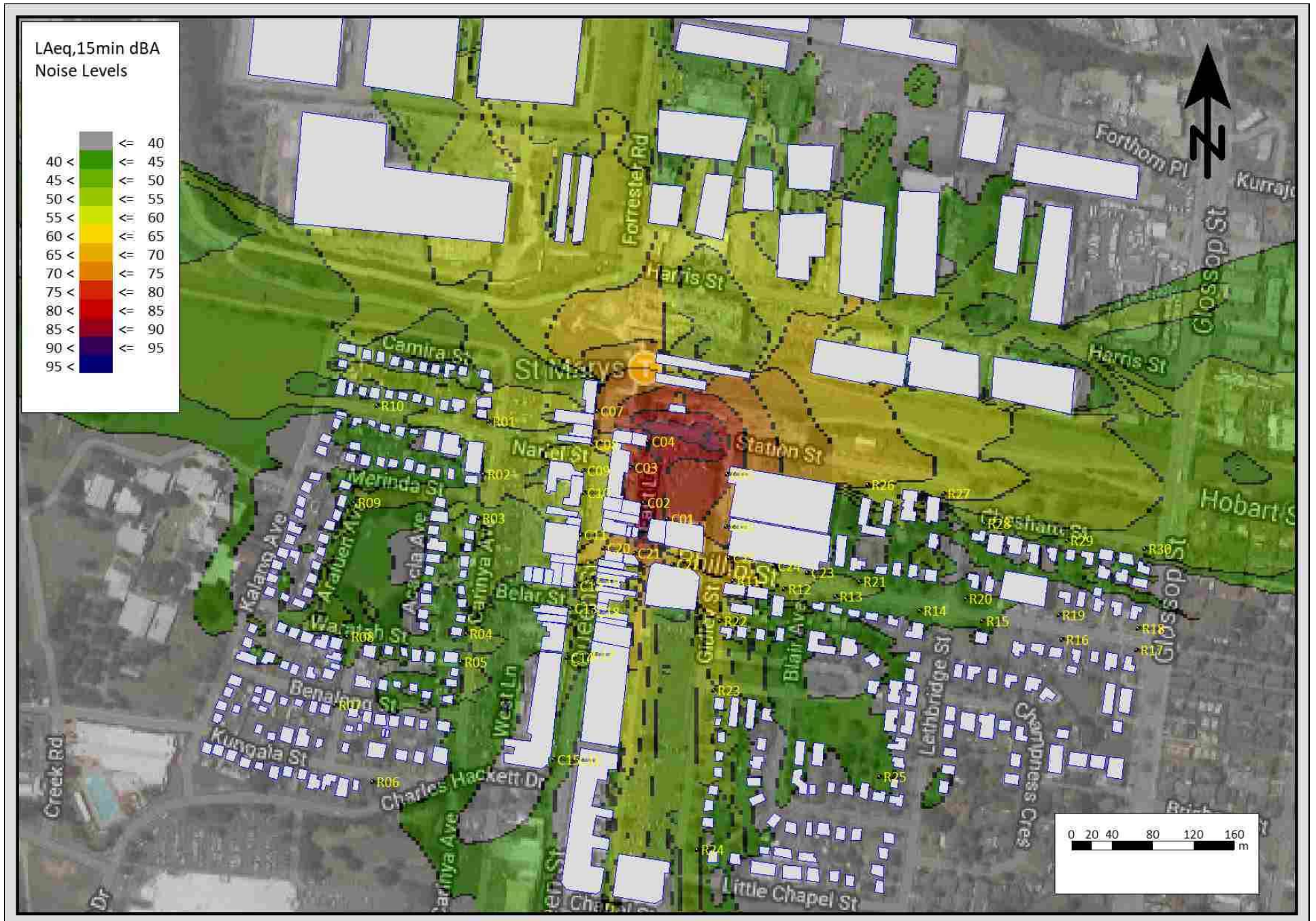
Noise Model Scenario 17 - EW - 2C- Nariel and Phillip Street - Service Installation



Noise Model Scenario 18 - EW - 2C Nariel & Philip Street - Asphalt Work



Noise Model Scenario 19 - EW- 3 Main Compound- F Type Barrier Installation, Median on Station St & Stamped Asphalt along East Lane & Main Car Park



APPENDIX F

Construction Noise & Vibration Monitoring Program





Construction Noise & Vibration Monitoring Program

Conditions C13 - C15 specify in detail requirements for monitoring. These matters are addressed in the following sections. **Section 8.2.5** and **Appendix D** of the DNVIS will inform the most impacted receivers that trigger monitoring requirements.

The construction noise and vibration monitoring program will apply for the duration of works that pose a risk of exceeding set criteria. Monitoring is not required where activities to be undertaken do not pose risk of exceeding set criteria from the project planning approval.

Condition C13 requires consultation with relevant government agencies during preparation of the program. A risk assessment (see Section 7.1 of the CEMP) has assessed the works as low to moderate impact. In consultation with SM-WSA and the ER, based on the limited extent and duration of the works and their assessed low to moderate impact (as assessed in the DNVIS) further consultation was determined not to be required.

The Construction Noise and Vibration Monitoring Program results will be submitted to the EPA and relevant Councils, as required.

Noise and vibration monitoring will be undertaken to verify compliance with the noise and vibration objectives and/or the predicted levels in the DNVIS.

Baseline Noise Monitoring Data

Baseline noise monitoring data was reported in the CSSI EIS. A summary of the relevant noise monitoring results is provided in **Table 7-1** of the DNVIS and reproduced below. No further baseline data is required to be obtained.

DNVIS Table 7-1 NCA3 Unattended Noise Monitoring Results – Determined by EIS

Location	Rating Background Level - RBL (L_{A90} dBA)			Ambient Noise Level (L_{Aeq} dBA)		
	Day	Evening	Night	Day	Evening	Night
NM02	37	37	36	55	59	51

Time periods defined as follows – Day: 7.00am to 6.00pm Monday to Saturday, 8.00am to 6.00pm Sunday; Evening: 6.00pm to 10.00pm; and Night: 10.00pm to 7.00am Monday to Saturday, 10.00pm to 8.00am Sunday.

Consistent with the EIS study, the Rating Background Noise Levels (RBLs) shown have been considered in determining the construction noise criteria, as discussed in **Section 8** of the DNVIS.

Attended Airborne Noise Monitoring in the Community

Attended monitoring of construction noise levels will be undertaken as follows:

- As described in this DNVIS to ensure that noise and vibration levels in the adjacent community remain consistent with the requirements of the project planning approval conditions. Attended

monitoring will be completed during each work stage, to ensure appropriate management measures are implemented for the corresponding works.

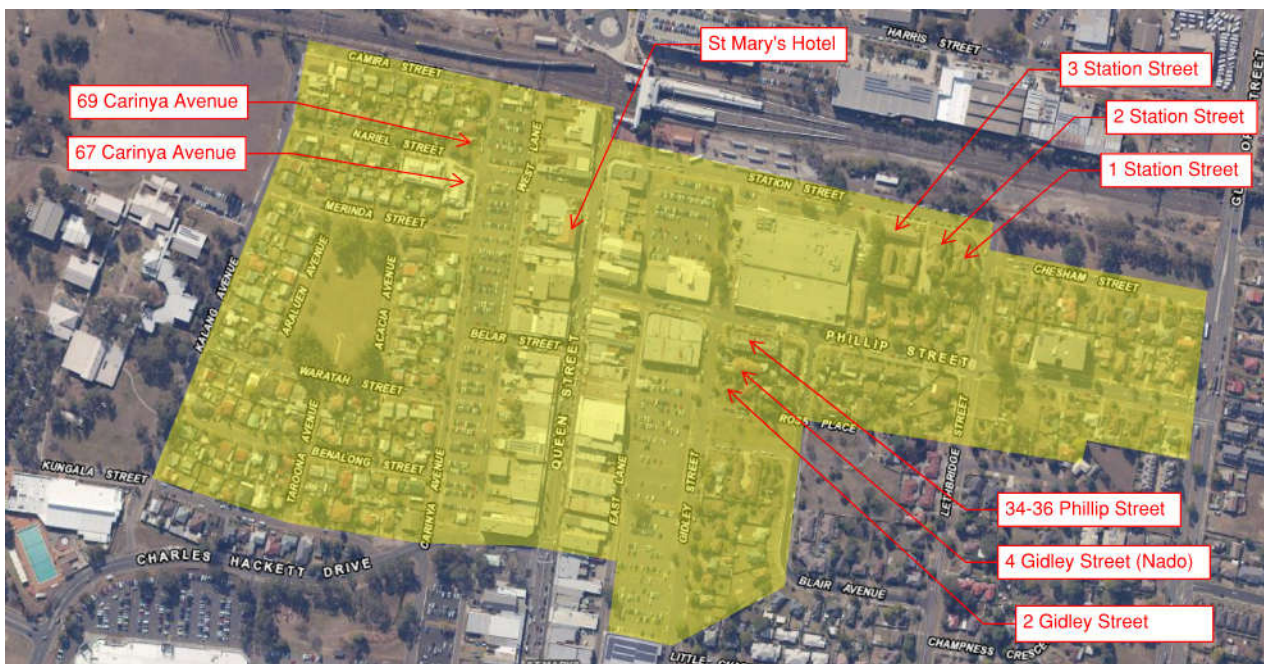
- Where appropriate in response to a noise related complaint(s) (determined on a case-by-case basis).

Attended monitoring will be undertaken at a location representative of the most affected noise sensitive receiver(s) in proximity to construction activities. Noise monitoring locations will consider factors including:

- The location of previous monitoring sites;
- The proximity of the receiver to the Project works area;
- The sensitivity of the receiver to noise;
- Background noise levels;
- The expected duration of the impact.

Subject to site conditions, attended noise monitoring will be undertaken at the representative locations identified in **Figure 8-1** (reproduced below) to verify predictions and ensure suitable management measures are in place. Depending on the locations of works, the monitoring locations identified may be varied in consultation with the ER.

DNVIS Figure 8-1 Nominated Noise Monitoring Locations



Monitoring may also be undertaken in response to a complaint. Where any investigation identifies works or activities being undertaken on the subject worksite as the likely source of the complaint, the proponent must offer to undertake attended noise or vibration monitoring at the complainant's premises. The attended measurements will need to be carried out by an appropriately trained person

in the measurement and assessment of construction noise, who is familiar with the requirements of the relevant standards and procedures.

Where noise monitoring indicates that the activity, work or combination of simultaneous activities or works has caused or is causing noise or vibration levels higher than the predicted levels at any noise sensitive receiver, Ward must review and where possible, modify the work or activity to prevent any recurrence.

Records of community enquiries and complaints, and Wards response will be managed via the project Community Communications Strategy.

Real time noise and vibration monitoring is not currently proposed, but shall be considered on a case-by-case basis, in response to any community concerns or complaints.

Parameters to be Monitored

A Type-1 integrating sound level meter should be used for attended noise monitoring. Measurements should be undertaken generally at the worst affected location on the residential boundary of an affected receiver, with the microphone at approximately 1.5m above ground and away (>3 m, where practicable) from any other reflecting surfaces. The sound level meter should be set to A-weighting frequency response and generally fast time response. Any deviations from this should be noted and reported.

As a minimum, when assessing construction noise levels, the $L_{Aeq,15min}$ and L_{Amax} (fast response) shall be measured and reported.

As a minimum, when assessing construction vibration levels, the Peak Particle Velocity - PPV (mm/s) in three orthogonal directions will be simultaneously measured.

Plant & Equipment Noise

Regular inspection of each item of plant will include listening for excessive noise from sources such as poorly performing mufflers, loose engine cowling and moving parts needing lubrication. Plant maintenance records are to be checked where excessive noise production is identified.

If subjective evaluation indicates excessive noise from any plant item(s), subject to safety, plant noise measurements shall be undertaken to confirm plant noise levels do not exceed the maximum permissible levels allowable, as set out in Table 13 of the Sydney Metro CNVS. If attended noise monitoring demonstrates exceedance of the maximum allowable plant noise level(s), corrective actions are to be identified to eliminate excessive noise and these are to be implemented as soon as practicable.

Attended Vibration Monitoring

Attended vibration monitoring is to be undertaken at the commencement of operation for each plant or activity on site, which has the potential to generate significant vibration levels, where the vibration screening criteria is likely to be exceeded. The results of the attended monitoring are to be used to confirm minimum safe working distances from the vibration generating plant.

Heritage-Listed Structures

Section 9.1.5 of the DNVIS identifies local heritage listed structures, none of which have been assessed as being structurally unsound and therefore are not considered particularly vibration

sensitive on account of their heritage classifications. Anticipated vibration levels are significantly lower than any threshold or criteria for commercial buildings, or for that matter heritage items. As such, no specific vibration monitoring of heritage structures is proposed.

In the event measurements become necessary (e.g. complaints), Ward would seek the advice of a Heritage consultant on methods and locations for installing equipment used for vibration monitoring of heritage-listed structures as required.

Where an exceedance of the vibration screening criterion is identified, the responsible works will cease, and the corresponding methodology will be reviewed and reassessed before recommencing works.

Reporting

The results of noise and vibration monitoring shall be documented in monthly construction noise and vibration monitoring reports and submitted to the Secretary for information, as required after ER endorsement.

In accordance with Condition C15, the results of the monitoring must be readily available to the construction team, the Proponent and ER. The Planning Secretary and EPA must be provided with access to the results on request.

The monthly reports shall contain:

- Details of the type of monitoring completed and a brief statement of the measurement method;
 - Relevant noise and vibration planning approval conditions and management objectives;
 - Monitoring equipment specifications and locations;
 - Description of works, construction equipment, meteorological conditions and nearest affected sensitive receivers;
 - Unattended monitoring results (if undertaken);
 - Attended monitoring results; and
 - Statements of compliances and non-compliances against noise and vibration planning approval conditions and management objectives, including reasons for any identified non-compliances and strategies for minimising further occurrence of identified non-compliances.
-

APPENDIX G

Relevant Conditions of Approval



The Sydney Metro Western Sydney Airport Approval includes several Conditions that relate to noise and vibration. These are set out below.

E37 - Land Use Survey

A detailed land use survey must be undertaken to confirm sensitive land use(s) (including critical working areas such as operating theatres and precision laboratories) potentially exposed to construction noise and vibration and construction ground-borne noise. The survey may be undertaken on a progressive basis but must be undertaken in any one area before the commencement of work which generates construction noise, vibration or ground-borne noise in that area. The results of the survey must be included in the Detailed Noise and Vibration Impact Statements required under Condition E47.

E38 - Construction Hours

Work must only be undertaken during the following hours:

- (a) 7:00am to 6:00pm Mondays to Fridays, inclusive;*
- (b) 8:00am to 1:00pm Saturdays; and*
- (c) at no time on Sundays or public holidays.*

E39 - Highly Noise Intensive Work

Except as permitted by an EPL or approved in accordance with the Out-of-Hours Works Protocol required by Condition E42, highly noise intensive work that result in an exceedance of the applicable NML at the same receiver must only be undertaken:

- (a) between the hours of 8:00 am to 6:00 pm Monday to Friday;*
- (b) between the hours of 8:00 am to 1:00 pm Saturday; and*
- (c) if continuously, then not exceeding three (3) hours, with a minimum cessation of work of not less than one (1) hour.*

For the purposes of this condition, 'continuously' includes any period during which there is less than one (1) hour between ceasing and recommencing any of the work.

E41- Variation to Work Hours

Notwithstanding Conditions E38 and E39 work may be undertaken outside the hours specified in the following circumstances:

(a) Safety and Emergencies, including:

- (i) for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or*

(ii) 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

(b) Low impact, including:

(i) 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 ICNG, and*
- no more than the 'Noise affected' NMLs specified in Table 3 of the ICNG at other sensitive land user(s); and*

(ii) construction that causes:

- continuous or impulsive vibration values, measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.2 of Assessing Vibration: a technical guideline (DEC, 2006), or*
- intermittent vibration values measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.4 of Assessing Vibration: a technical guideline (DEC, 2006); or*

(c) By Approval, including:

(i) where different construction hours are permitted or required under an EPL in force in respect of the CSSI; or

(ii) works which are not subject to an EPL that are approved under an Out-of-Hours Work Protocol as required by Condition E42; or

(iii) negotiated agreements with directly affected residents and sensitive land user(s); or

E42 - Out-of-Hours Work Protocol – Work not subject to an EPL

An Out-of-Hours Work Protocol must be prepared to identify a process for the consideration, management and approval of work (not subject to an EPL) that is outside the hours defined in Conditions E38 and E39. The Protocol must be approved by the Planning Secretary before commencement of the out-of-hours work. The Protocol must be prepared in consultation with the ER. The Protocol must provide:

(a) justification for why out-of-hours work need to occur;

(b) identification of low and high-risk activities and an approval process that considers the risk of activities, proposed mitigation, management, and coordination, including where:

(i) the ER reviews all proposed out-of-hours activities and confirms their risk levels;

(ii) low risk activities that can be approved by the ER; and

(iii) high risk activities that are approved by the Planning Secretary;

(c) a process for the consideration of out-of-hours work against the relevant NML and vibration criteria;

(d) a process for selecting and implementing mitigation measures for residual impacts in consultation with the community at each affected location, including respite periods consistent with the requirements of Condition E56. The measures must take into account the predicted noise levels and the likely frequency and duration of the out-of-hours works that sensitive land user(s) would be exposed to, including the number of noise awakening events;

(e) procedures to facilitate the coordination of out-of-hours work including those approved by an EPL or undertaken by a third party, to ensure appropriate respite is provided; and

(f) notification arrangements for affected receivers for all approved out-of-hours works and notification to the Planning Secretary of approved low risk out-of-hours works.

This condition does not apply if the requirements of Condition E41 are met.

Note: Out-of-hours work is any work that occurs outside the construction hours identified in Condition E38 and E39.

E43 - Construction Noise Management Levels and Vibration Criteria

Mitigation measures must be implemented with the aim of achieving the following construction noise management levels and vibration criteria:

(a) construction 'Noise affected' noise management levels established using the Interim Construction Noise Guideline (DECC, 2009);

(b) preferred vibration criteria established using the Assessing vibration: a technical guideline (DEC, 2006) (for human exposure);

(c) Australian Standard AS 2187.2 - 2006 "Explosives - Storage and Use - Use of Explosives" (for human exposure);

(d) BS 7385 Part 2-1993 "Evaluation and measurement for vibration in buildings Part 2" as they are "applicable to Australian conditions"; and

(e) the vibration limits set out in the German Standard DIN 4150-3: Structural Vibration- effects of vibration on structures (for structural damage).

Any work identified as exceeding the noise management levels and / or vibration criteria must be managed in accordance with the Noise and Vibration CEMP Sub-plan.

Note that in accordance with the Sydney Metro Staging Plan, a noise and vibration sub-plan is not required for this scope of works. Noise and vibration impacts will be managed under the Project CEMP and relevant management procedures.

Note: The ICNG identifies 'particularly annoying' activities that require the addition of 5 dB(A) to the predicted level before comparing to the construction Noise Management Level.

E44 - All reasonable and feasible mitigation measures must be applied when the following residential ground-borne noise levels are exceeded:

(a) evening (6:00 pm to 10:00 pm) — internal LAeq(15 minute): 40 dB(A); and

(b) night (10:00 pm to 7:00 am) — internal LAeq(15 minute): 35 dB(A).

The mitigation measures must be outlined in the Noise and Vibration CEMP Sub-plan, including in any Out-of-Hours Work Protocol, required by Condition E42.

E45 - Noise generating work in the vicinity of potentially-affected community, religious, educational institutions and noise and vibration-sensitive businesses and critical working areas (such as theatres, laboratories and operating theatres) resulting in noise levels above the NMLs must not be timetabled within sensitive periods, unless other reasonable arrangements with the affected institutions are made at no cost to the affected institution.

E46 - Construction Noise and Vibration Mitigation and Management

Industry best practice construction methods must be implemented where reasonably practicable to ensure that noise and vibration levels are minimised around sensitive land use(s). Practices may include, but are not limited to:

(a) use of regularly serviced low sound power equipment;

(b) at source control, temporary noise barriers (including the arrangement of plant and equipment) around noisy equipment and activities such as rock hammering and concrete cutting;

(c) use of non-tonal reversing alarms; and

(d) use of alternative construction and demolition techniques.

E47 - Detailed Noise and Vibration Impact Statements (DNVIS) must be prepared for any work that may exceed the NMLs, vibration criteria and / or ground-borne noise levels specified in Conditions E43 and E44 at any residence outside construction hours identified in Condition E38, or where receivers will be highly noise affected or subject to vibration levels above those otherwise determined as appropriate by a suitably qualified structural engineer under Condition E87. The DNVIS must include specific mitigation measures identified through consultation with affected sensitive land user(s) and the mitigation measures must be implemented for the duration of the works. A copy of the DNVIS must be provided to the ER before the commencement of the associated works. The Planning Secretary and the EPA may request a copy (ies) of the DNVIS.

E48 - Owners and occupiers of properties at risk of exceeding the screening criteria for cosmetic damage must be notified before works that generate vibration commences in the vicinity of those properties. If the potential exceedance is to occur more than once or extend over a period of 24 hours, owners and occupiers must be provided a schedule of potential exceedances on a monthly basis for the duration of the potential exceedances, unless otherwise agreed by the owner and occupier. These properties must be identified and considered in the Noise and Vibration CEMP Sub-plan.

E49 - Where sensitive land use(s) are identified in Appendix B as exceeding the highly noise affected criteria during typical case construction, mitigation measures must be implemented with the objective of reducing typical case construction noise below the highly noise affected criteria at each relevant sensitive land use(s). Activities that would exceed highly noise affected criteria during typical case construction must not commence until the measures identified in this condition have been implemented, unless otherwise agreed with the Planning Secretary.

Note: Mitigation measures may include path barrier controls such as acoustic sheds and/or noise walls, at-property treatment, or a combination of path and at-property treatment.

E50 - For all construction sites where acoustic sheds are installed, the sheds must be designed, constructed and operated to minimise noise emissions. This would include the following considerations:

(a) all significant noise producing equipment that would be used during the night-time would be inside the sheds, where feasible and reasonable;

(b) noise generating ventilation systems such as compressors, scrubbers, etc, would be located inside the sheds and external air intake/discharge ports would be appropriately acoustically treated; and

(c) the doors of acoustic sheds would be kept closed during the night-time period. Where night-time vehicle access is required at sites with nearby residences, the shed entrances would be designed and constructed to minimise noise breakout.

E51 - Where Condition E49 determines that at-property treatment (temporary or permanent) is the appropriate measure to reduce noise impacts, this at-property treatment must be offered to landowners of residential properties for habitable living spaces, unless other mitigation or management measures are agreed to by the landowner.

Landowners must be advised of the range of options that can be installed at or in their property and given a choice as to which of these they agree to have installed.

A copy of all guidelines and procedures that will be used to determine at-property treatment at their residence must be provided to the landowner.

E52 - Any offer for at-property treatment or the application of other noise mitigation measures in accordance with Condition E51, does not expire until the noise impacts specified in Condition E49, affecting that property are completed, even if the landowner initially refuses the offer.

Note: If an offer has been made but is not accepted, this does not preclude the commencement of construction under Condition E49.

E53 - The implementation of at-property treatment does not preclude the application of other noise and vibration mitigation and management measures including temporary and long-term accommodation.

E54 - Construction Vibration Mitigation – Heritage Items

Vibration testing must be conducted during vibration generating activities that have the potential to impact on Heritage items to verify minimum working distances to prevent cosmetic damage. In the event that the vibration testing and attended monitoring shows that the preferred values for vibration are likely to be exceeded, the Proponent must review the construction methodology and, if necessary, implement additional mitigation measures. Such measures must include, but not be limited to, review or modification of excavation techniques.

E55 - 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 items.

E56 - Utility Coordination and Respite

All 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 any work to provide respite to impacted noise sensitive land use(s) so that the respite is achieved in accordance with Condition E57; or

(b) consider the provision of alternative respite or mitigation to impacted noise sensitive land use(s); and

(c) provide documentary evidence to the ER in support of any decision made by the Proponent in relation to respite or mitigation.

The consideration of respite must also include all other approved Critical SSI, SSI and SSD projects which may cause cumulative and / or consecutive impacts at receivers affected by the delivery of the CSSI.

E57 – Out-of-Hours Works – Community Consultation on Respite

In order to undertake out-of-hours work outside the work hours specified under Condition E38, appropriate respite periods for the out-of-hours work must be identified in consultation with the community at each affected location on a regular basis. This consultation must include (but not be limited to) providing the community with:

(a) a progressive schedule for periods no less than three (3) months, of likely out-of-hours work;

(b) a description of the potential work, location and duration of the out-of-hours work;

(c) the noise characteristics and likely noise levels of the work; and

(d) likely mitigation and management measures which aim to achieve the relevant NMLs under Condition E43 (including the circumstances of when respite or relocation offers will be available and details about how the affected community can access these offers).

The outcomes of the community consultation, the identified respite periods and the scheduling of the likely out-of-hour work must be provided to the ER, EPA and the Planning Secretary prior to the out-of-hours work commencing.

Note: Respite periods can be any combination of days or hours where out-of-hours work would not be more than 5 dB(A) above the RBL at any residence.

APPENDIX H

Community Consultation Report





St Mary's nightwork - consultation report

Prepared by Kath Elliott, Director, 15 November 2021

Overview

KEC sent two staff to door knock residents regarding three different construction activities:

- Stormwater works on Station St from Queen to Philip streets
- Pedestrian works at the intersection of Queen and Nariel streets
- Works in Eastern Lane, St Mary's, off Philip St

Talking points were prepared and approved prior to door knocking and were used to discuss the details of the works with residents. (Appendix A)

Door knocking took place on the afternoon of Wednesday 10 November 2021 between 4pm and 7pm and Saturday 13 November 2021, between 10am and 2pm.

Three units at 23 Station St were in a isolated block which was locked and we were unable to gain entry.

65-67 Carinya Avenue was not accurate. The following Nariel Street addresses were actually on Carinya Avenue but part of a larger complex, with their address on the side street. We also knocked extra houses on Carinya Avenue that would be similarly affected to their neighbours who were on the list.

Residences knocked were:

- 3 Station Street – 18 units
- 2 Station Street – 8 units
- 1 Station Street / 3 Lethbridge Street – 7 units
- 1-6 Chesham Street – 6 houses
- 34-26 Phillip Street – 12 units
- 69 Carinya Avenue – 1 house
- 65-67 Carinya Avenue – 5 units
- 37 Queen Street (St Mary's Hotel)

Summary outcomes

There were few concerns regarding noise. Almost all were accepting that construction was taking place and did not object to nightworks. Understood it was necessary.

Some were concerned about the access and parking issues, particularly in the flats at 3 Station Street where there are quite a few people who park on Station Street.

We discovered a small number of particular personal circumstances and issues that are noted in the key issues section of this report.

Key Issues

Parking and access

- Several residents from Station Street, park on the street regularly. Timely advice about road closures may avoid delays to work.

- Several residents in Station Street work shift work and come or go at odd times late at night or very early in the morning. Timely advice about access limitations will be needed.

Health and welfare

- [REDACTED] has had repeated shoulder surgery this year and is still significantly limited in his ability to do things. As a result, his car has been parked on the street for some months and has a flat battery. Ray will need assistance to start his car and to have it moved to a different place.

[REDACTED]
[REDACTED] has hearing issues and finds sharp and loud noises distressing. [REDACTED]
[REDACTED] may benefit from noise-cancelling earphones.

- [REDACTED] is very concerned about dust as he has respiratory issues. This issue may require medical advice.
- [REDACTED] was anxious about noise interfering with baby's sleep but would not provide contact details.
- [REDACTED] is elderly and seems to live alone. She should not be troubled, but it may be suitable to be aware of her vulnerability and check that the work is not impacting her as it approaches the Chesham end of Station Street.

Local knowledge

- Several people expressed a general concern to know what will happen after Coles and the Child Care Centre closes. It might be helpful for local residents to have posters put up in the shopping centre to assuage their anxiety about future amenity. [REDACTED] asked to be contacted about this.
 - Some people expressed the hope that 3 Station Street (apartments appear to be privately owned) might be bought and demolished – presumably for future gain.
 - Some people wanted to know more about the general plans for the area and for future stations. Posters in the shopping centre might be a positive step.
-

Recommendations

- Prepare and distribute information regarding parking and access arrangements to residents on Station St.
- Contact [REDACTED] and assist him to move his car.

- Provide noise canceling headphones to [REDACTED] due to her hearing difficulties.
- Follow up with [REDACTED] with information on shopping Centre changes/timing.

Appendix A – talking points

Talking points- St Marys resident consultation, Station St stormwater - November 2021

Introduce ourselves by first name.

We are working with Ward Civil who are doing early construction works on the St Marys Temporary Bus Interchange for Transport for NSW.

Wanting to give you some information about some night construction work that is coming up nearby and get your thoughts on how that might impact you.

Do you have a few minutes?

Station Street Stormwater Drainage Works

We are intending to dig a stormwater drain along Station Street. We expect the work might impact you because it will be noisier than what you are normally used to.

We are planning on doing some of the work at night to avoid conflicts with road traffic.

This will involve nightshift work for 12 weeks, 5 nights a week with a break on Fridays and Saturdays. We will also be working every day from 7am and 6pm. We won't on public holidays.

The works will start on **Monday, 29 November**.

We expect the noise impact you will experience will be classified as moderate. It will be about 60 decibels which will feel like consistent traffic travelling at 40km per hour, about 7m away from your residence.

Every night we will do about 10 metres of work each night. We will be working from east to west (from the Queen St end first), using

- sawcutting equipment,
- a jackhammer
- a 5 tonne excavator (looks like a big bobcat) to dig out dirt
- a dry vac
- tipper trucks to remove soil
- followed by a cement pour and asphaltting the road (brought in by trucks) and
- tamped down with a plate compactor.
- Some vehicles may have "quacker" which you might hear

We will mitigate the noise by:

- Saw cutting prior to 10pm and other higher noise works by 11pm.
- Switching off jackhammers every 3 hours for 1 hour,
- Turning off machinery when not in use

Do you have any questions? Do you think the nightworks will affect you very much?

(wanting to get an idea of how we might provide some respite).

Talking points- St Marys resident consultation, Quenn/Nariel works - November 2021

Introduce ourselves by first name.

We are working with Ward Civil who are doing early construction works on the St Marys Temporary Bus Interchange for Transport for NSW.

Wanting to give you some information about some night construction work that is coming up nearby and get your thoughts on how that might impact you.

Do you have a few minutes?

We're building a new pedestrian crossing on Queen Street near the intersection of Queen and Nariel Streets, as well as removing some sections of kerb and footpath and replacing with new kerb and footpath

We expect the work might impact you because it will be noisier than what you are normally used to.

We are planning on doing some of the work at night to avoid conflicts with road traffic.

This will involve nightshift work for 3 weeks, 5 nights a week with a break on Fridays and Saturdays. We will also be working every day from 7am and 6pm. We won't work on public holidays.

The works will start on **29 November 2021**.

We expect the noise impact you will experience will be classified as moderate. It will be about 60 decibels which will feel like consistent traffic travelling at 40km per hour, about 7m away from your residence.

5 St Mary's door knocking report - 15 November 2021

We will use:

- sawcutting equipment,
- a jackhammer
- a 14 tonne excavator (looks like a big bobcat) to dig out dirt
- a dry vac truck
- tipper trucks to remove soil
- a cement pour from an agitator truck chute
- temporary asphaltting of the pavement (brought in by trucks) and
- asphalt roller
- tamping down with a plate compactor
- Line marking vehicles
- Some vehicles may have "quackers" which you might hear

We will mitigate the noise by:

- Saw cutting prior to 10pm and other higher noise works by 11pm
- Switching off jackhammers every 3 hours for 1 hour
- Turning off machinery when not in use

Do you have any questions? Do you think the nightworks will affect you very much?

(wanting to get an idea of how we might provide some respite).



**ST MARY'S BUS EXCHANGE
EARLY WORKS
ADDENDUM DETAILED NOISE &
VIBRATION IMPACT STATEMENT
(DNVIS) – STORMWATER
VARIATION**

Report 11.00323R_AD-01

prepared for Ward Civil Engineering Pty Ltd
on 05/11/2021



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BASIS OF REPORT

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

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from ACA. ACA disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

REFERENCE	DATE	PREPARED	REVIEWED	AUTHORISED
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APPENDIX A: GLOSSARY OF NOISE & VIBRATION TERMS

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APPENDIX C: CONSTRUCTION NOISE CONTOURS

Report 11.00323R_AD-01

1. INTRODUCTION

Acoustics Consultants Australia (ACA) has previously prepared on behalf of Ward Civil & Engineering Pty Ltd (Ward) a Detailed Noise and Vibration Impact Statement (DNVIS) for the St Mary's Temporary Bus Interchange (TBI) Early Works, which form part of the Sydney Metro Western Sydney Airport (SMWSA) Project (SSI 10051).

Details the DNVIS assessment are set out in ACA report 11.00323R-02.

Subsequent to the issue of the DNVIS assessment (ACA report 11.00323R-02), this report provides an addendum assessment in relation to the following additional scope items:

- Operation of a materials laydown and amenities compound on Station Street.
- Civil works scope variation – Stormwater drainage and pavement works on Station Street.
- Civil works scope variation – CCTV trench works on Station Street.

This addendum report should be read in conjunction with the main DNVIS (Report 11.00323R-02).

The included assessments have been undertaken in accordance with the provisions of the NSW Interim Construction Noise Guideline – (ICNG), the Sydney Metro – Western Sydney Airport Construction Noise & Vibration Strategy (Ver 4.2, 8 September 2020) – (CNVS) and relevant Conditions of Approval as set out in the Department of Planning, Industry and Environment's Critical State Significant Infrastructure Approval for Sydney Metro – Western Sydney Airport (SSI 10051).

This document details Noise Management Level (NML) exceedances and mitigation requirements for the identified civil works scope variation.

The main objectives of this addendum DNVIS are to minimise unreasonable noise and vibration impacts on residents and businesses, and to avoid structural damage to buildings or heritage items as a result of construction vibration. This addendum DNVIS aims to support active community communication and maintain positive, cooperative relationships with local residents, businesses and building owners. It is noted that ongoing community engagement and management of such relationships is primarily managed via the Sydney Metro – Western Sydney Airport Community Communications Strategy.

A copy of this addendum NVIS must be provided to the ER before commencement of the works.

2. DESCRIPTION OF PROPOSED WORKS

Figure 2-1 shows the locations of the materials laydown and amenities compound, the stormwater drainage and pavement reconstruction works alignment and the CCTV trench location.

Figure 2-1 Station Street Additional Works



Materials Laydown and Amenities Compound

The materials laydown and amenities compound as shown in **Figure 2-1** would be used principally for stockpiling materials and would also accommodate amenities and a small crib room for workers to use during breaks.

A 5-14-tonne excavator and truck may operate occasionally within the compound for the purposes of loading materials.

It has been assumed that loading may occur within the compound at any time during standard hours or out-of-hours, however, the loading activities are anticipated to be relatively infrequent and for much of the time the compound would generate no notable noise emissions.

Sound curtains would be installed on the chain-link fencing facing onto Station Street to minimise any noise breakout from the compound.

Station Street Stormwater Drainage Works

The stormwater drainage works on Station Street will be required to be undertaken outside standard hours to avoid conflicts with road traffic.

The work would need to be undertaken progressively, working from east to west along Station Street. It is anticipated that approximately 10m of drainage will be completed each night, with the following methodology for each out-of-hours work shift:

- Establish temporary traffic control as per the approved Traffic Guidance System (TGS).
- The section of road surface to be removed will be saw cut – this activity would be undertaken for each shift prior to 10.00pm and would typically take less than 30 minutes to complete.
- A 5-14t excavator will then excavate the utility trench to the required depth and the spoil will be direct loaded onto a rigid truck for offsite disposal at appropriately licensed landfill facility. It is noted that the asphalt is ~150mm thick and will be able to be removed with an excavator ripper / bucket attachment. Stormwater pipes will then be placed within the trench.
- The trench will then be backfilled with select material and compacted using a jumping jack / plate compactor.
- Pits will be installed (if pre-cast off site) or constructed in-situ from reinforcing and concrete. Reinforcing will be delivered in rigid trucks and lifted into position using an excavator. Concrete will be poured direct from the back of the chute.
- The road surface will then be reinstated with hot mix. The hot mix would be delivered by a rigid truck, placed using the 14t excavator with bucket attachment and then be compacted using a plate compactor.

It is expected that approximately 40 out-of-hours shifts would be required to complete the stormwater drainage installation, assuming that each shift would commence at approximately 9.00pm and be completed by approximately 4.00am.

Station Street Pavement Reconstruction Works

Once the stormwater drainage is installed, the Station Street pavement would be reconstructed. The pavement works would be undertaken progressively from east to west along Station Street. It is anticipated that approximately 20 m² of pavement would be reconstructed each night (10 linear metres per shift), with the following methodology for each out-of-hours work shift:

- Establish temporary traffic control as per the approved Traffic Guidance System (TGS).
- The section of road surface to be removed will be saw cut – this activity would be undertaken prior to 10.00pm each shift and would typically take less than 30 minutes to complete.

- A 5-14t excavator will then excavate the pavement to the required depth (~500mm below existing surface). Spoil will be direct loaded onto a rigid truck for temporary stockpiling within the TBI for later offsite disposal at appropriately licensed landfill facilities.
- Select materials will be placed within the excavation and compacted using a jumping jack / plate compactor
- The road surface will then be reinstated with hot mix. The hot mix would be delivered by a rigid truck, placed using the 14t excavator with bucket attachment and then be compacted using a plate compactor.
- Kerbs, pram ramps which were removed as part of the drainage / pavement works would then be rectified, which would involve pouring concrete directly from a concrete agitator chute.

It is expected that approximately 30 out-of-hours shifts would be required to complete the pavement reconstruction, assuming that each shift would commence at approximately 9.00pm and be completed by approximately 4.00am.

Station Street Asphalt Works (Milling and Re-Sheeting)

Once the pavement reconstruction is complete, asphaltting would be undertaken along Station Street, as follows:

- Mill nominal 50mm of asphalt of project footprint using a 2m profiler
- Install spray seal on the exposed milled surface.
- Lay replacement nominal 50mm of asphalt. Compaction to be achieved using a 7t smooth drum static roller as well as a 7t multi tyre static roller.
- Line marking to be completed using line marking / spray truck.

It is expected that approximately 2 out-of-hours shifts would be required to complete the asphaltting (milling and resheeting).

CCTV Trench Works

The CCTV trench works on Station Street would not require occupation of the public road and therefore may be undertaken during standard hours only. The works will involve:

- Trenching along the alignment, as indicated in **Figure 2-1**. The works will involve pulling up existing pavers by hand, creating a trench with a 5-7 tonne excavator (max trench size: 500mm x 200mm), installing cabling and then back filling and compacting with a plate compactor.

Construction Hours

Standard construction hours defined by Condition E38, consistent with the CNVS, are:

- (a) 7:00am to 6:00pm Mondays to Fridays, inclusive;
- (b) 8:00am to 1:00pm Saturdays; and
- (c) at no time on Sundays or public holidays.

The proposed out-of-hours works will be managed under the Sydney Metro Out of Hours Works Protocol as required under CSSI Condition E42, which applies to out of hours work not subject to an EPL. Note that this Protocol was still in development during the development of this DNVIS.

Where works are proposed to be undertaken outside of the standard hours, specific respites and management measures would be considered and developed for those works as required.

In accordance with the Sydney Metro Out of Hours Work Protocol, an out of hours application will be submitted to Sydney Metro, and independent Environmental Representative for relevant endorsements and approval when out of hours works are planned.

The Community Communication Strategy will also support Ward's application for commencing out of hours work. It will detail how the community will be notified in advance of planned activities, kept informed of works progress and how potential noise impacts will be managed.

3. SENSITIVE RECEIVERS

Figure 3-1 shows the representative residential receivers surrounding the works areas previously considered by the DNVIS assessment and Figure 3-2 shows the representative non-residential (commercial) receivers surrounding the works areas.

For consistency with the DNVIS predictions have been undertaken for all representative receivers. However, for the identified works, the representative receivers potentially most impacted may be expected to be the Station Street receivers in the vicinity of R26.

Figure 3-1 Representative Residential Receivers Surrounding the Works



Figure 3-2 Representative Non-Residential Receivers Surrounding the Works



Note: Receiver C10 is the St Mary's Hotel which includes a residential component on the first floor. For the purposes of assessment, the first floor has been considered a residential use. Receiver C26 is a Childcare Centre located within the Station Plaza building – this has a semi-enclosed play area to the east of the building.

4. EXISTING NOISE ENVIRONMENT

The noise and vibration assessment undertaken as part of the Sydney Metro - Western Sydney Airport Environmental Impact Statement (EIS) is documented in the EIS Technical Paper 2 (*Sydney Metro - Western Sydney Airport Technical Paper 2: Noise and Vibration*).

The EIS study defined Noise Catchment Areas (NCAs) for the wider project. The sensitive receivers potentially affected by the St May's Bus Exchange Early Works are located with NCA3.

Table 4-1 sets out the existing ambient and background noise levels considered by this assessment. The levels for the Day, Evening and Night periods are consistent with the survey results identified by the EIS.

Table 4-1 Summary of NCA3 Unattended Noise Monitoring Results – Determined by EIS

Location	Rating Background Level - RBL (L_{A90} dBA)			Ambient Noise Level (L_{Aeq} dBA)		
	Day	Evening	Night	Day	Evening	Night
NM02	37	37	36	55	59	51

Time periods defined as follows – Day: 7.00am to 6.00pm Monday to Saturday, 8.00am to 6.00pm Sunday; Evening: 6.00pm to 10.00pm; and Night: 10.00pm to 7.00am Monday to Saturday, 10.00pm to 8.00am Sunday.

Consistent with the EIS study, the Rating Background Noise Levels (RBLs) shown have been considered in determining the construction noise criteria, as discussed in **Section 5**.

Whilst the EIS background noise levels have been applied for the purposes of assessment, it has been noted during daytime site inspections that the RBLs in the vicinity of the Station Street works are notably higher than L_{A90} 37 dBA.

In this regard, ACA report (ACA 11.00323L-01, dated 15 October 2021) sets out the results of daytime supplementary attended noise monitoring of pre-construction noise levels within St Marys, at locations potentially affected by the TBI Early Works. Of particular note, the supplementary noise monitoring determined that the closest residential receivers to the Station Street works (R26), are ordinarily subjected to daytime background noise levels of L_{A90} 53 dBA due to the influence of the Station Plaza shopping centre's mechanical services (car park exhaust fans). Additionally, residential receivers on Chesham Street (R29), are ordinarily subjected to daytime background noise levels of L_{A90} 51 dBA due to the influence of Glossop Street traffic and another construction compound.

5. AIRBORNE CONSTRUCTION NOISE

Airborne Construction Noise Criteria

The CNVS notes that Construction Noise Management Levels (NMLs) for all Sydney Metro projects should be determined in accordance with the procedures nominated in the DECCW's "*Interim Construction Noise Guideline*" dated July 2009 (ICNG).

The noise criteria set out in the ICNG have been considered in the assessment of potential impacts from the project works. **Table 5-1** summarises the construction noise criteria recommended by the ICNG for residential receivers and **Table 5-2** summarises the criteria for non-residential receivers. **Table 5-2** additionally includes the construction noise criteria for relevant special use receivers (other sensitive land uses) not identified by the ICNG.

With consideration to the out of hours periods identified by the Sydney Metro Construction Noise and Vibration Standard, the resultant project specific NMLs set out in **Table 5-3**.

Table 5-1 ICNG Airborne Construction Noise Criteria – Noise at Residences¹

Time of Day	Management Level $L_{Aeq,15min}$	How to Apply
Recommended Standard Hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or Public Holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq,15min}$ is greater than the noise affected level, the proponent would apply all feasible and reasonable work practices to minimise noise. The proponent would also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the proponent would consider very carefully if there is any other feasible and reasonable way to reduce noise to below this level. If no quieter work method is feasible and reasonable, and the works proceed, the proponent would communicate with the impacted residents by clearly explaining the duration and noise level of the works, and by describing any respite periods that will be provided.
Outside recommended standard hours	Noise affected RBL + 5 dB	A strong justification would typically be required for works outside the recommended standard hours. The proponent would apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dBA above the noise affected level, the proponent would negotiate with the community. For guidance on negotiating agreements see Section 7.2.2 of the ICNG
Note 1:	Adopted from the ICNG.	
Note 2:	Noise levels apply at the property boundary that is most exposed to construction noise (or receiver building façade that is most exposed to construction noise, noting that noise levels may be higher at upper floors of the noise affected receiver buildings). 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 5-2 ICNG Airborne Construction Noise Criteria – Other Sensitive Land Uses

Land Use	Management Level $L_{Aeq, 15min}$ (applies when properties are being used)	Reference
Classrooms at schools and other educational	Internal noise level: 45 dBA ¹	ICNG ⁵
Hospital wards and operating theatres	Internal noise level: 45 dBA ²	ICNG ⁵
Places of worship	Internal noise level: 45 dBA ³	ICNG ⁵
Active recreation areas	External noise level: 65 dBA	ICNG ⁵
Passive recreation areas	External noise level: 60 dBA	ICNG ⁵
Commercial premises (offices, etc)	External noise level: 70 dBA	ICNG ⁵
Industrial premises	External noise level: 75 dBA	ICNG ⁵
Childcare Centres (Sleeping areas)	Internal noise level: 40 dBA ⁴	AAAC ⁶
Childcare Centres (External areas)	Internal noise level: 60 dBA ⁴	AAAC ⁶

Notes: 1, 2, 3: External Noise Management Levels (NML) of $L_{Aeq, 15min}$ 55 dBA are considered by this assessment, assuming 10dB attenuation achieved by façades with open window(s);

4: External Noise Management Levels (NML) of $L_{Aeq, 15min}$ 60 dBA are considered by this assessment, assuming 20 dB attenuation achieved by façades with closed/fixed window(s);

5: Management Levels specified by Interim Construction Noise Guideline;

6: Management Level based on Australian Acoustical Consultants (AAAC) Technical Guideline on Child Care Centre Noise Assessments.

Table 5-3 Airborne Noise Management Levels (External Levels)

Location	Standard Hours (Day)		OOHW (Day)		OOHW (Evening)		OOHW (Night)	
	RBL	NML	RBL	NML	RBL	NML	RBL	NML
Residential	37	47	37	42	37	42	36	41
School (Classrooms)	n/a	55	n/a	55	n/a	55	n/a	55
Commercial (Offices)	n/a	70	n/a	70	n/a	70	n/a	70
Childcare Centre (External Play Areas & External to Sleeping Areas)	n/a	60	n/a	60	n/a	60	n/a	60

Notes: RBL - Rating Background Noise Level; NML - Noise Management Level; Non-residential criteria only apply when receiver building is in use. Noise levels apply at the property boundary that is most exposed to construction noise (or receiver building façade that is most exposed to construction noise, noting that noise levels may be higher at upper floors of the noise affected receiver buildings). 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.

Sydney Metro Construction Noise & Vibration Standard (CNVS)

In addition to the ICNG, the noise criteria set out in the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (CNVS) have been considered.

The CNVS recognises that works requiring the use of heavy machinery can generate high noise and vibration levels and in urban areas there is often limited setback distance between these noise sources and nearby buildings and receivers. Under such circumstances, typically there is limited opportunity to practicably mitigate the noise and vibration effects in a cost-effective manner. Therefore, potential disturbance impacts are usually minimised as much as practicable through management techniques. For residential receivers, depending on how far the predicted airborne construction noise level is above RBL, the CNVS recommends the adoption of the management measures set out in **Table 5-4**. Full definitions of the identified management measures are set out in the CNVS.

Table 5-4 Additional Airborne Noise Management Measures (Residential)

Time Period		Mitigation Measures			
		Predicted $L_{Aeq,15min}$ Noise Level Above NML			
		0 to 10 dB	10 to 20 dB	20 to 30 dB	> 30 dB
Standard Hours	Mon-Fri (7.00am - 6.00pm)				
	Sat (8.00am - 1.00pm)	LB	LB, M	LB, M, SN	LB, M, SN
	Sun/Pub Hol (Nil)				
OOH (Evening)	Mon-Fri (6.00pm - 10.00pm)				
	Sat (1.00pm - 10.00pm)	LB, M	LB, M, SN	LB, M, SN, RO	LB, M, SN, IB, PC, RO, SN
	Sun/Pub Hol (8.00am - 6.00pm)				
OOH (Night)	Mon-Fri (10.00pm - 7.00am)				
	Sat (10.00pm - 8.00am)	LB, M	LB, M, SN, RO	LB, M, SN, IB, PC, RO, AA	LB, M, SN, IB, PC, RO, SN, AA
	Sun/Pub Hol (6.00pm - 7.00am)				

Notes: AA – Alternative Accommodation; M – Monitoring; IB – Individual Briefings; LB – Letterbox drops; RO – Project Specific Respite Offer; PC – Phone Calls and emails; SN – Specific Notifications. Full definitions of these Additional Mitigation Measures are set out in Table 15 of the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (Ver 4.2, 08/09/2020).

Construction Activities

Assessment of airborne noise impacts from the construction activities have been determined by modelling the noise sources, receiver locations, topographical features and buildings.

Key details regarding the construction site layouts, the likely plant and equipment and hours of operation were informed by the construction team.

Table 5-5 provides a summary of the works to be undertaken and the timeframes at which the works would occur.

Table 5-5 Construction Scenarios

Model ID	Stage	Activity	Standard Hours	Out-of-Hours Day	Out-of-Hours Evening	Out-of-Hours Night
External Works						
20	Materials Laydown and Amenities Compound	Laydown Operations	Yes	Yes	Yes	Yes
21a	Service Installation Stormwater Drainage and Pavement Reconstruction and Resurfacing Works	Saw Cut Asphalt	No	No	Yes	No
21b		Excavate & Backfill	No	No	No	Yes
21c		Pavement Reconstruction	No	No	No	Yes
21d		Asphalting Works – Milling and Resheeting	No	No	No	Yes
22a	Service Installation CCTV Services	Lift Pavers	Yes	No	No	No
22b		Excavate	Yes	No	No	No
22c		Backfill & Compact	Yes	No	No	No

Construction Equipment

For the purposes of this assessment, the construction equipment and sound power levels set out in **Table 5-6** have been considered across the identified works areas as shown in **Figure 2-1**. The sound power levels have been determined by measurements undertaken by ACA on other similar projects, or have been adopted from other similar CSSI projects.

Table 5-6 Construction Plant Sound Power Levels

Stage	Activity	Construction Equipment	Sound Power Level - SWL (L _{Aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL (L _{Aeq,15min} dBA)	Activity SWL (L _{A1,1min} dBA)
20	Materials Laydown and Amenities Compound	Hand Tools	90	5	85	100	115
		2t Tipper	105	5	100		
		14t Excavator	105	5	100		
21a	Service Installation - Stormwater Drainage Services 21a Saw Cut Asphalt	2t Tipper Truck	105	5	100	111	120
		Concrete Saw*	118	3	111		
21b & 21c	Service Installation - Stormwater Drainage Services	Hand Tools	90	5	85	110	115
		Jackhammer	113	5	108		
		14t Excavator with Bucket	110	5	105		
	21b Excavate & Backfill	2t Tipper Truck	100	5	95		
		Rigid Truck / Bogie	105	5	100		
	21c Pavement Reconstruction Works	Plate Compactor	109	5	104		
		Jumping Jack	109	5	104		
21d	Service Installation - Stormwater	Milling Machine / Profiler	117	5	112	112	119
		Paver	114	5	109		

ST MARY'S BUS EXCHANGE EARLY WORKS
ADDENDUM DETAILED NOISE & VIBRATION IMPACT STATEMENT (DNVIS) – STORMWATER VARIATION

	Drainage Services	7t Smooth Drum Static Roller	107	5	102		
	21d Asphalting (Milling and Resheeting)	7t Multi Tyre Static roller.	107	5	102		
		Line Marking Truck	108	5	103		
22a	CCTV Services Lift Pavers	2t Tipper Truck	105	5	100	105	110
		5t Excavator with Bucket	110	5	105		
22b	CCTV Services Excavate	Hand Tools	90	5	85	110	115
		Jackhammer	113	5	108		
		5t Excavator with Bucket	110	5	105		
		5t Excavator with Small Hammer*	115	5	110		
		2t Tipper Truck	100	5	95		
		Rigid Truck / Bogie	105	5	100		
22c	CCTV Services Backfill & Compact	Hand Tools	90	5	85	108	115
		5t Excavator with Bucket	110	5	105		
		2t Tipper Truck	100	5	95		
		Plate Compactor	109	5	104		
		Jumping Jack	109	5	104		

Note: Sources marked with an asterisk (e.g. concrete saws, grinders, hydraulic hammers, profilers, vibratory rollers) can emit noise with special audible (annoying) characteristics. In accordance with the ICNG and the CNVS, predicted noise levels for these stages incur a +5 dB penalty to for account for the additional annoyance that could arise. This penalty has been applied to the predicted levels. The activity sound power levels for each stage take account of the potential for the coinciding use of plant items – where certain plant items would operate at the same time adjustments have been calculated.

Activity 20 – Compound – The compound would support the out-of-hours works on Station Street and is assumed to operate at any time during standard hours and during the out-of-hours periods.

Activity 21a – Saw cutting – This activity would be restricted to the evening period (prior to 10.00pm). The saw cutting would be undertaken at the start of each shift and the activity would be completed within approximately 30 mins or less.

Activities 21b and 21c – Excavate, Backfill and Pavement Reconstruction – These activities would be undertaken during the night period.

Activities 21d – Asphalting (milling and re-sheeting) activities would be undertaken during the night period.

Activities 22a, 22b, 22c – CCTV Services would be undertaken during standard hours only.

Construction Noise Modelling

Construction noise emissions from the works have been modelled using the SoundPLAN (Version 8-2) environmental noise prediction software. This program is used and recognised internationally and is also recognised by NSW regulatory authorities as a preferred computer noise model. Factors that are addressed in the noise modelling are:

- Construction equipment sound power levels;
- Location of construction equipment;
- Screening from existing structures;
- Receiver locations, including multiple storey receivers;
- Ground topography;
- Noise attenuation due to geometric spreading;
- Ground absorption; and
- Atmospheric absorption.

Construction Noise Predictions

The predicted worst-case construction noise levels at the identified representative receivers for the modelled construction activities are set out in a series of tables in **Appendix B**. Additionally, the Additional Mitigation Measures that are required to be considered by the CNVS are identified in **Appendix B**.

A series of predicted noise contours is provided in **Appendix C**.

The predictions represent the typical-worst case noise levels that may be expected to arise at the external facades of the receiver buildings. It should be noted that construction noise levels would frequently be lower than the worst-case levels considered for significant periods of time. This would be apparent as works move around the work areas and are therefore more distant/more shielded from receivers and when less noisy activities are being undertaken.

The results show the airborne noise NLMs have potential to be exceeded at various localities and times depending on the works schedule. Given the likelihood of exceedances, the Sydney Metro standard mitigation measures will be applied throughout all of the identified work stages and the Additional Mitigation Measures (AMMs) will be considered at the locations indicated.

Highly Noise Affected Receivers

The modelling indicates the potential for some relatively high noise levels during the works. The highest levels and greatest impacts are anticipated at the closest receivers to the night works, principally on Station Street and Chesham Street. These receivers may be expected to be highly

noise affected at times during the works, that is, noise levels may be expected to exceed the NML by > 20 dB externally to these receivers.

Ward proposes to consult with the potentially affected receivers on Station Street and Chesham Street prior to the works to determine if any particular concerns regarding noise impacts may be addressed during the scheduling.

CNVS Additional Mitigation Measures – Airborne Construction Noise

The highlighted Additional Mitigation Measure (AMM) triggers shown in tables set out in **Appendix B** are based on the exceedance of the $L_{Aeq,15min}$ NMLs. The tables identify some AMM triggers of Respite Offer (RO) and Alternative Accommodation (AA).

Whilst the noise levels identified in **Appendix B** are representative of the typical worst case noise levels that may be expected to arise during the works, it is noted that given the scheduling of the works there is potential for the most exposed receivers to be impacted over several consecutive evenings and nights.

Modelling indicates the potential for AA triggers when the night works are undertaken within the easternmost 120 m of the Station Street works areas. **Figure 5-1** indicates the residential receiver buildings affected, these are located at 1 Station Street / 3 Lethbridge Street, 2 Station Street and 3 Station Street.

Figure 5-1 Residential Buildings where Alternative Accommodation (AA) Trigger Levels Predicted during Night Works



Ward will consult with these receivers to determine any AA requirements and will consider their feedback regarding the works scheduling.

Receiver Consultation in Accordance with E57

In accordance with Conditions E57, Ward proposes to consult with highly impacted residential receivers on Station Street and will also consult with the receivers that may be impacted by levels predicted to trigger RO, as indicated in **Appendix B**.

Consultation to negotiate suitable respite requirements to minimise any potential noise impacts to residents will be undertaken with:

- 1-3 Station Street / 3 Lethbridge Street
- 1-6 Chesham Street
- 3 Station Street
- 34-36 Phillip Street
- 69 Carinya Avenue
- 65-67 Carinya Avenue
- St Mary's Hotel residents

Ward will consult with these potentially affected receivers and consider any community feedback during the works scheduling.

The outcomes of this community consultation including any identified respite periods will be provided to the ER, EPA and the Planning Secretary prior to the out-of-hours work commencing.

All project community consultation will be completed in accordance with the Sydney Metro Overarching Community Communications Strategy (OCCS) and project specific Community Communications Strategy (CCS). Forecast noise and vibration levels and predicted potential impacts detailed in this DNVIS will be used to inform and guide the required project consultation.

All potentially affected receivers, as previously identified by the TBI DNVIS will be provided with regular letterbox drop notifications regarding the works, as required by the CNVS.

Noise Monitoring

Noise monitoring would be undertaken during the works at the most affected monitoring locations nominated by the DNVIS, based on on-site subjective evaluation.

The results of the noise monitoring at the identified locations would be reviewed as the works proceed and would be compared against the NML. Where necessary the results would be used to inform the

construction team of any notable exceedances, over the levels set out in **Appendix B** and would be used to identify any recommended modifications to work methods or to identify the requirements for additional specific amelioration measures.

Sleep Disturbance

Maximum noise level events from construction activities during the night-time period can trigger both awakenings and disturbance to sleep stages. The CNVS approach to managing events that cause sleep disturbance is consistent with the Noise Policy for Industry (EPA, 2017). A detailed maximum noise level event assessment is to be undertaken where night-time noise levels at a residential location exceed the:

- $L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, or the
- L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater.

The CNVS notes the maximum noise level event assessments should be based on the L_{AFmax} descriptor on an event basis under 'fast' time response. The detailed assessment will consider all feasible and reasonable noise mitigation measures with a goal of achieving the above trigger levels for night-time activities.

To assess the likelihood of sleep disturbance, **Table B-11 (Appendix B)** sets out the predicted maximum noise levels for each stage and identifies where exceedances may occur during works undertaken in the night period.

It is noted that the CNVS AMMs are based on the degree to which the $L_{Aeq,15min}$ level exceeds the RBL and not the L_{Amax} level. The AMMs based on the $L_{Aeq,15min}$ assessment would be expected to adequately address potential sleep disturbance impacts.

6. GROUNDBORNE CONSTRUCTION NOISE & VIBRATION

Construction Vibration Criteria

The effects of vibration in buildings can be divided into three main categories; those in which the occupants or users of the building are inconvenienced or possibly disturbed (human comfort), those where the building contents may be affected (effects on building contents) and those in which the integrity of the building or the structure itself may be prejudiced (structural damage).

Human Comfort

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

British Standard 6472-1992 "Guide to evaluation of human exposure to vibration in building" nominates guideline values for various categories of disturbance, the most stringent of which are the levels of building vibration associated with a "low probability of adverse comment" from occupants.

BS 6472-1992 provides guideline values for continuous, transient and intermittent events that are based on a Vibration Dose Value (VDV), rather than a continuous vibration level. The vibration dose value is dependent upon the level and duration of the short-term vibration event, as well as the number of events occurring during the daytime or night-time period.

The vibration dose values recommended in BS 6472-1992 for which various levels of adverse comment from occupants may be expected are presented in **Table 6 -1** (based on CNVS Table 4).

Table 6-1 Vibration Dose Values re Expected Adverse Comment in Residential Buildings

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	0.13	0.26	0.51

With respect to VDV, ACA notes that there can be practical difficulties in the prediction and measurement of this parameter, particularly given the limited available measured data. ACA considers the Peak Particle Velocity (PPV) levels as recognised by AVTG is an acceptable substitution (as per table C1.1 of the AVTG – i.e. Residential Daytime: 0.28 to 0.56 mm/s PPV; Residential Night: 0.2 to 0.4 mm/s PPV; Commercial: 0.56 to 1.1 mm/s PPV).

This is a common approach in the industry and allows alignment with structural damage vibration guide values and provides an opportunity for the same vibration equipment to measure for comfort and damage.

Effects on Building Contents

People can perceive floor vibration at levels well below those likely to cause damage to building contents or affect the operation of typical equipment found in most buildings that is not particularly vibration sensitive.

For most receivers, the controlling vibration criterion is the human comfort criterion, and it is therefore not normally required to set separate criteria in relation to the effect of construction vibration on typical building contents.

Where appropriate, objectives for the satisfactory operation of vibration sensitive critical instruments or manufacturing processes should be sourced from manufacturer's data and/or other published objectives.

Structural Damage

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.

BS 7385 Part 2-1993 sets guide values for building vibration based on the lowest vibration levels above which damage has been credibly demonstrated. These levels are judged to give a minimum risk of vibration induced damage, where minimal risk for a named effect is usually taken as a 95% probability of no effect.

Sources of vibration that are considered in the standard include demolition, blasting (carried out during mineral extraction or construction excavation), piling, ground treatments (e.g. compaction), construction equipment, tunnelling, road and rail traffic and industrial machinery.

The recommended limits (guide values) for transient vibration to ensure minimal risk of cosmetic damage to residential and industrial buildings are presented numerically in **Table 6-2** (based on CNVS Table 5).

Table 6-2 Transient Vibration Guide Values – Minimal Risk of Cosmetic Damage

Peak Component Particle Velocity, PCPV in the Frequency Range of Predominant Pulse (mm/s)		
Type of Building	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed building structures and heavy commercial buildings	50 mm/s at 4 Hz and above	
Unreinforced or light framed structures Residential or light commercial buildings	15 mm/s at 4 Hz, increasing to 20 mm/s at 15Hz	20 mm/s at 15 Hz, increasing to 50 mm/s at 40 Hz and above

In order to assess the likelihood of cosmetic damage due to vibration measurements would be as a minimum undertaken at the base of the building in three orthogonal vibration components (transverse, longitudinal and vertical directions).

It is noteworthy that extra to the guide values nominated, 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” and

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

Additionally, Condition E84 requires that before commencement of construction, all buildings identified as being at risk of damage must be inspected and a building condition survey undertaken by a suitably qualified and experienced person.

Due to the current difficulties in conducting internal building inspections due to Covid-19 restrictions, Ward generally proposes to minimise any building inspection requirements by minimising the potential for cosmetic damage effects.

General Vibration Screening Criterion

The guide values 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 may need to be reduced by up to 50%.

Note: rockbreaking/hammering and vibratory rolling activities are considered (by TfNSW) to have the potential to cause dynamic loading in some structures and it may therefore be appropriate to reduce the transient values by 50%.

Therefore, for most construction activities involving intermittent vibration sources such as rockbreakers, piling rigs, vibratory rollers, excavators with hydraulic hammers and the like, the predominant vibration energy occurs at frequencies greater than 4 Hz (and usually in the 10 Hz to 100 Hz range). On this basis, a conservative vibration damage screening level per receiver type is given below:

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

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

Guidelines for Heritage Structures

Heritage buildings and structures would be assessed as per the screening criteria as they should not be assumed to be more sensitive to vibration unless they are found to be structurally unsound. If a heritage building or structure is found to be structurally unsound (following inspection) a more conservative cosmetic damage criteria of 2.5 mm/s peak component particle velocity (from DIN 4150) would be considered.

Table 9-3 outlines the heritage listed items within the vicinity of the project, none of which have been assessed as being structurally unsound.

Table 6-3 Heritage Items

Heritage Item / Location	Register Listings	Significance	Location
St Marys Railway Station	State Heritage Register and State Rail S170 register under the Heritage Act	State	North of Site
St Marys Railway Station Parcel Office	Penrith City Council LEP (01249)	Local	North of Site

Guidelines for Sensitive Scientific & Medical Equipment

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

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 Table 6 and Figure 3 of the CNVS.

The land use survey undertaken by ward has not identified any uses that may be expected to include sensitive scientific or medical equipment.

Other Vibration Sensitive Structures & Utilities

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 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 with the structure or utility's owner in order to determine acceptable vibration levels.

CNVS Additional Mitigation Measures – Groundborne Construction Vibration

In addition to the vibration criteria discussed above, the CNVS requires the consideration of Additional Mitigation Measures, in the case of appreciable levels of vibration occurring at sensitive receivers.

Table 6-4 (based on Table 17 of the CNVS) sets out the Additional Mitigation Measures (AMMs) to be applied in the case of exceedances of the groundborne vibration management levels.

Table 6-4 Additional Mitigation Measures - Ground-Borne Vibration

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

Notes: AA – Alternative Accommodation; M – Monitoring; IB – Individual Briefings; LB – Letterbox drops; RO – Project Specific Respite Offer; PC – Phone Calls and emails; SN – Specific Notifications. Full definitions of these Additional Mitigation Measures are set out in Table 15 of the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (Ver 4.2, 08/09/2020). The 'maximum' vibration value is taken as the 'Maximum Peak Velocity (mm/s)' value identified in Table C1.1 in the Assessing Vibration: A technical guideline (DEC 2006).

ICNG Groundborne Construction Noise Criteria

Groundborne (regenerated) noise is noise generated by vibration transmitted through the ground into a structure. Groundborne noise caused, for example by underground works such as tunnelling, can be more noticeable than airborne noise. The following groundborne noise levels for residences are nominated in the ICNG and indicate when management actions would be implemented. These levels recognise the temporary nature of construction and are only applicable when groundborne noise levels are higher than airborne noise levels.

The groundborne noise management levels considered by this assessment are shown in **Table 6-5**.

Table 6-5 Ground-Borne Noise Management Levels

Receiver Type	Standard Hours (Day)	OOHW (Day)	OOHW (Evening)	OOHW (Night)
	L _{Aeq,15min} dBA	L _{Aeq,15min} dBA	L _{Aeq,15min} dBA	L _{Aeq,15min} dBA
Residential	45	40	40	35
Commercial	50 when in use			
Childcare	40 when in use			
School	45 when in use			

Note: The Groundborne Noise Management Levels for non-residential uses only apply when the building is in use.

The daytime criteria are applicable to both residential and commercial receivers, whereas the evening and night-time criteria are only applicable to residential receivers. The Groundborne Noise Management Levels for non-residential uses only apply when the receiver building is in use.

The internal noise levels are to be assessed at the centre of the most-affected habitable room.

CNVS Additional Mitigation Measures – Groundborne Construction Noise

Table 6-6 (based on Table 15 of the CNVS) sets out the AAMs to be applied in the case of exceedances of the groundborne noise management levels.

Table 6-6 Additional Groundborne Noise Management Measures (Residential)

	Time Period	Mitigation Measures			
		Predicted L _{Aeq,15min} Noise Level Above NML			
		0 to 10 dB	10 to 20 dB	20 to 30 dB	> 30 dB
Standard Hours	Mon-Fri (7.00am - 6.00pm)				
	Sat (8.00am - 1.00pm)	LB	LB, M	LB, M, SN	LB, M, SN
	Sun/Pub Hol (Nil)				
OOH (Evening)	Mon-Fri (6.00pm - 10.00pm)				LB, M, SN
	Sat (1.00pm - 10.00pm)	LB, M	LB, M, SN	LB, M, SN, RO	IB, PC, RO, SN
	Sun/Pub Hol (8.00am - 6.00pm)				
OOH (Night)	Mon-Fri (10.00pm - 7.00am)				LB, M, SN
	Sat (10.00pm - 8.00am)	LB, M	LB, M, SN, RO	LB, M, SN, IB, PC, RO, AA	IB, PC, RO, SN, AA
	Sun/Pub Hol (6.00pm - 7.00am)				

Notes: AA – Alternative Accommodation; M – Monitoring; IB – Individual Briefings; LB – Letterbox drops; RO – Project Specific Respite Offer; PC – Phone Calls and emails; SN – Specific Notifications. Full definitions of these Additional Mitigation Measures are set out in Table 15 of the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (Ver 4.2, 08/09/2020).

Groundborne Construction Noise & Vibration Assessment

Certain construction activities require the use of vibration intensive equipment that have potential to adversely impact the closest sensitive receivers.

With respect to groundborne noise, ACA notes that for the proposed surface works airborne noise levels would dominate over groundborne noise. It is considered that management of airborne noise impacts in addition to management of vibration impacts would satisfactorily manage any groundborne noise effects. Accordingly, this assessment does not consider groundborne noise effects any further.

Minimum working distances to sensitive receivers for cosmetic building damage and human response have been identified for vibration generating plant that may be used during the works. If equipment operates closer to a sensitive receiver, vibration from construction works may potentially exceed the vibration guidelines. It should be noted, however, the minimum working distances are conservative and indicative. Actual distances may be expected to vary depending on the activity/operator, equipment particularities, local ground conditions and receiver conditions (e.g. building footings).

Notwithstanding this, Ward has selected plant and works methods to, as far as practicable, minimise any potential vibration (and noise) effects during the night. In particular, only static (non-vibratory) rollers would be used. Out of hours compaction works would be undertaken with less vibration intensive plate compactors and jumping jacks, in lieu of vibratory rollers.

Additionally, hydraulic hammering would not be undertaken during the out of hours works. Some provision has been made for some limited use (for contingency) of a small hydraulic hammer during the CCTV works, but this would only be used during standard hours and whilst observing all safe working distances from structures.

Table 6-7 shows the vibration generating plant that would be used and the associated minimum working distances. The hammer setback distances are noted to be generally consistent with the TfNSW Construction Noise and Vibration Strategy (V 4.1). The TfNSW Strategy does not include reference distances for plate compactors or jumping jacks. The distances identified for these items are based on measurements undertaken by the University of Western Australia which are consistent with ACA's experience.

Vibration monitoring trials would be undertaken on site at the commencement of the works to confirm vibration levels and safe working distances for all vibration generating equipment.

Table 6-7 Recommended Minimum Working Distances for Vibration Intensive Equipment

Plant Item	Minimum Distance – Cosmetic Damage (BS 7385)	Minimum Distance – Human Response (OE&H Vibration Guideline)
5t Excavator with Small (300kg) Hydraulic Hammer	2	7
60kg Plate Compactor	2	7
Jumping Jack	2	7
Jackhammer	1 m (nominal)	Avoid contact with structure

Note 1: Hydraulic hammer & vibratory roller distances are consistent with the TfNSW Construction Noise and Vibration Strategy (V 4.1).
Note 2: Plate compactor distances are based on measurements undertaken by University of Western Australia.

Hydraulic Hammers

During the service installation works on Station Street if the 5-tonne excavator with small hydraulic hammer is used, a setback distance of >20 m would be maintained from the St Marys Railway Station Parcel Office (Heritage Receiver). At this distance vibration levels from a small hydraulic hammer are predicted to not exceed 1 mm/s PPV. Therefore, no material risk of exceedance of the screening criteria for cosmetic building damage for commercial or heritage receivers is predicted for the identified hydraulic hammering works.

Additionally, it is considered there would be no material risk of human comfort vibration exceedances from the identified potential hammering works.

Compaction Works

For the compaction works requiring plate compactors or jumping jacks, safe working distances with respect to cosmetic building damage and human comfort will be maintained and there would be no material risk of exceedances of the identified vibration screening criteria.

CNVS Additional Mitigation Measures – Groundborne Noise & Vibration

Given Ward's proposed vibration controls, further specific additional mitigation measures relating to groundborne noise or vibration are not considered necessary, beyond the standard measures defined by the CNVS. Application of the standard measures (outlined in **Section 8**) in addition to the controls discussed above would be expected to be sufficient to ensure vibration effects on the occupants of nearby buildings are satisfactorily managed.

7. CONSTRUCTION ROAD TRAFFIC NOISE

Construction Road Traffic Noise Guidelines

Criteria for off-site road traffic noise applicable to existing residences affected by additional traffic on existing local roads generated by land use developments are specified in the NSW Road Noise Policy (RNP). Whilst these criteria do not specifically apply to construction traffic movements, they have been conservatively considered and are summarised in **Table 7-1**.

Table 7-1 RNP Criteria for Road Traffic Noise

Type of Development	Daytime (07:00-22:00)	Night (22:00-07:00)
Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	L _{Aeq,15 hour} 60 (external)	L _{Aeq,9 hour} 55 (external)
Existing residences affected by additional traffic on existing local roads generated by land use developments	L _{Aeq,1 hour} 55 (external)	L _{Aeq,1 hour} 50 (external)

Note: The identified criteria do not apply to vehicle movements within the Project Site. For the purpose of assessment, any noise generated by on-site vehicle movements is considered as construction noise and assessed holistically with on-site mobile plant in accordance with the ICNG.

As required by the RNP, an initial screening test should first be applied by evaluating whether noise levels would increase by more than 2 dB (an increase in the number vehicles of approximately 60%) due to construction traffic or a temporary reroute due to a road closure.

Where noise levels increase by more than 2 dB further assessment is required using the criteria presented in the RNP, as shown in **Table 10-1**. A 2 dB increase is typically considered not noticeable.

Construction Road Traffic Assessment

Ward estimates that a maximum of 10 heavy vehicle movements per hour would be required during the peak construction phase.

Considering the existing volume of traffic on the adjacent roads, the noise impact generated by construction delivery vehicles arriving and leaving the site would be expected to result in an increase in road traffic noise levels of significantly less than 2 dB which is in compliance with the established criteria.

On this basis, no material construction traffic noise impacts are expected.

8. CONSTRUCTION NOISE & VIBRATION MITIGATION MEASURES

CNVS Additional Mitigation Measures

The CNVS sets out standard construction noise and vibration mitigation measures to be implemented on all Sydney Metro projects by default in order to minimise the potential noise and vibration impacts at the surrounding Noise Sensitive Receivers. These will be implemented by Ward where feasible and reasonable and are summarised in **Table 8-1**. A summary of roles and responsibilities is provided in **Table 8-2**.

Table 8-1 Standard Mitigation Measures to Reduce Construction Noise and Vibration

Action Required	Applies To	Details
Management Measures		
Implementation of any project specific mitigation measures required	Airborne noise Ground-borne noise and vibration	In addition to the measures set out in this table, any project specific mitigation measures identified in the environmental assessment documentation (e.g. EA, REF, submissions or representations report) or approval or licence conditions must be implemented.
Implement community consultation measures	Airborne noise Ground-borne noise and vibration	A register of all noise and vibration sensitive receivers (NSRs) would be kept on site. The register would include the following details for each NSR: <ul style="list-style-type: none"> • Address of receiver • Category of receiver (e.g. Residential, Commercial etc.) • Contact name and phone number
Site Inductions	Airborne noise Ground-borne noise and vibration	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: <ul style="list-style-type: none"> • All relevant project specific and standard noise and vibration mitigation measures • Relevant licence and approval conditions • Permissible hours of work • Any limitations on high noise generating activities • Location of nearest sensitive receivers • Construction employee parking areas • Designated loading/unloading areas and procedures • Site opening/closing times (including deliveries) • Environmental incident procedures

ST MARY'S BUS EXCHANGE EARLY WORKS
ADDENDUM DETAILED NOISE & VIBRATION IMPACT STATEMENT (DNVIS) – STORMWATER VARIATION

Behavioural practices	Airborne noise	No swearing or unnecessary shouting or loud stereos/radios; on site. No dropping of materials from height; throwing of metal items; and slamming of doors. No excessive revving of plant and vehicle engines Controlled release of compressed air.
Monitoring	Airborne noise Ground-borne noise and vibration	A noise monitoring program is to be carried out for the duration of the works in accordance with the Construction Noise and Vibration Management Plan and any approval and licence conditions.
Attended vibration measurements	Ground-borne vibration	Attended vibration measurements are required at the commencement of vibration generating activities to confirm that vibration levels satisfy the criteria for that vibration generating activity. Where there is potential for exceedances of the criteria further vibration site law investigations would be undertaken to determine the site-specific safe working distances for that vibration generating activity. Continuous vibration monitoring with audible and visible alarms would be conducted at the nearest sensitive receivers whenever vibration generating activities need to take place inside the applicable safe-working distances.
Source Controls		
Construction hours and scheduling	Airborne noise Ground-borne noise and vibration	Where feasible and reasonable, construction would be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels would be scheduled during less sensitive time periods.
Construction respite period	Ground-borne noise and vibration Airborne noise	High noise and vibration generating activities ² may only be carried out in continuous blocks, not exceeding 3 hours each, with a minimum respite period of one hour between each block ³ .
Equipment selection	Airborne noise Ground-borne noise and vibration	Use quieter and less vibration emitting construction methods where feasible and reasonable. For example, when piling is required, bored piles rather than impact-driven piles will minimise noise and vibration impacts. Similarly, diaphragm wall construction techniques, in lieu of sheet piling, will have significant noise and vibration benefits.
Maximum noise levels	Airborne-noise	The noise levels of plant and equipment must have operating Sound Power Levels compliant with the criteria in Table 13 (of the CNVS).
Rental plant and equipment	Airborne-noise	The noise levels of plant and equipment items are to be considered in rental decisions and in any case cannot be used on site unless compliant with the criteria in Table 13 (of the CNVS).

ST MARY'S BUS EXCHANGE EARLY WORKS
ADDENDUM DETAILED NOISE & VIBRATION IMPACT STATEMENT (DNVIS) – STORMWATER VARIATION

Plan worksites and activities to minimise noise and vibration	Airborne noise Ground-borne vibration	Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.
Non-tonal reversing alarms	Airborne noise	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.
Minimise disturbance arising from delivery of goods to construction sites	Airborne-noise	<p>Loading and unloading of materials/deliveries is to occur as far as possible from NSRs</p> <p>Select site access points and roads as far as possible away from NSRs</p> <p>Dedicated loading/unloading areas to be shielded if close to NSRs</p> <p>Delivery vehicles to be fitted with straps rather than chains for unloading, wherever feasible and reasonable</p>
Path Controls		
Shield stationary noise sources such as pumps, compressors, fans etc	Airborne-noise	<p>Stationary noise sources would be enclosed or shielded whilst ensuring that the occupational health and safety of workers is maintained.</p> <p>Appendix F of AS 2436: 1981 lists materials suitable for shielding.</p>
Shield sensitive receivers from noisy activities	Airborne-noise	<p>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.</p>

Table 8-2 Roles and Responsibilities

Role	Definition and Responsibilities
Project Environment Manager	<ul style="list-style-type: none"> Oversee the implementation of all noise and vibration management initiatives including coordinating responses to noise and vibration complaints. Manage review and continual improvement of the DNVIS/CNVMP. Ensure that sufficient resources are allocated for the implementation of the DNVIS/CNVMP. Consider and advise senior management on compliance obligations regarding noise and vibration. 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.
Site Supervisor	<ul style="list-style-type: none"> Ensure that all requirements of the DNVIS/CNVMP are effectively implemented. Ensure all appropriate noise and vibration mitigation measures are implemented.
EHS Coordinators	<ul style="list-style-type: none"> Assist the Project Environment Manager and Construction Managers in implementing the DNVIS/CNVMP. Oversee noise and vibration training including inductions, toolbox talks and specific technical training on monitoring equipment. Ensure all appropriate noise and vibration mitigation measures are implemented. Monitoring and reporting on compliance.
Site Engineers	<ul style="list-style-type: none"> Assist the Construction Manager in implementing the DNVIS/CNVMP.
Project Noise and Vibration Consultant	<ul style="list-style-type: none"> Provide Ward with specialist noise and vibration input and advice including development of the CNVMP, DNVIS and discussions regarding progressive construction works. Undertaking noise and vibration monitoring when required. Assisting in community consultation when required.
Construction Manager	<ul style="list-style-type: none"> Manage the delivery of the construction process, in relation to noise and vibration management across the site together with the Environment Manager. Ensure that all requirements of the DNVIS/CNVMP are effectively implemented, including all subcontractors
Stakeholder and Community Relations Manager	<ul style="list-style-type: none"> Manage notifications and consultation for noise and vibration and liaise with the Environment Manager about management of noise and vibration complaints. Assist in coordinating responses to noise and vibration complaints.

CNVS Additional Mitigation Measures

Based on the predictions, all reasonable and feasible mitigation measures to minimise noise and vibration from construction will be implemented. This includes the Standard Mitigation Measures (SMM) set out in **Table 8-1** and the Additional Mitigation Measures (AMM) required by the CNVS, as set out in **Section 5** and **Appendix B**.

Construction Noise & Vibration Monitoring Program

Conditions C13 - C15 specify in detail requirements for monitoring. These matters are addressed in the Construction Noise & Vibration Monitoring Program provided in the TBI Early Works DNVIS.

9. CONCLUSION

Acoustics Consultants Australia (ACA) has previously prepared on behalf of Ward Civil & Engineering Pty Ltd (Ward) a Detailed Noise and Vibration Impact Statement (DNVIS) for the St Mary's Temporary Bus Interchange (TBI) Early Works, which form part of the Sydney Metro Western Sydney Airport (SMWSA) Project (SSI 10051).

Details the DNVIS assessment are set out in ACA report 11.00323R-02.

Subsequent to the issue of the DNVIS assessment (ACA report 11.00323R-02), this addendum report has been prepared in relation to the following additional scope items:

- Operation of a materials laydown and amenities compound on Station Street.
- Civil works scope variation – for stormwater drainage and pavement works on Station Street.
- Civil works scope variation – for CCTV trench works on Station Street.

This addendum report should be read in conjunction with the main DNVIS (Report 11.00323R-02).

This addendum assessment has identified further Additional Mitigation Measures required to manage the proposed out of hours works.

APPENDIX A: Glossary of Noise & Vibration Terms

1 Sound Level (or Noise Level)

Sound may be defined as any pressure variation that the human ear can detect. The human ear responds to a wide range of changes in sound pressure. As the greatest sound pressures to which the human ear responds are 10,000,000 times greater than the lowest, the decibel (dB) scale, by the use of logarithms is used to express sound pressure levels more conveniently.

The standard reference sound pressure used to define a Sound Pressure Level is 2×10^{-5} Pascals (Pa).

The decibel is defined as ten times the logarithmic ratio of two pressures. The smallest perceptible change is approximately 1 dB.

Sound Pressure Level is typically abbreviated as SPL, L_p , or L.

2 "A" Weighted Sound Pressure Level

The most common frequency rating is 'A-Weighting'. The A-weighting frequency response curve is designed to approximate the sensitivity of the human ear. The symbol L_A represents A-weighted Sound Pressure Level - The overall broadband level of a sound/noise is typically expressed as a dB(A) level.

Human hearing is most sensitive mid frequencies sounds (500 Hz to 4000 Hz), and less sensitive at higher and lower frequencies. Therefore, the level expressed in dB(A) correlates strongly with the perceived loudness of the sound/noise.

A change in sound pressure level of 1-2 dB is barely noticeable to most people, whilst a 3-5 dB change is perceived as a small but noticeable change in loudness. A 10 dB change is perceived as an approximate doubling or halving in loudness. The table below present the sound pressure levels of some common sources.

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

In addition to A-weighting, other less commonly applied frequency weightings include B, C and D weightings. Unweighted or Linear levels are sound levels measured without any weighting. These are expressed as simply dB, or dB(lin) or dB(Z).

3 Sound Power Level

The rate at which a noise source emits acoustic energy is defined by its Sound Power Level. Sound Power Levels are also expressed in decibel units (dB or dB(A)). Sound Power is typically identified as SWL or LW. The standard reference sound power used to define a Sound Power Level is 1×10^{-12} Watts (W).

4 Statistical Noise Levels

Environmental noise levels from various sources in the environment will vary in level over time. Statistical exceedance levels are typically expressed as L_{AN} levels (i.e. the A-weighted sound pressure level exceeded for N% of a specific measurement period).

The most commonly used statistical noise levels are as follows:

L_{Amax}	Maximum noise level over a sample period (typically measured on fast time-weighting response).
L_{A1}	Noise level exceeded for 1% of a sample period (typically 15-minute interval).
L_{A10}	Noise level exceeded for 10% of a sample period (typically 15-minute interval).
L_{A90}	Noise level exceeded for 90% of a sample period. This noise level is commonly used to describe the background noise level (in the absence of the source under investigation).
L_{Aeq}	A-weighted equivalent noise level. This is equivalent to the steady sound level containing the same amount of acoustical energy as the time-varying sound. Often referred to as the average noise level.
ABL	Assessment Background Level. This is the single figure background level representing each assessment period (day, evening and night) for each day. It is determined by calculating the lowest 10th percentile background noise level (L_{A90}) for each period.
RBL	Rating Background Level. This is the median value of the ABL values for each period (day, evening, night), determined over several days of measurements.

Common Vibration Terms

Hertz (Hz) – Units in which frequency is expressed. Synonymous with cycles per second.

Decibel – Ratios of identical quantities are expressed in decibel or dB units. The number of dB is “ratio” against some standard or reference value in terms of the base 10 logarithm of that ratio. In measuring acoustic or vibration power (as in PSD or ASD of random vibration), the number of dB = $10 \text{ Log}_{10} (P/P_0)$. P_0 , the reference level, equals 0 dB. In measuring the more common voltage-like quantities such as acceleration, the number of dB = $20 \text{ Log}_{10} (E/E_0)$ E_0 , the reference level, equals 0 dB.-

Displacement – A vector quantity that specifies the change of position of a body or particle with respect to a reference frame.

Velocity – A vector quantity that specifies the time derivative of displacement.

Acceleration – Acceleration is rate of change of velocity with time usually along a specified axis, usually expressed in m/s^2

Peak – Extreme value of a varying quantity, measured from the zero or mean value. Also, a maximum spectral value.

Peak-to-peak value – The algebraic difference between extreme values (as $D = 2X$).

Duration of a shock pulse is how long it lasts. Time is usually measured between instants when the amplitude is greater than 10% of the peak value.

Amplitude – The magnitude of variation (in a changing quantity) from its zero value. Always modify it with an adjective such as **peak, RMS, average**, etc. May refer to displacement, velocity, acceleration.

Crest factor – Of an oscillating quantity. The ratio of the peak value to the r.m.s. value.

VDV – The Vibration Dose Value is the accumulation of energy measured over a given time period, proportional to the root mean quad of acceleration. This is usually measured in each of the three axes of motion. In most cases, vibration tends to be higher in the Z (vertical) axis. This is measured with units of $m/s^{1.75}$.

PPV – Peak Particle Velocity is the instantaneous peak of the resultant vector sum of all three axes of motion. Results are expressed in terms of velocity normally mm/s.

Peak Acceleration – This is the peak acceleration level measured in each of the three axes of motion. In some cases, this can also be combined in a vector sum. This is measured in m/s^2 .

Accelerometer – A sensor or transducer or pickup for converting acceleration to an electrical signal. Two common types are piezoresistive and piezoelectric.

Charge amplifier – An amplifier which converts a charge input signal (as from an accelerometer) into an output voltage; a charge-to-voltage converter.

Geophone – A sensor or transducer or pickup for converting velocity to an electrical signal.

APPENDIX B

Construction Noise Prediction Tables and CNVS Additional Mitigation Measures



Table B-1 L_{Aeq,15min} Construction Noise Predictions for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c – Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	38	56	50	50	52	42	52	45
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	35	57	51	51	53	42	52	45
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	31	55	49	49	51	40	50	43
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	22	47	41	41	43	33	43	36
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	22	46	40	40	42	31	41	34
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	10	35	29	29	31	20	30	23
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	12	39	33	33	35	25	35	28
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	19	47	41	41	43	33	43	36
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	36	51	45	45	47	34	44	37
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	31	49	43	43	45	28	38	31
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	23	60	54	54	56	46	56	49
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	24	50	44	44	46	37	47	40
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	39	53	47	47	49	24	34	27
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	32	51	45	45	47	23	33	26
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	34	51	45	45	47	25	35	28
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	26	42	36	36	38	24	34	27
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	23	39	33	33	35	19	29	22
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	20	39	33	33	35	20	30	23
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	31	43	37	37	39	18	28	21
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	35	55	49	49	51	25	35	28
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	38	51	45	45	47	23	33	26
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	19	55	49	49	51	38	48	41
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	17	50	44	44	46	32	42	35
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	11	45	39	39	41	29	39	32
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	37	46	40	40	42	28	38	31
R26	3 Station St	Residential	37	37	36	47	42	42	41	58	76	70	70	72	47	57	50
R27	1 Station St	Residential	37	37	36	47	42	42	41	51	76	70	70	72	41	51	44
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	44	63	57	57	59	24	34	27
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	41	58	52	52	54	37	47	40
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	37	55	49	49	51	36	46	39
C10 [#]	St Mary's Hotel	Residential	37	37	36	47	42	42	41	36	66	60	60	62	53	63	56

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver.

20 - Materials Laydown and Amenities Compound

- 21a - Service Installation - Stormwater Drainage Services - Saw Cut Asphalt (Approx 30 mins)
- 21b - Service Installation - Stormwater Drainage Services - Excavate & Backfill
- 21c - Service Installation - Stormwater Drainage Services - Pavement Works
- 21d - Service Installation - Stormwater Drainage Services - Asphalt Works (Mill & Resheet)

- 22a - CCTV Services - Lift Pavers
- 22b - CCTV Services - Excavate
- 22c - CCTV Services - Backfill & Compact

Table B-2 L_{Aeq,15min} Construction Noise Predictions for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c – Non-Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
C01	TBC	Commercial	-	-	-	70	70	70	70	30	72	66	66	68	58	68	61
C02	TBC	Commercial	-	-	-	70	70	70	70	38	71	65	65	67	57	67	60
C03	TBC	Commercial	-	-	-	70	70	70	70	45	69	63	63	65	51	61	54
C04	TBC	Commercial	-	-	-	70	70	70	70	46	78	72	72	74	64	74	67
C05	TBC	Commercial	-	-	-	70	70	70	70	29	74	68	68	70	59	69	62
C06	TBC	Commercial	-	-	-	70	70	70	70	35	69	63	63	65	55	65	58
C07	TBC	Commercial	-	-	-	70	70	70	70	45	80	74	74	76	66	76	69
C08	TBC	Commercial	-	-	-	70	70	70	70	32	75	69	69	71	62	72	65
C09	TBC	Commercial	-	-	-	70	70	70	70	29	69	63	63	65	56	66	59
C10#	TBC	Commercial	-	-	-	70	70	70	70	36	66	60	60	62	53	63	56
C11	TBC	Commercial	-	-	-	70	70	70	70	21	60	54	54	56	47	57	50
C12	TBC	Commercial	-	-	-	70	70	70	70	21	56	50	50	52	43	53	46
C13	TBC	Commercial	-	-	-	70	70	70	70	18	54	48	48	50	41	51	44
C14	TBC	Commercial	-	-	-	70	70	70	70	16	53	47	47	49	39	49	42
C15	TBC	Commercial	-	-	-	70	70	70	70	15	50	44	44	46	37	47	40
C16	TBC	Commercial	-	-	-	70	70	70	70	15	42	36	36	38	29	39	32
C17	TBC	Commercial	-	-	-	70	70	70	70	18	44	38	38	40	31	41	34
C18	TBC	Commercial	-	-	-	70	70	70	70	17	45	39	39	41	31	41	34
C19	TBC	Commercial	-	-	-	70	70	70	70	23	53	47	47	49	40	50	43
C20	TBC	Commercial	-	-	-	70	70	70	70	22	57	51	51	53	43	53	46
C21	TBC	Commercial	-	-	-	70	70	70	70	19	59	53	53	55	45	55	48
C22	TBC	Commercial	-	-	-	70	70	70	70	20	57	51	51	53	43	53	46
C23	TBC	Commercial	-	-	-	70	70	70	70	29	46	40	40	42	29	39	32
C24	TBC	Commercial	-	-	-	70	70	70	70	22	49	43	43	45	35	45	38
C25	TBC	Commercial	-	-	-	70	70	70	70	22	59	53	53	55	45	55	48
C26	TBC	Childcare Centre	-	-	-	60	60	-	-	55	73	67	67	69	44	54	47

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver.

20 - Materials Laydown and Amenities Compound

21a - Service Installation - Stormwater Drainage Services - Saw Cut Asphalt (Approx 30 mins)

21b - Service Installation - Stormwater Drainage Services - Excavate & Backfill

21c - Service Installation - Stormwater Drainage Services - Pavement Works

21d - Service Installation - Stormwater Drainage Services - Asphalt Works (Mill & Resheet)

22a - CCTV Services - Lift Pavers

22b - CCTV Services - Excavate

22c - CCTV Services - Backfill & Compact

Table B-3 L_{Aeq,15min} Construction Noise Predictions – Standard Hours NML Exceedances for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c & Additional Mitigation – Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	5	-
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	5	-
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	3	-
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	9	2
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	1	-
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R26	3 Station St	Residential	37	37	36	47	42	42	41	11	-	-	-	-	-	10	3
R27	1 Station St	Residential	37	37	36	47	42	42	41	4	-	-	-	-	-	4	-
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41	-	-	-	-	-	6	16	9

Yellow = LB
 Amber = LB, M
 Red = LB, M, SN
 Purple = LB, M, SN

Table B-4 L_{Aeq,15min} Construction Noise Predictions – Out-of-Hours Daytime NML Exceedances for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c & Additional Mitigation – Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R26	3 Station St	Residential	37	37	36	47	42	42	41	16	-	-	-	-	-	-	-
R27	1 Station St	Residential	37	37	36	47	42	42	41	9	-	-	-	-	-	-	-
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	2	-	-	-	-	-	-	-
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-

Yellow = LB, M

Amber = LN, M, SN

Red = LB, M, SN, RO

Purple = LB, M, SN, IB, PC, RO, SN

Note, the highlighted Additional Mitigation triggers are based on the exceedance of the L_{Aeq,15min} NMLs. To determine whether it is justified to provide Respite Offer measures, consideration must also be given to the duration of the works.

Given the scheduling of the works, it would be expected that the identified impacts would occur for only one or two shifts at any one location before they are completed, and therefore the actual duration of impact would not be prolonged at any particular receiver location. On this basis, it is considered that offers of RO would not be justified.

Table B-5 L_{Aeq,15min} Construction Noise Predictions – Out-of-Hours Evening NML Exceedances for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c & Additional Mitigation – Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	-	14	-	-	-	-	-	-
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	-	15	-	-	-	-	-	-
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	-	13	-	-	-	-	-	-
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	5	-	-	-	-	-	-
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	4	-	-	-	-	-	-
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	5	-	-	-	-	-	-
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	9	-	-	-	-	-	-
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	-	7	-	-	-	-	-	-
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	-	18	-	-	-	-	-	-
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	-	8	-	-	-	-	-	-
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	-	11	-	-	-	-	-	-
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	-	9	-	-	-	-	-	-
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	-	9	-	-	-	-	-	-
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	-	1	-	-	-	-	-	-
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	-	13	-	-	-	-	-	-
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	-	9	-	-	-	-	-	-
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	-	13	-	-	-	-	-	-
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	-	8	-	-	-	-	-	-
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	3	-	-	-	-	-	-
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	4	-	-	-	-	-	-
R26	3 Station St	Residential	37	37	36	47	42	42	41	16	34	-	-	-	-	-	-
R27	1 Station St	Residential	37	37	36	47	42	42	41	9	34	-	-	-	-	-	-
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	2	21	-	-	-	-	-	-
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	-	16	-	-	-	-	-	-
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	13	-	-	-	-	-	-
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41	-	24	-	-	-	-	-	-

Yellow = LB, M
 Amber = LN, M, SN
 Red = LB, M, SN, RO
 Purple = LB, M, SN, IB, PC, RO, SN

Note, the highlighted Additional Mitigation triggers are based on the exceedance of the L_{Aeq,15min} NMLs. To determine whether it is justified to provide Respite Offer measures, consideration must also be given to the duration of the works.

Given the scheduling of the works, it would be expected that the identified impacts would occur for only one or two evenings at any one location before they are completed. Additionally, the required saw cutting would be brief (less than 30 minutes per shift) and therefore the actual duration of impact would not be prolonged at any particular receiver location. On this basis, it is considered that offers of RO would not be justified.

Table B-6 L_{Aeq,15min} Construction Noise Predictions – Out-of-Hours Night NML Exceedances for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c & Additional Mitigation – Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	9	9	11	-	-	-
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	10	10	12	-	-	-
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	8	8	10	-	-	-
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	2	-	-	-
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	1	-	-	-
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	-	-	-	2	-	-	-
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	-	4	4	6	-	-	-
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	-	-	2	2	4	-	-	-
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	-	-	13	13	15	-	-	-
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	-	-	3	3	5	-	-	-
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	-	-	6	6	8	-	-	-
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	-	-	4	4	6	-	-	-
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	-	-	4	4	6	-	-	-
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	-	-	8	8	10	-	-	-
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	-	-	4	4	6	-	-	-
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	-	-	8	8	10	-	-	-
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	-	-	3	3	5	-	-	-
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	1	-	-	-
R26	3 Station St	Residential	37	37	36	47	42	42	41	17	-	29	29	31	-	-	-
R27	1 Station St	Residential	37	37	36	47	42	42	41	10	-	29	29	31	-	-	-
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	3	-	16	16	18	-	-	-
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	0	-	11	11	13	-	-	-
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	-	8	8	10	-	-	-
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41	-	-	9	9	11	-	-	-

Yellow = LB, M

Amber = LN, M, SN, RO

Red = LB, M, SN, IB, PC, RO, AA

Purple = LB, M, SN, IB, PC, RO, SN, AA

Note, the highlighted Additional Mitigation triggers are based on the exceedance of the L_{Aeq,15min} NMLs. To determine whether it is justified to provide Respite Offers and Alternative Accommodation measures, consideration must also be given to the duration of the works.

Given the scheduling of the works, it would be expected that the identified impacts may occur for several consecutive nights at the impacted locations. On this basis, Ward will consult with the identified residents to determine appropriate mitigation measures, prior to the commencement of the works.

Table B-7 L_{Aeq,15min} Construction Noise Predictions – Standard Hours NML Exceedances for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c & Additional Mitigation – Non-Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
C01	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C02	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C03	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C04	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	4	-
C05	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C06	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C07	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	6	-
C08	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	2	-
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C10#	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C26	-	Childcare Centre	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results. Additional Mitigation Measures are only applicable when the receiver building is in use.

- Yellow = LB
- Amber = LB, M
- Red = LB, M, SN
- Purple = LB, M, SN

Table B-8 L_{Aeq,15min} Construction Noise Predictions – Out-of-Hours Daytime NML Exceedances for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c & Additional Mitigation – Non- Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
C01	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C02	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C03	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C04	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C05	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C06	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C07	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C08	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C10	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C26	-	Childcare Centre	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results. Additional Mitigation Measures are only applicable when the receiver building is in use.

Yellow = LB, M
Amber = LN, M, SN
Red = LB, M, SN, RO
Purple = LB, M, SN, IB, PC, RO, SN

Table B-9 $L_{Aeq,15min}$ **Construction Noise Predictions – Out-of-Hours Evening NML Exceedances for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c & Additional Mitigation – Non-Residential**

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
C01	-	Commercial	-	-	-	70	70	70	70	-	2	-	-	-	-	-	-
C02	-	Commercial	-	-	-	70	70	70	70	-	1	-	-	-	-	-	-
C03	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C04	-	Commercial	-	-	-	70	70	70	70	-	8	-	-	-	-	-	-
C05	-	Commercial	-	-	-	70	70	70	70	-	4	-	-	-	-	-	-
C06	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C07	-	Commercial	-	-	-	70	70	70	70	-	10	-	-	-	-	-	-
C08	-	Commercial	-	-	-	70	70	70	70	-	5	-	-	-	-	-	-
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C10	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C26	-	Childcare Centre	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results. Additional Mitigation Measures are only applicable when the receiver building is in use.

Yellow = LB, M
Amber = LN, M, SN
Red = LB, M, SN, RO
Purple = LB, M, SN, IB, PC, RO, SN

Table B-10 L_{Aeq,15min} Construction Noise Predictions – Out-of-Hours Night NML Exceedances for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c & Additional Mitigation – Non-Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
C01	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C02	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C03	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C04	-	Commercial	-	-	-	70	70	70	70	-	-	2	2	4	-	-	-
C05	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C06	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C07	-	Commercial	-	-	-	70	70	70	70	-	-	4	4	6	-	-	-
C08	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	1	-	-	-
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C10	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C26	-	Childcare Centre	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results. Additional Mitigation Measures are only applicable when the receiver building is in use.

- Yellow = LB, M
- Amber = LN, M, SN, RO
- Red = LB, M, SN, IB, PC, RO, AA
- Purple = LB, M, SN, IB, PC, RO, SN, AA

Table B-11 LA1,1min Maximum Construction Noise Predictions – Out-of-Hours Night - for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c – Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	RBL+15 NML	NPfl	RNP	-	20	21a	21b	21c	21d	22a	22b	22c
R01	69 Carinya Ave	Residential	-	-	36	51	52	65	-	43	-	55	55	59	-	-	-
R02	65-67 Carinya Ave	Residential	-	-	36	51	52	65	-	40	-	56	56	60	-	-	-
R03	59 Carinya Ave	Residential	-	-	36	51	52	65	-	36	-	54	54	58	-	-	-
R04	43 Carinya Ave	Residential	-	-	36	51	52	65	-	27	-	46	46	50	-	-	-
R05	41 Carinya Ave	Residential	-	-	36	51	52	65	-	27	-	45	45	49	-	-	-
R06	9 Kungala St	Residential	-	-	36	51	52	65	-	15	-	34	34	38	-	-	-
R07	13 Benalong St	Residential	-	-	36	51	52	65	-	17	-	38	38	42	-	-	-
R08	7 Waratah St	Residential	-	-	36	51	52	65	-	24	-	46	46	50	-	-	-
R09	17 Araluen St	Residential	-	-	36	51	52	65	-	41	-	50	50	54	-	-	-
R10	14 Nariel St	Residential	-	-	36	51	52	65	-	36	-	48	48	52	-	-	-
R11	34-36 Phillip St	Residential	-	-	36	51	52	65	-	28	-	59	59	63	-	-	-
R12	36A Phillip St	Residential	-	-	36	51	52	65	-	29	-	49	49	53	-	-	-
R13	30 Phillip St	Residential	-	-	36	51	52	65	-	44	-	52	52	56	-	-	-
R14	7 Lethbridge St	Residential	-	-	36	51	52	65	-	37	-	50	50	54	-	-	-
R15	16 Phillip St	Residential	-	-	36	51	52	65	-	39	-	50	50	54	-	-	-
R16	8 Phillip St	Residential	-	-	36	51	52	65	-	31	-	41	41	45	-	-	-
R17	109 Glossop St	Residential	-	-	36	51	52	65	-	28	-	38	38	42	-	-	-
R18	1 Phillip St	Residential	-	-	36	51	52	65	-	25	-	38	38	42	-	-	-
R19	9 Phillip St	Residential	-	-	36	51	52	65	-	36	-	42	42	46	-	-	-
R20	19A Phillip St	Residential	-	-	36	51	52	65	-	40	-	54	54	58	-	-	-
R21	29 Phillip St	Residential	-	-	36	51	52	65	-	43	-	50	50	54	-	-	-
R22	2 Gidley St	Residential	-	-	36	51	52	65	-	24	-	54	54	58	-	-	-
R23	1 Ross Pl	Residential	-	-	36	51	52	65	-	22	-	49	49	53	-	-	-
R24	43 Little Chapel St	Residential	-	-	36	51	52	65	-	16	-	44	44	48	-	-	-
R25	20 Blair Ave	Residential	-	-	36	51	52	65	-	42	-	45	45	49	-	-	-
R26	3 Station St	Residential	-	-	36	51	52	65	-	63	-	75	75	79	-	-	-
R27	1 Station St	Residential	-	-	36	51	52	65	-	56	-	75	75	79	-	-	-
R28	1A Chesham St	Residential	-	-	36	51	52	65	-	49	-	62	62	66	-	-	-
R29	6 Chesham St	Residential	-	-	36	51	52	65	-	46	-	57	57	61	-	-	-
R30	10A Chesham St	Residential	-	-	36	51	52	65	-	42	-	54	54	58	-	-	-
C10 [#]	St Mary's Hotel	Residential	-	-	36	51	52	65	-	41	-	65	65	69	-	-	-

The predicted LA1,1min levels shown are considered to be approximately equivalent to LAmax levels.

The amber shaded cells indicate exceedances of LAmax 52 dBA recognised by the NPfl

The red shaded cells indicate levels in excess of the LAmax 65 dBA level recognised by the NSW Road Noise Policy, based on a synopsis of research on sleep disturbance and awakenings.

APPENDIX C

Predicted Construction Noise Contours



Noise Model Scenario 20 - Materials Laydown and Amenities Compound on Station Street



Noise Model Scenario 21b - Stormwater Drainage Works on Station Street



Noise Model Scenario 21c - Pavement Reconstruction Works on Station Street



Noise Model Scenario 21d – Asphalt Works (Mill & Resheet) on Station Street



Noise Model Scenario 22b – CCTV Installation Works on Station Street



Noise Model Scenario 20 - Materials Laydown and Amenities Compound on Station Street



Noise Model Scenario 21b - Stormwater Drainage Works on Station Street



Noise Model Scenario 21c - Pavement Reconstruction Works on Station Street



Noise Model Scenario 21d – Asphalt Works (Mill & Resheet) on Station Street



Noise Model Scenario 22b – CCTV Installation Works on Station Street





APPENDIX J. CONSTRUCTION NOISE AND VIBRATION MANAGEMENT PROCEDURE



25/02/2022


Construction Noise and Vibration Management

ENVIRONMENTAL MANAGEMENT PROCEDURE

725.EMP.06.CNVMP

Rev 2.3

APPROVAL

Approver	Position	Approval Signature
Patrick McMahon	Project Manager	

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Timeframe for review: Minimum every 3 months or as required during construction.

DOCUMENT AND RECORD CONTROL

Document control, including approval and the handling of superseded versions, shall be in accordance with the Document Control procedure.

REFERENCE TO SUPPORTING WARD DOCUMENTATION



Documents required to complete the tasks in this procedure are referenced in **bold** throughout the procedure. Refer to the Related Documents section for the corresponding document numbers.

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1. PURPOSE

The purpose of this Construction Noise and Vibration Management Procedure (CNVMP) for the St Marys – Temporary Bus Interchange Project (the Project) is to ensure that construction activities and works are managed in a way that minimises construction-based vibration impacts to the surrounding identified sensitive areas.

The CNMP has been written in conjunction with Ward Civil Environmental Engineering Management System [EMS] and forms part of the Project's Contractors Environmental Management Plan (CEMP). It consists of mitigation measures and procedures required to be implemented to avoid or minimise construction vibration impacts on nearest potentially affected sensitive receivers.

This plan should be read and applied in conjunction with the CEMP and associated sub-plans.

2. PROJECT SCOPE OF WORKS

The key features of Ward's scope of works are to complete the St Marys Temporary Bus Interchange (TBI) which is being constructed off Station Street within an existing car parking facility:

- Establishment of an ancillary facility in a vacant parcel of land off Station Street, St Marys
- Construct the permanent and temporary pavements for the St Marys TBI;
- Mill and place asphalt overlay to the existing pavement on Station Street to match existing levels and carpark to required levels;
- Raised pedestrian crossings on Queen Street and at grade pedestrian crossing on Nariel Street and pram ramps;
- Bus stops on Phillip Street;
- Reconfiguration of existing carpark on East Lane;
- Utility relocations;
- Drainage installation;
- Install road furniture;
- Install CCTV Surveillance;
- Install wayfinding signage;
- Relocate bus shelters for customers and shades for kiss-and-ride passengers;
- Install street lighting;
- Lane resurfacing on Phillip Street/ Queen Street and Nariel Street; and
- Construction of dedicated driver facility (DDF) unit in the temporary bus interchange.
- Construction of stormwater drainage and pavement reconstruction along Station Street
- Construct two (2) raised pedestrian crossings, pedestrian fencing, traffic medians and new lighting poles at the Phillip Street and Lethbridge Street intersection.
- Temporary removal of on-street parking on Lethbridge Street (approximately 16 car park spaces)

- This Scope of works is depicted in



Figure 1 and Figure 2.

Construction is anticipated to occur from November 2021 to April 2022. Construction will be undertaken during a mix of standard working hours and out of hours works. The timing of the works will be scheduled to minimise disruption to pedestrians and general traffic and provide safer working conditions for construction.

It is noted that the Lethbridge Street and Phillip Street scope of works will be primarily undertaken during standard working hours to minimize noise impacts to receivers. Note that milling and resheeting (including line marking) to be undertaken during out of hours works.



Figure 1 St Marys TBI works



Figure 2 Lethbridge Street and Phillip Street scope of works

3. CONDITIONS OF APPROVAL

The following CoAs and REMMS have been considered in this procedure:

Table 1 Relevant Conditions of Approval

COA Reference	COA	Responsibility	How Addressed
Construction Monitoring Program			
CoA C13	<p>The following Construction Monitoring Programs must be prepared in consultation with the relevant government agencies (as required by Condition A6) identified for each to compare actual performance of construction of the CSSI against the performance predicted in the documents listed in Condition A1 or in the CEMP. Where a government agency(ies) request(s) is not included, the Proponent must provide the Planning Secretary / ER (whichever is applicable) justification as to why</p> <p>A risk assessment for the works (see Section 7.1 of the CEMP) assessed the works as low to moderate impact, and in consultation with SM-WSA and the ER based on the limited extent and duration of the works, moderate impact as assessed in the DNVIS, consultation was determined not to be required in accordance with CoA C5.</p>	Environmental Manager	A noise and vibration monitoring program has been included within the DNVIS
CoA C14	<p>Each Construction Monitoring Program must provide:</p> <p>(a) details of baseline data available including the period of baseline monitoring;</p> <p>(b) details of baseline data to be obtained and when;</p> <p>(c) details of all monitoring of the project to be undertaken;</p> <p>(d) the parameters of the project to be monitored;</p> <p>(e) the frequency of monitoring to be undertaken;</p> <p>(f) the location of monitoring;</p> <p>(g) the reporting of monitoring results and analysis results against relevant criteria;</p> <p>(h) details of the methods that will be used to analyse the monitoring data;</p> <p>(i) procedures to identify and implement additional mitigation measures where the results of the monitoring indicated unacceptable project impacts;</p> <p>(j) a consideration of SMART principles;</p> <p>(k) any consultation to be undertaken in relation to the monitoring programs; and</p> <p>(l) any specific requirements as required by Conditions C15 to C16.</p>	Environmental Manager	<p>A noise and vibration monitoring program has been included within the DNVIS. Specifically:</p> <p>a) Section 7 of the DNVIS and Table 7-1 of the Monitoring Program in Appendix F</p> <p>b) Text included in monitoring program that No further baseline data is required to be obtained</p> <p>c) Required monitoring included in Monitoring Program (Appendix F of DNVIS)</p> <p>d) Required parameters included in Monitoring Program (Appendix F of DNVIS)</p> <p>e) Frequency of monitoring included within Monitoring Program (Appendix F of DNVIS)</p> <p>f) Monitoring locations included within Monitoring Program (Appendix F of DNVIS)</p> <p>g) Reporting included within Monitoring Program (Appendix F of DNVIS)</p> <p>h) Details of analysis of data included within Monitoring Program (Appendix F of DNVIS)</p> <p>i) Mitigation measures have been included should excessive noise or vibration impacts be identified are included within Monitoring Program (Appendix F of DNVIS)</p> <p>j) Discussion on relevant parameters have been considered which are SMART and included within Monitoring</p>

COA Reference	COA	Responsibility	How Addressed
			<p>Program (Appendix F of DNVIS)</p> <p>k) A risk assessment for the works (see Section 7.1 of the CEMP) assessed the works as low to moderate impact, and in consultation with SM-WSA and the ER based on the limited extent and duration of the works, moderate impact as assessed in the DNVIS, consultation was determined not to be required in accordance with CoA C5.</p> <p>l) See section below</p>
CoA C15	<p>The Noise and Vibration Construction Monitoring Program must include:</p> <p>(a) noise and vibration monitoring at representative residential and other locations (including at the worst- affected residences), subject to property owner approval, to confirm construction noise and vibration levels;</p> <p>(b) monitoring undertaken during the day, evening and night-time periods throughout the construction period and cover the range of activities being undertaken;</p> <p>(c) method and frequency for reporting monitoring results; and</p> <p>(d) a process to undertake real time noise and vibration monitoring.</p> <p>The results of the monitoring must be readily available to the construction team, the Proponent and ER. The Planning Secretary and EPA must be provided with access to the results on request</p>	Environmental Manager	<p>A noise and vibration monitoring program has been included within the DNVIS. Specifically:</p> <p>a) Noise and vibration impacts at representative locations included within Appendix D of the DNVIS</p> <p>b) Commitment to monitoring to be undertaken for each work stage included within Noise and Vibration Monitoring Program, included as Appendix F of DNVIS.</p> <p>c) Reporting information included within monitoring program within Appendix F of the DNVIS</p> <p>d) Commitment to include attended monitoring during each stage included within Noise and Vibration Monitoring Program, included as Appendix F of DNVIS</p> <p>e) Commitment included within monitoring program included within Noise and Vibration Monitoring Program, included as Appendix F of DNVIS</p>
Noise and Vibration			
CoA E37	<p>Land Use Survey</p> <p>A detailed land use survey must be undertaken to confirm sensitive land use(s) (including critical working areas such as operating theatres and precision laboratories) potentially exposed to construction noise and vibration and construction ground-borne noise. The survey may be undertaken on a progressive basis but must be undertaken in any one area before the commencement of work which generates construction noise, vibration or ground-borne noise in that area. The results of the survey must be included in the Detailed Noise and Vibration Impact Statements required under Condition E47</p>	Environmental Manager	<p>A land use survey was undertaken on 7 September 2021 and was used to inform the DNVIS and the management procedure.</p> <p>Refer Section 6 of the DNVIS</p>
CoA E38	<p>Construction Hours</p> <p>Work must only be undertaken during the following hours:</p>	Environmental Manager Project Manager	Section 4.1 of this Procedure

COA Reference	COA	Responsibility	How Addressed
	(a) 7:00am to 6:00pm Mondays to Fridays, inclusive;	Supervisor	
	(b) 8:00am to 1:00pm Saturdays; and		
	(c) at no time on Sundays or public holidays		
CoA E39	Highly Noise Intensive Work	Environmental Manager Project Manager Supervisor	High intensive noisy works (hammering, saw cutting) to be undertaken during standard working hours in blocks not exceeding 3 hours. Section 4.2 of this procedure
	Except as permitted by an EPL or approved in accordance with the Out-of-Hours Works Protocol required by Condition E42 , highly noise intensive work that result in an exceedance of the applicable NML at the same receiver must only be undertaken:		
	(a) between the hours of 8:00 am to 6:00 pm Monday to Friday;		
	(b) between the hours of 8:00 am to 1:00 pm Saturday; and		
	(c) if continuously, then not exceeding three (3) hours, with a minimum cessation of work of not less than one (1) hour.		
	For the purposes of this condition, 'continuously' includes any period during which there is less than one (1) hour between ceasing and recommencing any of the work.		
CoA E40	This approval does not permit blasting	NA	Not triggered - Blasting not included for this Scope of Works.
Variation to Work Hours			
CoA E41	Variation to Work Hours	Environmental Manager Project Manager Supervisor	Out of hours works to be undertaken in accordance with Sydney Metro – Western Sydney Airport Out of hours works protocol. Refer to Section 4.3 of this procedure Out of hours protocol (document SM-21-00306108) was approved for use on 11/11/21.
	Notwithstanding Conditions E38 and E39 work may be undertaken outside the hours specified in the following circumstances:		
	(a) Safety and Emergencies , including:		
	(i) for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or		
	(ii) 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		
	(b) Low impact , including:		
	(i) 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 ICNG, and		
	• no more than the 'Noise affected' NMLs specified in Table 3 of the ICNG at other sensitive land user(s); and		
	(ii) construction that causes:		

COA Reference	COA	Responsibility	How Addressed
	<ul style="list-style-type: none"> • continuous or impulsive vibration values, measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.2 of <i>Assessing Vibration: a technical guideline</i> (DEC, 2006), or • intermittent vibration values measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.4 of <i>Assessing Vibration: a technical guideline</i> (DEC, 2006); or <p>(c) By Approval, including:</p> <ul style="list-style-type: none"> (i) where different construction hours are permitted or required under an EPL in force in respect of the CSSI; or (ii) works which are not subject to an EPL that are approved under an Out-of-Hours Work Protocol as required by Condition E42; or (iii) negotiated agreements with directly affected residents and sensitive land user(s); or <p>(d) By Prescribed Activity, including:</p> <ul style="list-style-type: none"> (i) tunnelling and ancillary support activities (excluding cut and cover tunnelling and surface works not directly supporting tunneling) are permitted 24 hours a day, seven days a week; or (ii) grout batching at the Orchard Hills construction site is permitted 24 hours per day, seven days per week; or (iii) delivery of material that is required to be delivered outside of standard construction hours in Condition E38 to directly support tunnelling activities, except between the hours 10:00 pm and 7:00 am to / from the Orchard Hills ancillary facility; or (iv) haulage of spoil generated through tunnelling is permitted 24 hours per day, seven days per week except between the hours of 10:00 pm and 7:00 am to / from the Orchard Hills construction site; or (v) works within an acoustic enclosure are permitted 24 hours a day, seven days a week where there is no exceedance of noise levels or intermittent vibration levels under Low impact circumstances identified in Condition E41(b), unless otherwise agreed with the Planning Secretary; or (vi) tunnel and underground station box fit out works are permitted 24 hours per day, seven days per week. <p>On becoming aware of the need for emergency work in accordance with (c)(ii) above, the ER, the Planning Secretary and the EPA must be notified of the reasons for such work. The Proponent must use best endeavours to notify as soon as practicable all noise and/or vibration affected sensitive land user(s) of the likely impact and duration of those work.</p> <p>Notes:</p> <ol style="list-style-type: none"> 1. <i>Tunnelling does not include station box excavation.</i> 		

COA Reference	COA	Responsibility	How Addressed
	<p>2. <i>Tunnelling ancillary support activities includes logistics support and material handling and delivery</i></p>		
CoA E42	<p>Out of hours works Protocol - work not subject to an EPL</p> <p>An Out-of-Hours Work Protocol must be prepared to identify a process for the consideration, management and approval of work (not subject to an EPL) that is outside the hours defined in Conditions E38 and E39. The Protocol must be approved by the Planning Secretary before commencement of the out-of-hours work. The Protocol must be prepared in consultation with the ER. The Protocol must provide:</p> <p>(a) justification for why out-of-hours work need to occur;</p> <p>(b) identification of low and high-risk activities and an approval process that considers the risk of activities, proposed mitigation, management, and coordination, including where:</p> <p>(i) the ER reviews all proposed out-of-hours activities and confirms their risk levels;</p> <p>(ii) low risk activities that can be approved by the ER; and</p> <p>(iii) high risk activities that are approved by the Planning Secretary;</p> <p>(c) a process for the consideration of out-of-hours work against the relevant NML and vibration criteria;</p> <p>(d) a process for selecting and implementing mitigation measures for residual impacts in consultation with the community at each affected location, including respite periods consistent with the requirements of Condition E56. The measures must take into account the predicted noise levels and the likely frequency and duration of the out-of-hours works that sensitive land user(s) would be exposed to, including the number of noise awakening events;</p> <p>(e) procedures to facilitate the coordination of out-of-hours work including those approved by an EPL or undertaken by a third party, to ensure appropriate respite is provided; and</p> <p>(f) notification arrangements for affected receivers for all approved out-of-hours works and notification to the Planning Secretary of approved low risk out-of-hours works.</p> <p>This condition does not apply if the requirements of Condition E41 are met.</p> <p>Note: <i>Out-of-hours work is any work that occurs outside the construction hours identified in Condition E38 and E39</i></p>	Metro Environmental Manager	<p>CoA - Implemented by Metro.</p> <p>Ward will comply with the Out of Hours Protocol</p> <p>Out of hours protocol (document #SM-21-00306108) was approved for use on 11/11/21. Included with APPENDIX B</p>
CoA E43	<p>Construction Noise Management Levels and Vibration Criteria</p> <p>Mitigation measures must be implemented with the aim of achieving the following construction noise management levels and vibration criteria:</p>	Environmental Manager	<p>Noise and vibration criteria are included within this procedure and used to inform the DNVIS.</p> <p>a) Section 8.1 of DNVIS (Appendix A)</p>

COA Reference	COA	Responsibility	How Addressed
	<p>(a) construction 'Noise affected' noise management levels established using the <i>Interim Construction Noise Guideline</i> (DECC, 2009);</p> <p>(b) preferred vibration criteria established using the <i>Assessing vibration: a technical guideline</i> (DEC, 2006) (for human exposure);</p> <p>(c) Australian Standard AS 2187.2 - 2006 "<i>Explosives - Storage and Use - Use of Explosives</i>" (for human exposure);</p> <p>(d) BS 7385 Part 2-1993 "<i>Evaluation and measurement for vibration in buildings Part 2</i>" as they are "applicable to Australian conditions"; and</p> <p>(e) the vibration limits set out in the <i>German Standard DIN 4150-3: Structural Vibration- effects of vibration on structures</i> (for structural damage).</p> <p>Any work identified as exceeding the noise management levels and / or vibration criteria must be managed in accordance with the Noise and Vibration CEMP Sub-plan</p> <p>Note: <i>The ICNG identifies 'particularly annoying' activities that require the addition of 5 dB(A) to the predicted level before comparing to the construction Noise Management Level</i></p>		<p>b) Section 9.1.1 of DNVIS (refer to Appendix A)</p> <p>c) N/A no explosives to be used during this Project</p> <p>d) Section 9.1.3 of DNVIS (refer to Appendix A)</p> <p>e) Section 9.1.3 of DNVIS (refer to Appendix A)</p>
CoA E44	<p>All reasonable and feasible mitigation measures must be applied when the following residential ground-borne noise levels are exceeded:</p> <p>(a) evening (6:00 pm to 10:00 pm) — internal LAeq(15 minute): 40 dB(A); and</p> <p>(b) night (10:00 pm to 7:00 am) — internal LAeq(15 minute): 35 dB(A).</p> <p>The mitigation measures must be outlined in the Noise and Vibration CEMP Sub-plan, including in any Out-of-Hours Work Protocol, required by Condition E42</p>	Environmental Manager	<p>Mitigation measures have been considered within DNVIS and incorporated into this plan where applicable.</p> <p>Mitigation measures included within Section 9 of this plan</p>
CoA E45	<p>Noise generating work in the vicinity of potentially-affected community, religious, educational institutions and noise and vibration-sensitive businesses and critical working areas (such as theatres, laboratories and operating theatres) resulting in noise levels above the NMLs must not be timetabled within sensitive periods, unless other reasonable arrangements with the affected institutions are made at no cost to the affected institution</p>	Project Manager Supervisor	<p>Noise and vibration assessments have identified potentially impacted receivers. Previous community consultation undertaken by TfNSW has been undertaken with the impacted receivers.</p> <p>Ongoing consultation with receivers is included within the community / consultation strategy.</p> <p>Commitment included with Section 9 of this plan</p>
CoA E46	<p>Noise and Vibration Mitigation and Management</p> <p>Industry best practice construction methods must be implemented where reasonably practicable to ensure that noise and vibration levels are minimised around sensitive land use(s). Practices may include, but are not limited to:</p> <p>(a) use of regularly serviced low sound power equipment;</p>	Project Manager Environmental Manager Supervisor	<p>Relevant noise mitigation measures are included within this procedure and within the area specific ECM.</p> <p>Commitments are included with Table 19</p>

COA Reference	COA	Responsibility	How Addressed
	<p>(b) at source control, temporary noise barriers (including the arrangement of plant and equipment) around noisy equipment and activities such as rock hammering and concrete cutting;</p> <p>(c) use of non-tonal reversing alarms; and</p> <p>(d) use of alternative construction and demolition techniques</p>		
CoA E47	<p>Detailed Noise and Vibration Impact Statements (DNVIS) must be prepared for any work that may exceed the NMLs, vibration criteria and / or ground-borne noise levels specified in Conditions E43 and E44 at any residence outside construction hours identified in Condition E38, or where receivers will be highly noise affected or subject to vibration levels above those otherwise determined as appropriate by a suitably qualified structural engineer under Condition E87. The DNVIS must include specific mitigation measures identified through consultation with affected sensitive land user(s) and the mitigation measures must be implemented for the duration of the works. A copy of the DNVIS must be provided to the ER before the commencement of the associated works. The Planning Secretary and the EPA may request a copy (ies) of the DNVIS</p>	Environmental Manager	A detailed noise and vibration impact assessment is included within this procedure. Refer APPENDIX A.
CoA E48	<p>Owners and occupiers of properties at risk of exceeding the screening criteria for cosmetic damage must be notified before works that generate vibration commences in the vicinity of those properties. If the potential exceedance is to occur more than once or extend over a period of 24 hours, owners and occupiers must be provided a schedule of potential exceedances on a monthly basis for the duration of the potential exceedances, unless otherwise agreed by the owner and occupier. These properties must be identified and considered in the Noise and Vibration CEMP Sub-plan</p>	Environmental Manager Supervisor	<p>Properties have been identified during the DNVIS process.</p> <p>Ongoing communication with affected receivers is included within the mitigation measures of the procedure.</p> <p>DNVIS is included with APPENDIX A.</p> <p>Commitment included with Table 19</p>
CoA E49	<p>Where sensitive land use(s) are identified in Appendix B as exceeding the highly noise affected criteria during typical case construction, mitigation measures must be implemented with the objective of reducing typical case construction noise below the highly noise affected criteria at each relevant sensitive landuse(s). Activities that would exceed highly noise affected criteria during typical case construction must not commence until the measures identified in this condition have been implemented, unless otherwise agreed with the Planning Secretary.</p> <p><i>Note: Mitigation measures may include path barrier controls such as acoustic sheds and/or noise walls, at-property treatment, or a combination of path and at-property treatment</i></p>	Environmental Manager Supervisor	<p>Assessment of impacts is included within the DNVIS.</p> <p>Mitigation measures are included within the DNVIS and incorporated into this procedure where relevant. Refer to Table 19 with this Procedure</p>
CoA E50	<p>For all construction sites where acoustic sheds are installed, the sheds must be designed, constructed and operated to minimise noise emissions. This would include the following considerations:</p> <p>(a) all significant noise producing equipment that would be used during the night-time would be inside the sheds, where feasible and reasonable;</p> <p>(b) noise generating ventilation systems such as compressors, scrubbers, etc, would be located inside the sheds and external air intake/discharge ports would be appropriately acoustically treated; and</p> <p>(c) the doors of acoustic sheds would be kept closed during the night-time period. Where nighttime vehicle access is required at</p>	NA	NA - Not triggered for this scope of works. Acoustic enclosures not required for this scope of works

COA Reference	COA	Responsibility	How Addressed
	sites with nearby residences, the shed entrances would be designed and constructed to minimise noise breakout		
CoA E51	Where Condition E49 determines that at-property treatment (temporary or permanent) is the appropriate measure to reduce noise impacts, this at-property treatment must be offered to landowners of residential properties for habitable living spaces, unless other mitigation or management measures are agreed to by the landowner. Landowners must be advised of the range of options that can be installed at or in their property and given a choice as to which of these they agree to have installed. A copy of all guidelines and procedures that will be used to determine at-property treatment at their residence must be provided to the landowner	NA	The DNVIS has been undertaken to determine impacted receivers where at property treatments are recommended. Note that not at property treatments have been recommended
CoA E52	Any offer for at-property treatment or the application of other noise mitigation measures in accordance with Condition E51 , does not expire until the noise impacts specified in Condition E49 , affecting that property are completed, even if the landowner initially refuses the offer. <i>Note: If an offer has been made but is not accepted, this does not preclude the commencement of construction under Condition E49</i>	NA	NA – To date not triggered for this scope of works.
CoA E53	The implementation of at-property treatment does not preclude the application of other noise and vibration mitigation and management measures including temporary and long term accommodation	NA	NA – To date not triggered for this scope of works.
CoA E54	Construction Vibration Mitigation - Heritage Items Vibration testing must be conducted during vibration generating activities that have the potential to impact on Heritage items to verify minimum working distances to prevent cosmetic damage. In the event that the vibration testing and attended monitoring shows that the preferred values for vibration are likely to be exceeded, the Proponent must review the construction methodology and, if necessary, implement additional mitigation measures. Such measures must include, but not be limited to, review or modification of excavation techniques	Environmental Manager	Vibration monitoring included within the Noise and Vibration Monitoring program (Appendix F of the DNVIS). Note that vibration will be undertaken for works in the vicinity of the St Marys train station
CoA E55	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 items	Environmental Manager	NA – Not triggered to date. Advice to be sought if monitoring equipment is required to be installed on heritage structures. Currently, monitoring equipment proposed to be located adjacent heritage structures.
CoA E56	All 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 any work to provide respite to impacted noise sensitive land use(s) so that the respite is achieved in accordance with Condition E57 ; or	Project Manager Environmental Manager	Respite between work packages will be managed by SM-WSA and TfNSW. Ward will comply with directions from SM-WSA / TfNSW. For this scope of works, respite will be provided for high noise activities

COA Reference	COA	Responsibility	How Addressed
	<p>(b) consider the provision of alternative respite or mitigation to impacted noise sensitive land use(s); and</p> <p>(c) provide documentary evidence to the ER in support of any decision made by the Proponent in relation to respite or mitigation. The consideration of respite must also include all other approved Critical SSI, SSI and SSD projects which may cause cumulative and / or consecutive impacts at receivers affected by the delivery of the CSSI</p>		<p>such as saw cutting and hammering.</p> <p>Commitment included with the mitigation measures of this procedure (Table 19).</p>
CoA E57	<p>Out-of-Hours Works – Community Consultation on Respite</p> <p>In order to undertake out-of-hours work outside the work hours specified under Condition E38, appropriate respite periods for the out-of-hours work must be identified 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:</p> <p>(a) a progressive schedule for periods no less than three (3) months, of likely out-of-hours work;</p> <p>(b) a description of the potential work, location and duration of the out-of-hours work;</p> <p>(c) the noise characteristics and likely noise levels of the work; and</p> <p>(d) likely mitigation and management measures which aim to achieve the relevant NMLs under Condition E43 (including the circumstances of when respite or relocation offers will be available and details about how the affected community can access these offers). The outcomes of the community consultation, the identified respite periods and the scheduling of the likely out-of-hour work must be provided to the ER, EPA and the Planning Secretary prior to the out-of-hours work commencing.</p> <p><i>Note: Respite periods can be any combination of days or hours where out-of-hours work would not be more than 5 dB(A) above the RBL at any residence</i></p>	<p>Environmental Manager Community Manager Project Manager</p>	<p>TfNSW are managing the community interaction for this package of works. Ward will work TfNSW to comply with community consultation requirements.</p> <p>Commitment included within mitigation measures.</p> <p>Note that a community consultation report is included within Appendix H of the DNVIS</p>
CoA E58	<p>Noise Mitigation - Operational Noise and Vibration Mitigation Measures</p> <p>The Proponent must prepare an Operational Noise and Vibration Review (ONVR) to confirm noise and vibration mitigation measures that would be implemented for the Operation of the CSSI for the ultimate service. The ONVR must be prepared as part of the iterative design development and in consultation with the EPA, relevant council(s), other relevant stakeholders and must:</p> <p>(a) identify appropriate Operational noise and vibration objectives and levels for surrounding development, including existing and potential future (as known at the time of ONVR preparation) sensitive land use(s);</p> <p>(b) confirm the operational noise and vibration predictions based on the expected final design. Confirmation must be based on an appropriately calibrated noise model;</p> <p>(c) identify sensitive landuses that are predicted to exceed:</p> <p>(i) noise criteria set out in the Rail Infrastructure Noise Guideline (EPA, 2013), Noise Policy for Industry (EPA, 2017); and</p> <p>(ii) vibration goals for human exposure for existing sensitive</p>	<p>NA</p>	<p>NA - Not triggered for this scope of works (refer to Staging Plan)</p>

COA Reference	COA	Responsibility	How Addressed
	<p>land use(s), as presented in Assessing Vibration: a Technical Guideline (DECC, 2006);</p> <p>(d) identify all noise and vibration mitigation measures including location, type and timing of mitigation measures, with a focus on:</p> <p>(i) source control and design;</p> <p>(ii) at the receiver (if relevant); and</p> <p>(iii) 'best practice' achievable noise and vibration outcome for each activity;</p> <p>(e) describe how the final suite of mitigation measures will achieve:</p> <p>(i) the noise criteria outlined in the Rail Infrastructure Noise Guideline (EPA, 2013) and Noise Policy for Industry (EPA, 2017); and</p> <p>(ii) vibration goals for human exposure for existing sensitive land use(s), as presented in Assessing Vibration: a Technical Guideline (DECC, 2006);</p> <p>(f) include a consultation strategy to seek feedback from directly affected landowners on the noise and vibration mitigation measures being offered;</p> <p>(g) include procedures for operational noise and vibration complaints management, including investigation and monitoring (subject to complainant agreement).</p> <p>The ONVR must be verified by an independent acoustic expert and submitted to the Planning Secretary for approval before the implementation of any operational noise mitigation measures. The Proponent must implement the identified noise and vibration control measures and make the ONVR publicly available.</p> <p>Note: The design of noise barriers and the like must be undertaken in consultation with the relevant stakeholders, including affected landowners and businesses (or a representative of a business), Western Parklands City Authority and relevant council(s) as part of the Place, Urban Design and Corridor Landscape Plan required under Condition E79.</p>		
CoA E59	<p>Operational noise mitigation measures as identified in Condition E58 that will not be physically affected by work, must be implemented within six months of submitting the ONVR, unless otherwise agreed by the Planning Secretary. Where implementation of operational noise mitigation measures are not proposed to be implemented in accordance with this requirement, the Proponent must submit to the Planning Secretary a report providing justification as to why, along with details of temporary measures that would be implemented to reduce construction noise impacts, until such time that the operational noise mitigation measures are implemented.</p> <p>The report must be submitted to the Planning Secretary within six months of submitting the ONVR.</p> <p>Note: Not having finalised detailed design is not sufficient justification for not implementing the proposed mitigation measures.</p>	NA	NA - Not triggered for this scope of works (refer to Staging Plan)
CoA E60	<p>Within 12 months of the commencement of operation of the CSSI, the Proponent must undertake monitoring of operational noise to compare actual noise performance of the CSSI against the noise performance predicted in the review of noise mitigation measures required by Condition E58. An Operational Noise and Vibration Compliance Report (ONVCR) must be prepared to document this monitoring and include, but not necessarily be limited to:</p> <p>(a) noise and vibration monitoring to assess compliance with the operational noise levels predicted in the review of operational noise mitigation measures required under Condition E58;</p> <p>(b) methodology, location and frequency of noise and vibration monitoring undertaken, including monitoring sites at which CSSI noise and vibration levels are ascertained, with specific</p>	NA	NA - Not triggered for this scope of works (refer to Staging Plan)

COA Reference	COA	Responsibility	How Addressed
	<p>reference to locations indicative of impacts on receivers;</p> <p>(c) a review of the performance of the CSSI against the:</p> <p>(i) operational noise levels in terms of criteria and noise goals established in the NSW Rail Infrastructure Noise Guideline (EPA 2013) and Noise Policy for Industry (EPA, 2017);</p> <p>(ii) vibration goals for human exposure for existing sensitive land use(s), as presented in Assessing Vibration: a Technical Guideline (DECC, 2006);</p> <p>(d) details of any complaints and enquiries received in relation to Operational noise and vibration generated by the CSSI (between the date of commencement of Operation and the date the report was prepared);</p> <p>(e) an assessment of the performance and effectiveness of applied noise and vibration mitigation measures together with a review and if necessary, reassessment of mitigation measures;</p> <p>(f) identification of:</p> <p>(i) additional measures to meet the criteria outlined in the NSW Rail Infrastructure Noise Guideline (EPA 2013) and Noise Policy for Industry (EPA, 2017),</p> <p>(ii) additional measures to meet the vibration goals for human exposure for existing sensitive land, as presented in Assessing Vibration: a Technical Guideline (DECC, 2006);</p> <p>(iii) when these measures are to be implemented; and</p> <p>(iv) how their effectiveness is to be measured and reported to the Planning Secretary and the EPA.</p> <p>The ONVCR must be submitted to the Planning Secretary and the EPA within 60 days of completing the Operational noise and vibration monitoring and made publicly available.</p> <p>Note: Refer to Condition B5 about how personal information will be handled</p>		
COA E84	<p>A suitably qualified and experienced person must undertake condition surveys of all buildings, structures, utilities and the like identified in the documents listed in Condition A1 and the further assessment carried out under mitigation measure GW1 of the Submissions Report as being at risk of damage before commencement of any work that could impact on the subject surface / subsurface structure. The results of the surveys must be documented in a Pre-construction Condition Survey Report for each item surveyed. Copies of Pre-construction Condition Survey Reports must be provided to the relevant owners of the items surveyed in the vicinity of the proposed work, and no later than one (1) month before the commencement of the work that could impact on the subject surface / subsurface structure</p>	PM	Refer to Section 8.2.1 of this plan. Building condition surveys have been completed

Table 2 relevant REMMs

REMM Reference	REMM Description	Responsible Party	How Addressed
NV1	<p>Where acoustic sheds are installed, the internal lining and type of material used in the construction of the sheds would be considered during design development and construction planning to ensure appropriate attenuation is provided</p>	NA	NA – Staging report

NV2	<p>To avoid potential vibration impacts to the Warragamba to Prospect Water Supply Pipelines, a detailed construction vibration assessment would be undertaken in accordance with the Guidelines for Development Adjacent to the Upper Canal and Warragamba Pipelines (WaterNSW, 2020) and would consider the following requirements:</p> <ul style="list-style-type: none"> • velocity limits for construction activities and the impact the works will have on WaterNSW assets • excavation methods in accordance with German Standard DIN 4150-3:2016 (2.5 mm/s PPV) • vibration monitoring would be undertaken prior to and during construction for high risk construction activities • Vibration monitoring reports would be provided to WaterNSW 	NA	NA – Staging report
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Table 3 Relevant CNVS requirements

CEMF Reference	CEMF Requirement	How Implemented	Responsibility
8.1a	<p>i. Minimise unreasonable noise and vibration impacts on residents and businesses;</p> <p>ii. Avoid structural damage to buildings or heritage items as a result of construction vibration;</p> <p>iii. Undertake active community consultation;</p> <p>iv. Maintain positive, cooperative relationships with schools, childcare centres, local residents and building owners; and</p> <p>v. For on-airport works, the Sydney Metro Western Sydney Airport Noise and Vibration CEMP will detail all the noise and vibration management objectives and will be consistent with the WSA Noise and Vibration CEMP, including all appendices to the CEMP</p>	<p>i. Mitigation measures to minimise impacts included within Table 19</p> <p>ii. Vibration monitoring included with noise and vibration monitoring program (included as Appendix F of the DNVIS)</p> <p>iii. Community consultation is undertaken in accordance with the OCCS. Refer to Section 4 of the CEMP for the Stakeholder and Community Involvement Strategy for the Project</p> <p>iv. Commitment included within Table 19</p> <p>v. NA</p>	<p>Environmental Manager Supervisor Project Manager</p>
8.2a	<p>On-airport management of noise and vibration will be achieved through the implementation of the SMWSA</p> <p>Noise and Vibration CEMP and Principal Contractors will develop and implement a Construction Noise and Vibration Management Plan for all off-airport works consistent with the Interim Construction Noise Guidelines (Department of Environment and Climate Change, 2009). Both plans will include as a minimum:</p> <p>i. Identification of work areas, site compounds and access points;</p>	<p>This noise and vibration management procedure developed.</p> <p>i. Identified work areas and access points are included with the assessed areas of the DNVIS and included within this plan (refer Section 2)</p> <p>ii. Sensitive receivers are identified in Section 4. Relevant noise and vibration criteria included within Section 6</p> <p>iii. Mitigation measures included within Table 8, Table 9 and Table 19</p>	<p>Environmental Manager Supervisor Project Manager</p>

CEMF Reference	CEMF Requirement	How Implemented	Responsibility
	<ul style="list-style-type: none"> ii. Identification of sensitive receivers and relevant construction noise and vibration goals; iii. Be consistent with, and include the requirements of the noise and vibration mitigation measures as detailed in the planning approval documentation and the Sydney Metro Construction Noise and Vibration Standard (CNVS), including the provision of respite; iv. Details of construction activities and an indicative schedule for construction works, including the identification of key noise and/or vibration generating construction activities (based on representative construction scenarios) that have the potential to generate noise or vibration impacts on surrounding sensitive receivers, in particular residential areas; v. Identification of feasible and reasonable procedures and mitigation measures to ensure relevant vibrations and blasting criteria are achieved, including a suitable blast program; vi. The requirements of any applicable licence or approval (for example EPL); vii. Additional requirements in relation to activities undertaken 24 hours of the day, 7 days per week; viii. Pre-construction compliance requirements and hold points; ix. The responsibilities of key project personnel with respect to the implementation of the plan; x. Noise monitoring requirements; xi. Compliance record generation and management; and xii. An Out of Hours Works Protocol applicable to all construction methods and sites. 	<ul style="list-style-type: none"> iv. Key noise and vibration construction activities / stages are included with Table 13. Assessment of the impacts are included within the DNVIS. The DNVIS includes assessment of impacts on residential receivers. v. Reasonable and feasible mitigation measures are included within Table 19. Note that no blasting is proposed for this scope of works vi. NA – no EPL or additional approvals are applicable vii. NA – works are not planned to be undertaken 24 hours per day / seven days a week viii. Hold points for works are included with Section 3.10 of the CEMP ix. Responsibilities are included within the CEMP (Section 3.3). Responsible parties are identified within Table 19 for mitigation measures x. Noise monitoring requirements are included within the Noise & Vibration Monitoring Program included within the DNVIS xi. Compliance and record generation related to this plan is included within the Noise and Vibration Monitoring Program included within the DNVIS xii. An Out of hours Protocol has been developed by SM-WSA (document #SM-21-00306108) was approved for use on 11/11/21. 	
8.2 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 works proposed to be undertaken outside of standard construction hours and to support applications to undertake out of hours works (this includes variations	A DNVIS has been prepared and is included within APPENDIX A	Environmental Manager

CEMF Reference	CEMF Requirement	How Implemented	Responsibility
	of EPLs and applications to relevant agencies)		
8.2 c	Noise and vibration monitoring would be undertaken for construction as specified in the CNVS	Monitoring requirements are included within the Noise and Vibration Monitoring Program. This has considered and incorporated the requirements of the CNVS	Environmental Manager
8.2 d	The following compliance records would be kept by Principal Contractors: i. Records of noise and vibration monitoring results against appropriate NMLs and vibration criteria; and ii. Records of community enquiries and complaints, and the Contractor's response.	i. Commitment included within the noise and vibration monitoring within the DNVIS ii. Community enquiries, complaints and the relevant response to be undertaken in accordance with Section 4 of the CEMP	Communications manager
8.3a	All feasible and reasonable mitigation measures would be implemented in accordance with the CNVS. The on-airport Noise and Vibration CEMP and the off-airport Noise and Vibration Management Plan will include the following noise and vibration mitigation measures as well as relevant Conditions: i. Construction hours will be in accordance with the working hours specified in Section 5.1; ii. Hoarding and enclosures will be implemented where required to minimise airborne noise impacts; and iii. The layout of construction sites will aim to minimise airborne noise impacts to surrounding receivers iv. Provision of respite periods.	Feasible and reasonable mitigation measures are included within Table 19. Specifically: i. Refer to Section 4 ii. Use of perimeter controls included in Table 19 iii. The layout of construction sites to be undertaken in consideration of receivers. Laydown area assessment included within Appendix H of the CEMP. iv. Respite measures considered with Table 19	

4. GENERAL PROJECT INFORMATION

4.1. Standard Working Hours

In line with CoA E38, standard working hours for the Project are as follows:

- Monday to Friday 7:00am – 6:00pm
- Saturday 8:00am- 1:00pm
- No works on Sundays or Public Holidays

Works which can be undertaken outside of standard construction hours without any further approval include:

- a) Those which have been described and assessed in the environmental assessments. For example, tunnelling and underground excavations and supporting activities or works within Western Sydney International
- b) Works which are determined to comply with the relevant Noise Management Level at sensitive receivers;
- c) The delivery of materials outside of approved hours as required by the Police or other authorities (including Transport for NSW) for safety reasons;
- d) Where it is required to avoid the loss of lives, property and / or to prevent environmental harm in an emergency; and
- e) Where written agreement is reached with all affected receivers

In line with the Environmental Planning and Assessment (COVID-19 Development – Infrastructure Construction Work Days No. 2) Order 2020, the following standard work hours will be employed:

- Saturday, Sunday and public holidays 7am-6pm

The following is noted will be complied with including:

- a) be the subject of an approval, and
- b) comply with all conditions of the approval other than any condition that restricts the hours of work or operation on a Saturday, Sunday or public holiday, and
- c) for work or operation on a Saturday, Sunday or public holiday—
 - comply with the conditions of the approval that restrict the hours of work or operation on any other day as if the conditions applied to work or operation on a Saturday, Sunday or public holiday, and
 - not involve the carrying out of rock breaking, rock hammering, sheet piling, pile driving or similar activities during the hours of work or operation that would not be permitted but for this Order, and
 - take all feasible and reasonable measures to minimise noise.

It is noted that these work hours are currently valid until 31 March 2022. After this date, works will be undertaken in accordance with the approved construction hours outlined in CoA E38

4.2. Highly Noise Intensive Works

In line with CoA E39, except as permitted by an EPL or approved in accordance with the Out-of-Hours Works Protocol required by Condition E42, highly noise intensive work that result in an exceedance of the applicable NML at the same receiver must only be undertaken:

- a) between the hours of 8:00 am to 6:00 pm Monday to Friday;
- b) between the hours of 8:00 am to 1:00 pm Saturday; and
- c) if continuously, then not exceeding three (3) hours, with a minimum cessation of work of not less than one (1) hour.

For the purposes of this condition, 'continuously' includes any period during which there is less than one (1) hour between ceasing and recommencing any of the work.

As defined in the Conditions of Approval, Highly noise intensive works is described as the following:

- a) use of power saws, such as used for cutting timber, rail lines, masonry, road pavement or steel work;
- b) grinding metal, concrete or masonry;

- c) rock drilling;
- d) line drilling;
- e) Vibratory rolling;
- f) bitumen milling or profiling;
- g) jackhammering, rock hammering or rock breaking;
- h) rail tamping and regulating; and
- i) impact piling

4.3. Out of Hours Works

Out of hours works will be undertaken in accordance with the Sydney Metro Western Sydney Airport *Out of Hours Work Protocol* (Document #SM-21-00306108) and included in APPENDIX B. The Protocol includes the process to be followed prior to commencing out of hours works. Ward will comply with the Out of Hours Protocol.

The Out of Hours Protocol was approved for use on 11/11/21.

In accordance with the Sydney Metro Out of Hours Work Protocol, an out of hours application will be submitted to Sydney Metro, and independent Environmental Representative for relevant endorsements and approval when out of hours works are planned.

The Community Communication Strategy will also supports Ward's application for commencing out of hours work. It details how the community will be notified in advance of planned activities, kept informed of works progress and how potential noise impacts will be managed.

When applying for out of hours works, the following will be considered:

- a) justification for why out-of-hours work need to occur (note that project acceleration is not considered valid justification);
- b) identification of low and high-risk activities and an approval process that considers the risk of activities, proposed mitigation, management, and coordination, including where:
 - i. the ER reviews all proposed out-of-hours activities and confirms their risk levels;
 - ii. low risk activities that can be approved by the ER; and
 - iii. high risk activities that are approved by the Planning Secretary;
- c) a process for the consideration of out-of-hours work against the relevant NML and vibration criteria;
- d) a process for selecting and implementing mitigation measures for residual impacts in consultation with the community at each affected location, including respite periods consistent with the requirements of Condition E56. The measures take into account the predicted noise levels and the likely frequency and duration of the out-of-hours works that sensitive land user(s) would be exposed to, including the number of noise awakening events;
- e) procedures to facilitate the coordination of out-of-hours work including those approved by an EPL or undertaken by a third party, to ensure appropriate respite is provided; and

Notification arrangements for affected receivers for all approved out-of-hours works and notification to the Planning Secretary of approved low risk out-of-hours works.

In accordance with CoA E41, works may be undertaken outside of the standard working hours in the following circumstances:

- a) Safety and Emergencies, including:
 - (i) for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or

- (ii) 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
- b) Low impact, including:
- (i) 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 ICNG,
 - no more than the 'Noise affected' NMLs specified in Table 3 of the ICNG at other sensitive land user(s);
- (ii) construction that causes:
- continuous or impulsive vibration values, measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.2 of Assessing Vibration: a technical guideline (DEC, 2006), or
 - intermittent vibration values measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.4 of Assessing Vibration: a technical guideline (DEC, 2006); or
- c) By Approval, including:
- (i) where different construction hours are permitted or required under an EPL in force in respect of the CSSI; or
- (ii) works which are not subject to an EPL that are approved under an Out-of-Hours Work Protocol as required by Condition E42; or
- (iii) negotiated agreements with directly affected residents and sensitive land user(s); or
- d) By Prescribed Activity, including:
- (i) tunnelling and ancillary support activities (excluding cut and cover tunnelling and surface works not directly supporting tunneling) are permitted 24 hours a day, seven days a week; or
- (ii) grout batching at the Orchard Hills construction site is permitted 24 hours per day, seven days per week; or
- (iii) delivery of material that is required to be delivered outside of standard construction hours in Condition E38 to directly support tunnelling activities, except between the hours 10:00 pm and 7:00 am to / from the Orchard Hills ancillary facility; or
- (iv) haulage of spoil generated through tunnelling is permitted 24 hours per day, seven days per week except between the hours of 10:00 pm and 7:00 am to / from the Orchard Hills construction site; or
- (v) works within an acoustic enclosure are permitted 24 hours a day, seven days a week where there is no exceedance of noise levels or intermittent vibration levels under Low impact circumstances identified in Condition E41(b), unless otherwise agreed with the Planning Secretary; or
- (vi) tunnel and underground station box fit out works are permitted 24 hours per day, seven days per week.

In accordance with E57 (Out-of-Hours – Community Consultation on Respite) In order to undertake out-of-hours work outside the work hours specified under Condition E38, appropriate respite periods for the out-of-hours work

must be identified in consultation with the community at each affected location on a regular basis. This consultation must include (but not be limited to) providing the community with:

- a) a progressive schedule for periods no less than three (3) months, of likely out-of-hours work;
- b) a description of the potential work, location and duration of the out-of-hours work;
- c) the noise characteristics and likely noise levels of the work; and
- d) likely mitigation and management measures which aim to achieve the relevant NMLs under Condition E43 (including the circumstances of when respite or relocation offers will be available and details about how the affected community can access these offers).

The outcomes of the community consultation, the identified respite periods and the scheduling of the likely out-of-hour work must be provided to the ER, EPA and the Planning Secretary prior to the out-of-hours work commencing.

Note: Respite periods can be any combination of days or hours where out-of-hours work would not be more than 5 dB(A) above the RBL at any residence.

4.4. Sensitive Receivers

In accordance with Condition E37, Ward has undertaken a land use survey of the area surrounding the works. The land use survey was undertaken on 7 September 2021. This survey was undertaken to inform the DNVIS and respective addendum assessments (main works DNVIS, stormwater variation and Lethbridge Street and Phillip Street scopes of work). This has identified a mix of commercial and residential uses in the immediate areas surrounding the works areas. No critical working areas such as operating theatres and precision laboratories have been identified.

Figure 3 shows the representative residential receivers surrounding the works areas considered by this assessment and Figure 4 shows the representative non-residential (commercial) receivers surrounding the works areas.



Figure 3 Representative Residential Receivers Surrounding the Works



Figure 4 – Representative Non-Residential Receivers Surrounding the Works Area

Note: Receiver C10 is the St Mary’s Hotel which includes a residential component on the first floor. For the purposes of assessment, the first floor has been considered a residential use. Receiver C26 is a Childcare Centre located within the Station Plaza building – this has a semi-enclosed play area to the east of the building.

6. NOISE CRITERIA & EXISTING ENVIRONMENT

6.1. Existing Noise Environment

The noise and vibration assessment undertaken as part of the Sydney Metro - Western Sydney Airport Environmental Impact Statement (EIS) is documented in the EIS Technical Paper 2 (*Sydney Metro - Western Sydney Airport Technical Paper 2: Noise and Vibration*).

The EIS study defined Noise Catchment Areas (NCAs) for the wider project. The sensitive receivers potentially affected by the St May’s Bus Exchange Early Works are located with NCA3.

Table 4 sets out the existing ambient and background noise levels considered by this assessment. The levels for the Day, Evening and Night periods are consistent with the survey results identified by the EIS.

Table 4 Summary of NCA3 Unattended Noise Monitoring Results – Determined by EIS

Location	Rating Background Level - RBL (L_{A90} dBA)			Ambient Noise Level (L_{Aeq} dBA)		
	Day	Evening	Night	Day	Evening	Night
NM02	37	37	36	55	59	51

Time periods defined as follows – Day: 7.00am to 6.00pm Monday to Saturday, 8.00am to 6.00pm Sunday; Evening: 6.00pm to 10.00pm; and Night: 10.00pm to 7.00am Monday to Saturday, 10.00pm to 8.00am Sunday.

Consistent with the EIS study, the Rating Background Noise Levels (RBLs) shown have been considered in determining the construction noise criteria.

6.2. General Construction Noise Criteria

The Interim Construction Noise Guidelines (ICNG) provides an approach for determining $L_{Aeq}(15\text{minute})$ noise management levels (NMLs) at adjacent residential receivers based on measured $LA90(15\text{minute})$ rating background noise levels (RBL), as described in Table 5.

Table 5 Construction Noise Criteria

Time of Day	Management Level $L_{Aeq,15\text{min}}$	How to Apply
Recommended Standard Hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or Public Holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq,15\text{min}}$ is greater than the noise affected level, the proponent would apply all feasible and reasonable work practices to minimise noise. The proponent would also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the proponent would consider very carefully if there is any other feasible and reasonable way to reduce noise to below this level. If no quieter work method is feasible and reasonable, and the works proceed, the proponent would communicate with the impacted residents by clearly explaining the duration and noise level of the works, and by describing any respite periods that will be provided.

Outside recommended standard hours	Noise affected RBL + 5 dB	<p>A strong justification would typically be required for works outside the recommended standard hours.</p> <p>The proponent would apply all feasible and reasonable work practices to meet the noise affected level.</p> <p>Where all feasible and reasonable practices have been applied and noise is more than 5 dBA above the noise affected level, the proponent would negotiate with the community.</p> <p>For guidance on negotiating agreements see Section 7.2.2 of the ICNG</p>
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Note 1: Adopted from the ICNG.

Note 2: Noise levels apply at the property boundary that is most exposed to construction noise (or receiver building façade that is most exposed to construction noise, noting that noise levels may be higher at upper floors of the noise affected receiver buildings). 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.

The NMLs derived for the project are summarised in Table 7.

Table 6 ICNG Airborne Construction Noise Criteria – Other Sensitive Land Uses

Land Use	Management Level $L_{Aeq, 15min}$ (applies when properties are being used)	Reference
Classrooms at schools and other educational	Internal noise level: 45 dBA ¹	ICNG ⁵
Hospital wards and operating theatres	Internal noise level: 45 dBA ²	ICNG ⁵
Places of worship	Internal noise level: 45 dBA ³	ICNG ⁵
Active recreation areas	External noise level: 65 dBA	ICNG ⁵
Passive recreation areas	External noise level: 60 dBA	ICNG ⁵
Commercial premises (offices, etc)	External noise level: 70 dBA	ICNG ⁵
Industrial premises	External noise level: 75 dBA	ICNG ⁵
Childcare Centres (Sleeping areas)	Internal noise level: 35 dBA ⁴	AAAC ⁶
Childcare Centres (External areas)	Internal noise level: 55 dBA ⁴	AAAC ⁶

Notes: 1, 2, 3: External Noise Management Levels (NML) of $L_{Aeq, 15min}$ 55 dBA are considered by this assessment, assuming 10dB attenuation achieved by façades with open window(s);

4: Based on visual inspection of the childcare centre on Station Street, external Noise Management Levels (NML) of $L_{Aeq, 15min}$ 60 dBA are considered by this assessment, assuming 25 dB attenuation achieved by the building elements with closed/fixed window(s) for the indoor sleeping areas and 5 dB attenuation for the external play area;

5: Management Levels specified by Interim Construction Noise Guideline;

6: Management Level based on Australian Acoustical Consultants (AAAC) Technical Guideline on Child Care Centre Noise Assessments.

The out of hours periods identified by the Sydney Metro Construction Noise and Vibration Standard, the resultant project specific NMLs set out in Table 7.

Table 7 Airborne Noise Management Levels

Location	Standard Hours (Day)		OOHW (Day)		OOHW (Evening)		OOHW (Night)	
	RBL	NML	RBL	NML	RBL	NML	RBL	NML
Residential	37	47	37	42	37	42	36	41
School (Classrooms)	n/a	55	n/a	55	n/a	55	n/a	55
Commercial (Offices)	n/a	70	n/a	70	n/a	70	n/a	70
Childcare Centre (External Play Areas)	n/a	60	n/a	60	n/a	60	n/a	60
Childcare Centre (External to Sleeping Areas)	n/a	60	n/a	60	n/a	60	n/a	60

Notes: RBL - Rating Background Noise Level; NML - Noise Management Level; Non-residential criteria only apply when receiver building is in use. Noise levels apply at the property boundary that is most exposed to construction noise (or receiver building façade that is most exposed to construction noise, noting that noise levels may be higher at upper floors of the noise affected receiver buildings). 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.

6.2.1. Sydney Metro Construction Noise & Vibration Standard (CNVS)

In addition to the ICNG, the noise criteria set out in the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (CNVS) have been considered.

The CNVS recognises that works requiring the use of heavy machinery can generate high noise and vibration levels and in urban areas there is often limited setback distance between these noise sources and nearby buildings and receivers. Under such circumstances, typically there is limited opportunity to practicably mitigate the noise and vibration effects in a cost-effective manner. Therefore, potential disturbance impacts are usually minimised as much as practicable through management techniques. For residential receivers, depending on how far the predicted airborne construction noise level is above RBL, the CNVS recommends the adoption of the additional management measures (AMM) set out in Table 8. Full definitions of the identified management measures are set out in the CNVS.

Table 8 Additional Airborne Noise Management Measures (Residential)

Time Period		Mitigation Measures			
		Predicted L _{Aeq,15min} Noise Level Above NML			
		0 to 10 dB	10 to 20 dB	20 to 30 dB	> 30 dB
Standard Hours	Mon-Fri (7.00am - 6.00pm)	-	LB	LB, M, SN	LB, M, SN
	Sat (8.00am - 1.00pm)				
	Sun/Pub Hol (Nil)				
OOH (Evening)	Mon-Fri (6.00pm - 10.00pm)	LB	LB, M	LB, M, SN, RO	LB, M, SN, IB, PC, RO
	Sat (1.00pm - 10.00pm)				
	Sun/Pub Hol (8.00am - 6.00pm)				
OOH (Night)	Mon-Fri (10.00pm - 7.00am)	LB	LB, M, SN, RO	LB, M, SN, IB, PC, RO, AA	LB, M, SN, IB, PC, RO, AA
	Sat (10.00pm - 8.00am)				
	Sun/Pub Hol (6.00pm - 7.00am)				

Notes: AA – Alternative Accommodation; M – Monitoring; IB – Individual Briefings; LB – Letterbox drops; RO – Project Specific Respite Offer; PC – Phone Calls and emails; SN – Specific Notifications. Full definitions of these Additional Mitigation Measures are set out in Table 15 of the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (Ver 4.2, 08/09/2020).

6.3. Sleep Disturbance at Residences

Section 4.3 of the ICNG provides the following with respect to sleep disturbance at residences:

Where construction works are planned to extend over more than two consecutive nights, and a quantitative assessment method is used, the analysis should cover the maximum noise level, and the extent and the number of times that the maximum noise level exceeds the RBL. Some guidance indicating the potential for sleep disturbance is in the NSW Environmental Criteria for Road Traffic Noise (EPA 1999) (ECRTN).

Section 2.9 of the CNVS sets out the Sydney Metro sleep disturbance and maximum noise event requirements, as follows:

Maximum noise level events from construction activities during the night-time period can trigger both awakenings and disturbance to sleep stages. The approach to managing events that cause sleep disturbance shall be

consistent with the Noise Policy for Industry (EPA, 2017). Where night-time noise levels at a residential location exceed the:

- LAeq,15min 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, or the
- LAFmax 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,

a detailed maximum noise level event assessment is to be undertaken.

The detailed assessment will cover the maximum noise level, the extent to which the maximum noise level exceeds the RBL, and the number of times this happens during the night-time period.

Maximum noise level event assessments should be based on the LAFmax descriptor on an event basis under 'fast' time response. The detailed assessment will consider all feasible and reasonable noise mitigation measures with a goal of achieving the above trigger levels for night-time activities.

ACA (Wards acoustic consultant) notes that the EPA has conducted an independent and comprehensive review of the most recent research on sleep disturbance and maximum noise levels and a synopsis of this research is included in the NSW Road Noise Policy (RNP) and previously in the ECRTN. The EPA concluded that from the research on sleep disturbance to date:

- Maximum internal noise levels below 50-55dBA are unlikely to awaken people from sleep;
- One or two noise events per night with maximum internal noise levels of 65-70dBA are not likely to affect health and wellbeing significantly.

The 55 dBA maximum noise level may be considered to be equivalent to an external maximum noise level of 65 dBA, considering the 10 dB attenuation typically achieved through partially open windows.

Based on the above, the DNVIS considers the external screening level of LAFmax 52 dBA in accordance with the CNVS and additionally considers the external noise criterion of LAFmax 65 dBA referenced by the RNP.

6.4. Groundborne Construction Noise

The CNVS requires the consideration of Additional Mitigation Measures, in the case of appreciable levels of vibration occurring at sensitive receivers.

Table 9 (based on Table 17 of the CNVS) sets out the Additional Mitigation Measures (AMMs) to be applied in the case of exceedances of the groundborne vibration management levels.

Table 9 Additional Mitigation Measures - Ground-Borne Vibration

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

(Evening)	Sat (1.00pm - 10.00pm)	
	Sun/Pub Hol (8.00am - 6.00pm)	
OOH (Night)	Mon-Fri (10.00pm - 7.00am)	LB, M, IB, PC, RO, SN, AA
	Sat (10.00pm - 8.00am)	
	Sun/Pub Hol (6.00pm - 7.00am)	

Notes: AA – Alternative Accommodation; M – Monitoring; IB – Individual Briefings; LB – Letterbox drops; RO – Project Specific Respite Offer; PC – Phone Calls and emails; SN – Specific Notifications. Full definitions of these Additional Mitigation Measures are set out in Table 15 of the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (Ver 4.2, 08/09/2020). The ‘maximum’ vibration value is taken as the ‘Maximum Peak Velocity (mm/s)’ value identified in Table C1.1 in the Assessing Vibration: A technical guideline (DEC 2006).

6.5. Groundborne Construction Noise Criteria

6.5.1. ICNG Groundborne Construction Noise Criteria

Groundborne (regenerated) noise is noise generated by vibration transmitted through the ground into a structure. Groundborne noise caused, for example by underground works such as tunnelling, can be more noticeable than airborne noise. The following groundborne noise levels for residences are nominated in the ICNG and indicate when management actions would be implemented. These levels recognise the temporary nature of construction and are only applicable when groundborne noise levels are higher than airborne noise levels.

The groundborne noise management levels considered by this assessment are shown in Table 10.

Table 10 Ground-Borne Noise Management Levels

Receiver Type	Standard Hours (Day)	OOHW (Day)	OOHW (Evening)	OOHW (Night)
	L _{Aeq,15min} dBA	L _{Aeq,15min} dBA	L _{Aeq,15min} dBA	L _{Aeq,15min} dBA
Residential	45	40	40	35
Commercial	50 when in use			
Childcare	40 when in use			
School	45 when in use			

Note: The Groundborne Noise Management Levels for non-residential uses only apply when the building is in use.

The daytime criteria are applicable to both residential and commercial receivers, whereas the evening and night-time criteria are only applicable to residential receivers. The Groundborne Noise Management Levels for non-residential uses only apply when the receiver building is in use.

The internal noise levels are to be assessed at the centre of the most-affected habitable room.

6.5.2. CNVS Additional Mitigation Measures – Groundborne Construction Noise

Table 11 (based on Table 15 of the CNVS) sets out the AAMs to be applied in the case of exceedances of the groundborne noise management levels.

Table 11 Additional Groundborne Noise Management Measures (Residential) (Table 17 of CNVS)

Time Period		Mitigation Measures		
		Predicted $L_{Aeq,15min}$ Noise Level Above NML		
		0 to 10 dB	10 to 20 dB	> 20 dB
Standard Hours	Mon-Fri (7.00am - 6.00pm)	No NML for ground-bourne noise during standards hours (refer to Table 9)		
	Sat (8.00am - 1.00pm)			
	Sun/Pub Hol (Nil)			
OOH (Evening)	Mon-Fri (6.00pm - 10.00pm)	LB	LB, M, SN	LB, M, SN, IB, PC, RO
	Sat (1.00pm - 10.00pm)			
	Sun/Pub Hol (8.00am - 6.00pm)			
OOH (Night)	Mon-Fri (10.00pm - 7.00am)	LB, M, SN	LB, M, SN, IB, PC, RO, AA	LB, M, SB, IB, PC, RO, AA
	Sat (10.00pm - 8.00am)			
	Sun/Pub Hol (6.00pm - 7.00am)			

Notes: AA – Alternative Accommodation; M – Monitoring; IB – Individual Briefings; LB – Letterbox drops; RO – Project Specific Respite Offer; PC – Phone Calls and emails; SN – Specific Notifications. Full definitions of these Additional Mitigation Measures are set out in Table 15 of the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (Ver 4.2, 08/09/2020).

6.5.3. Groundborne Noise Assessment

Certain construction activities require the use of vibration intensive equipment that have potential to adversely impact the closest sensitive receivers.

With respect to groundborne noise, as reported in the DNVIS for the proposed surface works airborne noise levels would dominate over groundborne noise. It is considered that management of airborne noise impacts in addition to management of vibration impacts would satisfactorily manage any groundborne noise effects. Accordingly, this assessment of groundborne noise affects is not considered any further

6.6. Construction Road Traffic Noise

Criteria for off-site road traffic noise applicable to existing residences affected by additional traffic on existing local roads generated by land use developments are specified in the NSW Road Noise Policy (RNP). Whilst these criteria do not specifically apply to construction traffic movements, they have been conservatively considered and are summarised in Table 12.

Table 12 RNP Criteria for Road Traffic Noise

Type of Development	Daytime (07:00-22:00)	Night (22:00-07:00)
Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	L _{Aeq,15 hour} 60 (external)	L _{Aeq,9 hour} 55 (external)
Existing residences affected by additional traffic on existing local roads generated by land use developments	L _{Aeq,1 hour} 55 (external)	L _{Aeq,1 hour} 50 (external)

Note: The identified criteria do not apply to vehicle movements within the Project Site. For the purpose of assessment, any noise generated by on-site vehicle movements is considered as construction noise and assessed holistically with on-site mobile plant in accordance with the ICNG.

As required by the RNP, an initial screening test should first be applied by evaluating whether noise levels would increase by more than 2 dB (an increase in the number vehicles of approximately 60%) due to construction traffic or a temporary reroute due to a road closure.

Where noise levels increase by more than 2 dB further assessment is required using the criteria presented in the RNP, as shown in Table 12. A 2 dB increase is typically considered not noticeable.

7. NOISE ASSESSMENT

The following Section summarises the noise assessment results. For details on the noise assessment, refer to the DNVIS within APPENDIX A.

It is noted that the following DNVIS have been completed:

- St Marys Temporary Bus Interchange Works, Detailed Noise and Vibration Impact Statement (DNVIS) (Report 11.00323R-03)
- St Marys Temporary Bus Interchange Works, Detailed Noise and Vibration Impact Statement (DNVIS) – Stormwater variation (11.00323R_AD-03)
- St Marys Temporary Bus Interchange Works, Detailed Noise and Vibration Impact Statement (DNVIS) – Lethbridge variation (11.00323R_AD2-01)

The assessment of airborne noise impacts from the construction activities have been determined by modelling the noise sources, receiver locations, topographical features and buildings.

Key details regarding the construction site layouts, the likely plant and equipment and hours of operation were informed by the Design and Construction Teams. This information is presented in Appendix B of the DNVIS and forms the basis for all modelling assumptions used in this assessment.

7.1.1. Construction Stages

Assessment of airborne noise impacts from the construction activities have been determined by modelling the noise sources, receiver locations, topographical features and buildings.

Key details regarding the construction site layouts, the likely plant and equipment and hours of operation were informed by the Design and Construction Teams. This information is presented in Appendix B of the DNVIS and forms the basis for all modelling assumptions used in this assessment.

Table 13 provides a summary of the works to be undertaken and the timeframes at which the works would occur. As shown in Table 13 predominantly the main car park area works would be undertaken during standard hours, with the one exception being potholing that would also be undertaken out-of-hours. It is anticipated that the out-of-hours component of this activity would be completed within two to three night-shifts.

The external works on Nariel, Queen, Phillip and Station Streets would need to be undertaken during a mix of day and the night-time period, however, each of the identified external work sub-stages would be completed within one or two night-shifts and therefore any noise and vibration effects arising from these activities would not be prolonged

Table 13 Work Stages and Expected Work Periods

Model ID	Stage	Activity	Standard Hours	Out-of-Hours Day	Out-of-Hours Evening	Out-of-Hours Night	Location of Modelled Scenario
Main Car Park Area Works							
01	SE	Setup Environmental Controls/Tree Protection Install ATF Fencing	Yes	No	No	No	DNVIS
02	1A	Potholing	Yes	Yes	Yes	Yes	DNVIS
03	1A	Removal of asphalt and concrete kerbing	Yes	No	No	No	DNVIS
04	1B	Pavement Box Out	Yes	No	No	No	DNVIS
05	1B	Pavement Box Out Service Installation - Stormwater	Yes	No	No	No	DNVIS
-	1B	Pavement Box Out Service Installation - Electrical Services	Yes	No	No	No	DNVIS
06	2A	Sub base installation Pavement works	Yes	No	No	No	DNVIS
-	2A	Kerb Construction	Yes	No	No	No	DNVIS
-	2B	Pavement Final Trim	Yes	No	No	No	DNVIS
-	2B	Landscape Prep Works	Yes	No	No	No	DNVIS
-	2B	AC Prep Works	Yes	No	No	No	DNVIS
-	2B	Driver Facility Installation	Yes	No	No	No	
-	2B	Bus Shelter Installation	Yes	No	No	No	DNVIS

Model ID	Stage	Activity	Standard Hours	Out-of-Hours Day	Out-of-Hours Evening	Out-of-Hours Night	Location of Modelled Scenario
07	2B	Asphalt Works - Mill and Correct in Car Park	Yes	No	No	No	DNVIS
08	3	Stamped Asphalt	Yes	No	No	No	DNVIS
-	3A	Line Marking	Yes	No	No	No	DNVIS
-	3A	Signage Installation	Yes	No	No	No	DNVIS
External Works							
-	1A - Nariel and Queen St	Set up ATF Fencing/Satellite Site Compounds	No	No	No	Yes	DNVIS
09	1A - Nariel and Queen St	Potholing	No	No	No	Yes	DNVIS
10	1A - Nariel and Queen St	Remove Parking Lanes	No	No	No	Yes	DNVIS
11	1A - Nariel and Queen St	Kerb Demolition	No	No	No	Yes	DNVIS
12	1A - Nariel and Queen St	Kerb/Pram Ramp Construction	No	No	No	Yes	DNVIS
13	1A - Nariel and Queen St	Raised Crossing Construction	No	No	No	Yes	DNVIS
14	1A - Nariel and Queen St	Tree Removal	No	No	No	Yes	DNVIS
15	1B - Nariel and Phillip St	Excavate/Box out and Re-instate Footpath Corners	No	No	No	Yes	DNVIS
15	1B - Nariel and Phillip St	Asphalt Works to Corners	No	No	No	Yes	DNVIS
16	2A - Nariel and Phillip St	Line Marking	No	No	No	Yes	DNVIS
17	2C - Nariel and Phillip St	Service Installation - Electrical Services	Yes	No	No	No	DNVIS
18	2C - Nariel and Phillip St	Asphalt Works	Yes	No	No	No	DNVIS

Model ID	Stage	Activity	Standard Hours	Out-of-Hours Day	Out-of-Hours Evening	Out-of-Hours Night	Location of Modelled Scenario
19	3 - Main Car Park and Station St	Main Compound- F Type Barrier Installation, Median on Station St & Stamped Asphalt along East Lane & Main Car Park	Yes	No	No	Yes	DNVIS
20	Materials Laydown and Amenities Compound	Laydown Operations	Yes	Yes	Yes	Yes	DNVIS – Stormwater variation
21a	Service Installation	Saw Cut Asphalt	No	No	Yes	No	DNVIS – Stormwater variation
21b	Stormwater Drainage and Pavement Reconstruction and Resurfacing Works	Excavate & Backfill	No	No	No	Yes	DNVIS – Stormwater variation
21c		Pavement Reconstruction	No	No	No	Yes	DNVIS – Stormwater variation
21d		Asphalting Works – Milling and Resheeting	No	No	No	Yes	DNVIS – Stormwater variation
22a	Service Installation	Lift Pavers	Yes	No	No	No	DNVIS – Stormwater variation
22b	CCTV Services	Excavate	Yes	No	No	No	DNVIS – Stormwater variation
22c		Backfill & Compact	Yes	No	No	No	DNVIS – Stormwater variation
23	Lethbridge	Potholing	Yes	No	No	No	DNVIS – Lethbridge variation

Model ID	Stage	Activity	Standard Hours	Out-of-Hours Day	Out-of-Hours Evening	Out-of-Hours Night	Location of Modelled Scenario
24a	Lethbridge	Saw Cut Kerb and Gutter, Median Islands	Yes	No	No	No	DNVIS – Lethbridge variation
24b	Lethbridge	Demolish Kerb and Gutter, Median Islands	Yes	No	No	No	DNVIS – Lethbridge variation
25a	Lethbridge	Saw Cut Asphalt	Yes	No	No	No	DNVIS – Lethbridge variation
25b	Lethbridge	Demolish Asphalt	Yes	No	No	No	DNVIS – Lethbridge variation
26	Lethbridge	Excavation	Yes	No	No	No	DNVIS – Lethbridge variation
27	Lethbridge	Form Reo Pour – Concrete Works	Yes	No	No	No	DNVIS – Lethbridge variation
28	Lethbridge	Electrical Install Works	Yes	No	No	No	DNVIS – Lethbridge variation
29	Lethbridge	Asphalt Works – Full Depth and Mill and Re-Sheet	No	Yes	Yes	Yes	DNVIS – Lethbridge variation
30	Lethbridge	Line Marking	No	Yes	Yes	Yes	DNVIS – Lethbridge variation
31	Lethbridge	Footpath	Yes	No	No	No	DNVIS – Lethbridge variation

7.1.2. Construction Equipment

For the purposes of this assessment, the construction equipment and sound power levels are set out in Appendix C of the DNVIS and have been considered across the identified works areas as shown in the Staging Plans provided in Appendix B of the DNVIS and as summarised in Table 13. The sound power levels in Appendix C have been determined by measurements undertaken by Ward’s consultant, ACA on other similar projects, or have been adopted from other similar CSSI projects.

7.1.3. Construction Noise Modelling

Construction noise emissions from the works have been modelled using the SoundPLAN (Version 8-2) environmental noise prediction software. This program is used and recognised internationally and is also recognised by NSW regulatory authorities as a preferred computer noise model. Factors that are addressed in the noise modelling are:

- Construction equipment sound power levels;
- Location of construction equipment;
- Screening from existing structures;

- Receiver locations, including multiple storey receivers;
- Ground topography;
- Noise attenuation due to geometric spreading;
- Ground absorption; and
- Atmospheric absorption.

7.1.4. Construction Noise Predictions

The predicted worst-case construction noise levels and Additional Mitigation Measures at the identified representative receivers for the representative construction sub stages modelled are set out in a series of tables in:

- Appendix D of the DNVIS (scenarios 1-19)
- Appendix B of the DNVIS – Stormwater variation (Scenarios 20-22)
- Appendix B of the DNVIS – Lethbridge variation (Scenarios 23-31)

A series of predicted noise contours is provided in Appendix E of the DNVIS.

The predictions represent the typical-worst case noise levels that may be expected to arise at the external facades of the receiver buildings when groups of noise sources operate simultaneously. It should be noted that construction noise levels would frequently be lower than the worst-case levels considered for significant periods of time. This would be apparent as works move around the sites and are therefore more distant/more shielded from receivers and when less noisy activities are being undertaken.

The results show the airborne noise NLMs have potential to be exceeded at various localities and times depending on the works schedule. Given the likelihood of exceedances, the Sydney Metro standard mitigation measures will be applied throughout all of the identified work stages.

7.1.5. CNVS Additional Mitigation Measures – Airborne Construction Noise

Table 8 (based on Table 17 of the CNVS) sets out the Additional Mitigation Measures (AMMs) to be considered in the case of exceedances of the airborne noise criteria.

The airborne noise predictions indicate that at the closest residential and non-residential receivers some monitoring, and letterbox drop notifications are required.

Figure 5 and Figure 6 indicate the area over which the NMLs may be exceeded at various times during the works. All residents and commercial receivers within the area identified will be provided with regular letterbox drop notifications regarding the works, as required by the CNVS.

For the works undertaken within the car park area the modelling indicates the potential for the daytime NML to be exceeded by >10 dB at the closest residential receivers located at:

- R11 - 34-36 Phillip St,
- R22 - 2 Gidley St and 4 Gidley St (Nado),
- R26 - 3 Station St,
- R27 - 2 Station St, 1 Station St, and
- C10 - St Mary's Hotel, 37 Queen St.

In accordance with the CVNS, noise monitoring will be undertaken at these locations to confirm construction noise levels periodically during the car parks works.

Additionally, for the works undertaken on Nariel St and Queen St, the modelling indicates the potential for the daytime NML to be exceeded by >10 dB at the closest residential receivers located on Carinya Avenue, Carmira

St, Nariel St and Merinda St. To confirm construction noise levels during the external works, noise monitoring will be undertaken at the potentially worst affected locations, these being:

- R02 - 67 Carinya Avenue,
- R01 - 69 Carinya Avenue, and
- C10 - St Mary's Hotel, 37 Queen St

For the Lethbridge Street and Phillip Street scope of works modelling (Table B-3 of the DNVIS) indicates that during standard working hours, the most impacted receivers (>10 dBA above NML) are listed below (It is noted that these levels are driven by saw cutting and rock breaking. These activities will generally be undertaken for short durations (anticipated to be up to 2 hours for up to 8 shifts over the duration of the works) and in accordance with condition E46 (b) standard mitigation measures (not reflected in the predictions) will be used where practicable to reduce these impacts (it is noted that noise monitoring will be undertaken to confirm modelling predictions):

- 36A Phillip Street
- 30 Phillip Street *
- 7 Lethbridge Street *
- 16 Phillip Street *
- 8 Phillip Street *
- 109 Glossip Street
- 9 Phillip Street*
- 19A Phillip Street*
- 29 Phillip Street*
- 1 Station Street*
- 1A Station Street

* indicates where noise levels are predicted to be >20 dBA above NML.

For the Lethbridge Street and Phillip Street works the modelling (indicates that during the out of hours works the most highly impacted receivers (residential receivers where modelling indicates noise levels >20 dBA above NML):

- 3 Lethbridge Street;
- 5 Lethbridge Street,
- 21 Phillip Street,
- 23 Phillip Street,
- 25 Phillip Street,
- 27 Phillip Street,
- 29 Phillip Street,
- 31 Phillip Street,
- 32 Phillip Street,
- 30 Phillip Street,
- 28 Phillip Street,
- 26 Phillip Street,
- 24 Phillip Street,
- 7 Lethbridge Street,
- 9 Lethbridge Street,
- 11Lethbridge Street,
- 2 Lethbridge Street,
- 14-18 Lethbridge Street (these units are not currently occupied),

- 11-15 Phillip Street,
- 17 Phillip Street,
- 19A Phillip Street,
- 1A Chesham Street,
- 2A Chesham Street

It is noted that these levels are anticipated during milling and resheeting works which are expected to be completed in 2-3 shifts. To confirm construction noise levels during these works, noise monitoring will be undertaken at the following locations, these being:

- R12 – 36A Phillip Street
- R14 – 7 Lethbridge Street
- R16 – 8 Phillip Street
- R28 – 1A Chesham Street

The nominated monitoring locations are shown on Figure 5. As noted above noise levels at any particular location would vary according to the location of the works and the work activity. It will not be necessary to monitor at all the identified locations at for all activities. Monitoring will be undertaken at the locations identified on a case-by-case basis, with a focus on the most noise-affected locations, based on on-site subjective evaluation.

The results of the noise monitoring at the identified locations would be reviewed as the works proceed and would be compared against the NML. Where necessary the results would be used to inform the construction team of any notable exceedances, over the levels set out in DNVIS (and related Addendum assessments) and would be used to identify any recommended modifications to work methods or to identify the requirements for additional specific amelioration measures.

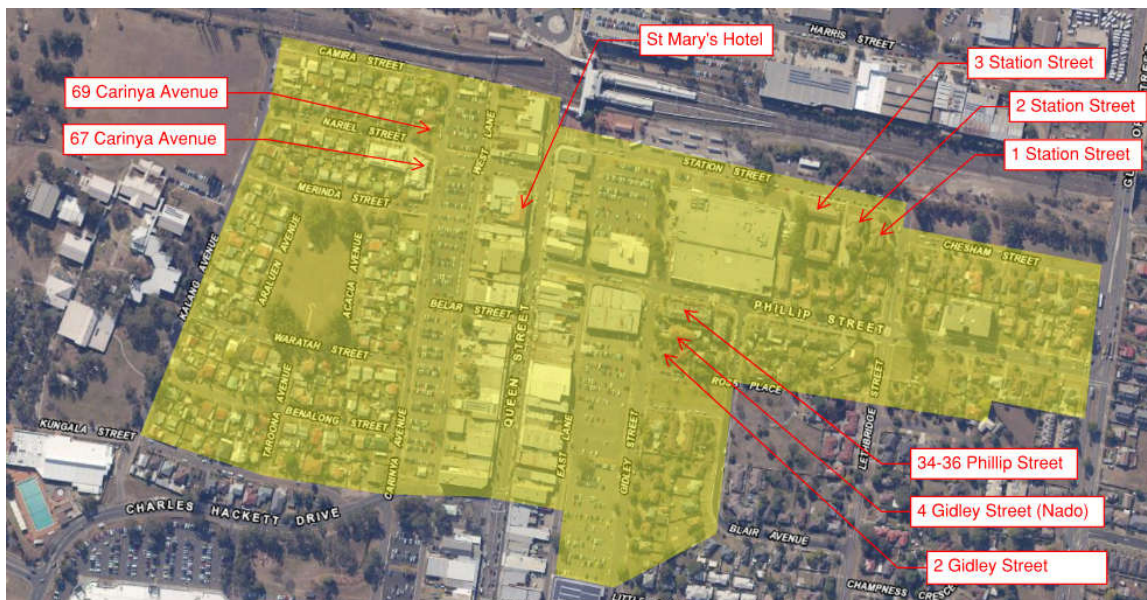


Figure 5 NML Exceedance Letterbox Drop Area and Nominated Noise Monitoring Locations



Figure 6 NML exceedance Letter Box Drop Area for Lethbridge Street works and nominated Noise Monitoring Locations.

The highlighted Additional Mitigation Measure (AMM) triggers shown in tables set out in DNVIS (and associated addendums) are based on the exceedance of the $L_{Aeq,15min}$ NMLs. The tables identify some AMM triggers of Respite Offer and Alternative Accommodation (AA). To determine whether it is justified to provide the identified RO and AA measures, consideration must also be given to the duration of the works.

Works have been scheduled to minimise impacts on receivers. The following overarching scheduling has been undertaken:

- Station Street drainage works undertaken 5 consecutive nights per week to reduce the overall duration of the works and impacts on receivers
- Queen Street works completed on a 72-hour shut down to reduce the overall duration of the scope of works from up to 3 weeks
- Lethbridge Street and Phillip Street works – rescheduled to be predominately completed during standard working hours (milling and resheeting to be completing on night shift. Expected to be undertaken over 5 consecutive shifts)

This scheduling would be considered as part of the development of Out of Hours applications.

It should be noted that the non-residential Additional Mitigation Measures are only applicable when the receiver building is in use.

Ward will consult with the potentially affected receivers identified by this assessment, in particular the C10 (St Mary's Hotel) and R11 (34-36 Phillip St) prior to the works to determine if any particular concerns regarding noise impacts may be addressed during the scheduling.

7.1.6. Highly Noise Affected Receivers (Out of Hours)

The modelling indicates the potential for some relatively high noise levels during the works. The highest levels are anticipated at C10 (St Mary's Hotel at 37 Queen St), R11 (34-36 Phillip St), R22 (2 Gidley St and 4 Gidley St (Nado)), R26 (3 Station St), R27 (2 Station St, 1 Station St), R02 (67 Carinya Avenue), R01 (69 Carinya Avenue), R13 (30 Phillip Street), R14 (7 Lethbridge Street), R15 (14-18 Phillip Street), R20 (19A Phillip Street) and R21 (29 Phillip Street). These receivers may be expected to be highly noise affected at times during the works, that is, noise levels may be expected to exceed the NML by > 20 dB externally to these receivers. However, as discussed above, the durations of these high noise levels would be only for relatively short durations, of typically one or two nights in any one location. Ward will consult with the most potentially affected receivers as part of the DNVIS process and consider any community feedback during the works scheduling and implement respite offer outcomes.

7.1.7. Highly Noise Affected Receivers 9 Standard Hours)

Modelling additionally indicates the potential for high noise impacts during the standard hours works (refer to Section 7.1.5 for list of impacted receivers). The residential receiver buildings where the standard hours NML has potential to be exceeded by >20 dB at times during the standard hours works. It is noted that the highest impacts are associated with the use of concrete / road saws and rock breaking equipment. This equipment is only anticipated to be used for short durations (< 2 hours) and is only anticipated to be required up to 8 times during the works.

In accordance with condition E46 (b) standard mitigation measures (not reflected in the predictions) will be used where practicable to reduce these impacts such as temporary noise barriers including sound curtains and/or arrangement of plant and equipment will be used around noisy equipment and activities such as rock hammering and concrete cutting (it is noted that noise monitoring will be undertaken to confirm modelling predictions). Ward will consult with the most potentially affected receivers as part of the DNVIS process and consider any community feedback during the works scheduling and implement respite offer outcomes.

7.1.8. Receiver Consultation in Accordance with E57

In accordance with Conditions E57, respite will be offered to properties / receivers where Respite Offers are predicted / identified in the DNVIS modelling.

Respite Offers will consist of:

- White noise machines or
- Noise cancelling headphones

Respite offers will be offered through direct consultation (door knock). Where direct consultation is unable to occur, a 'sorry we missed you' notification will be left, with contact information provided should the receiver want to request respite.

It is noted that consultation with the operators of the St Marys Hotel has indicated that they do not require respite.

The outcomes of this community consultation including any identified respite periods will be provided to TfNSW whom will provide the information to the ER, EPA and the Planning Secretary prior to the out-of-hours work commencing as required.

All project community consultation will be completed in accordance with the Sydney Metro Overarching Community Communications Strategy (OCCS) and project specific Community Communications Strategy (CCS). Forecast noise and vibration levels and predicted potential impacts detailed in the DNVIS will be used to inform and guide the required project consultation.

7.1.9. Sleep Disturbance

Maximum noise level events from construction activities during the night-time period can trigger both awakenings and disturbance to sleep stages. The CNVS approach to managing events that cause sleep disturbance is consistent with the Noise Policy for Industry (EPA, 2017). A detailed maximum noise level event assessment is to be undertaken where night-time noise levels at a residential location exceed the:

- $L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, or the
- L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater.

The CNVS notes the maximum noise level event assessments should be based on the L_{AFmax} descriptor on an event basis under 'fast' time response. The detailed assessment will consider all feasible and reasonable noise mitigation measures with a goal of achieving the above trigger levels for night-time activities.

To assess the likelihood of sleep disturbance, Table D-11 (Appendix D of the DNVIS, Table B-11 of the DNVIS – Stormwater variation and Table B-11 of the DNVIS – Lethbridge Variation set out the predicted maximum noise levels for each stage and identifies where exceedances may occur during works undertaken in the night period.

It is noted that the CNVS AMMs are based on the degree to which the $L_{Aeq,15min}$ level exceeds the RBL and not the L_{Amax} level. The AMMs based on the $L_{Aeq,15min}$ assessment (Table 8), are expected to adequately address potential sleep disturbance impacts.

8. GROUNDBORNE CONSTRUCTION NOISE & VIBRATION

8.1. Construction Vibration Criteria

The effects of vibration in buildings can be divided into three main categories; those in which the occupants or users of the building are inconvenienced or possibly disturbed (human comfort), those where the building contents may be affected (effects on building contents) and those in which the integrity of the building or the structure itself may be prejudiced (structural damage).

8.1.1. Human Comfort

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

British Standard 6472-1992 "Guide to evaluation of human exposure to vibration in building" nominates guideline values for various categories of disturbance, the most stringent of which are the levels of building vibration associated with a "low probability of adverse comment" from occupants.

BS 6472-1992 provides guideline values for continuous, transient and intermittent events that are based on a Vibration Dose Value (VDV), rather than a continuous vibration level. The vibration dose value is dependent upon

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

The vibration dose values recommended in BS 6472:1992 for which various levels of adverse comment from occupants may be expected are presented in Table 14 (based on CNVS Table 4).

Table 14 Vibration Dose Values re Expected Adverse Comment in Residential Buildings

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	0.13	0.26	0.51

With respect to VDV, ACA notes that there can be practical difficulties in the prediction and measurement of this parameter, particularly given the limited available measured data. ACA considers the Peak Particle Velocity (PPV) levels as recognised by AVTG is an acceptable substitution (as per table C1.1 of the AVTG – i.e. Residential Daytime: 0.28 to 0.56 mm/s PPV; Residential Night: 0.2 to 0.4 mm/s PPV; Commercial: 0.56 to 1.1 mm/s PPV).

8.1.2. Structural Damage

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.

There are currently no Australian Standards or guidelines to provide guidance on assessing the potential for building damage from vibration. It is common practice to derive goal levels from international standards. British Standard BS7385:1993 and German Standard DIN4150:1999 both provide goal levels, below which vibration is considered insufficient to cause building damage.

It is noted that the CNVS references the British Standard BS7385:1993, however, the Conditions of Approval also specifies German Standard DIN 4150-3: *Structural vibration – Effects of vibration on structures* (DIN 4150). Of these, DIN4150 is the more stringent and has therefore been considered by the DNVIS.

Table 15 summarises the recommended limits outlined in DIN 4150 to ensure minimal risk of cosmetic damage to residential and industrial buildings. Achieving the DIN 4150 vibration levels would also result in compliance with the British Standard BS7385:1993.

Table 15 Recommended Vibration Limits for Minimal Risk of Cosmetic Damage

Type of Building	Guideline Values for Velocity, v_i , in mm/s Vibration at the Foundation at a Frequency of			Plane of Floor of Uppermost Storey
	1 Hz to 10 Hz	10 Hz to 50Hz	50 Hz to 100 Hz	Frequency Mixture
Buildings used for commercial purposes, industrial buildings, and buildings of similar design	20	20 - 40	40 - 50	40

Dwellings and buildings of similar design and/or occupancy	5	5 - 15	15 - 20	15
Structures that, because of their particular sensitivity to vibration, cannot be classified and are of great intrinsic value (e.g. listed buildings under preservation order)	6	3 - 8	8 - 10	8

On this basis, conservative general vibration screening levels (Peak Particle Velocity (PPV)) are provided for intermittent vibration sources as follows:

- reinforced or framed structures: 20 mm/s
- unreinforced or light framed structures 5 mm/s.

8.1.3. Guidelines for Heritage Structures

Heritage buildings and structures would be assessed as per the screening criteria as they should not be assumed to be more sensitive to vibration unless they are found to be structurally unsound. If a heritage building or structure is found to be structurally unsound (following inspection) the more conservative cosmetic damage criteria of 2.5 mm/s peak component particle velocity (from DIN 4150) would be considered.

Table 16 outlines the heritage listed items within the vicinity of the project, none of which have been assessed as being structurally unsound.

Table 16 *Heritage Items*

Heritage Item / Location	Register Listings	Significance	Location
St Marys Railway Station	State Heritage Register and State Rail S170 register under the Heritage Act	State	North of Site
St Marys Railway Station Parcel Office	Penrith City Council LEP (01249)	Local	North of Site

8.1.4. Guidelines for Sensitive Scientific & Medical Equipment

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

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 Table 6 and Figure 3 of the CNVS.

The land use survey undertaken by ward has not identified any uses that may be expected to include sensitive scientific or medical equipment.

8.1.5. Other Vibration Sensitive Structures & Utilities

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 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 with the structure or utility’s owner in order to determine acceptable vibration levels.

In lieu of specific vibration criteria being provided by the asset owner, screening criteria would be adopted from guidance provided in DIN 4150-3 for buried pipework. The screening criteria is outlined in Table 17.

Table 17 Guideline Values for Vibration Velocity to be used when Evaluating the Effects of Vibration on Buried Pipework

Pipe Material	Guideline Values for Velocity Measured on the Pipe, v_i , in mm/s
Steel (including welded pipes)	100
Clay, concrete, reinforced concrete, pre-stressed concrete, metal (with or without flange)	80
Masonry, plastic	50

8.2. Groundborne Construction Noise & Vibration Assessment

Certain construction activities require the use of vibration intensive equipment that have potential to adversely impact the closest sensitive receivers.

With respect to groundborne noise, ACA notes that for the proposed surface works airborne noise levels would dominate over groundborne noise. It is considered that management of airborne noise impacts in addition to management of vibration impacts would satisfactorily manage any groundborne noise effects. Accordingly, this assessment does not consider groundborne noise effects any further.

Minimum working distances to sensitive receivers for cosmetic building damage and human response have been identified for vibration generating plant that may be used during the works. If equipment operates closer to a sensitive receiver, vibration from construction works may potentially exceed the vibration guidelines provided in Table 15. It should be noted, however, the minimum working distances are conservative and indicative. Actual distances may be expected to vary depending on the activity/operator, equipment particularities, local ground conditions and receiver conditions (e.g. building footings).

Table 18 shows the vibration generating plant that would be used and the associated minimum working distances. The setback distances are noted to be generally consistent with those recognised by TfNSW. The TfNSW guidelines do not include reference distances for plate compactors or jumping jacks. The distances identified for these items are based on measurements undertaken by the University of Western Australia which are consistent with ACA’s experience.

Vibration monitoring trials would be undertaken on site at the commencement of the works to confirm vibration levels and safe working distances for all vibration generating equipment.

Table 18 Recommended Minimum Working Distances for Vibration Intensive Equipment

Plant Item	Minimum Distance – Cosmetic Damage (BS 7385)	Cosmetic damage (DIN 4150) Heritage and other Sensitive Structures	Minimum Distance – Human Response (OE&H Vibration Guideline)
5t Excavator with Small (300kg) Hydraulic Hammer	2	5	7
14t Excavator with Medium (900kg) Hydraulic Hammer	7	19	23
Vibratory Roller (7 tonne)	15	41	100
CC10 Vibratory Roller (2 tonne)	5	14	15 to 20
60kg Plate Compactor	2	4	7
Jumping Jack	2	4	7
Jackhammer	1 m (nominal)	2	3

Note 1: Hydraulic hammer & vibratory roller distances are consistent with the TfNSW Construction Noise and Vibration Strategy (V 4.1).

Note 2: Plate compactor distances are based on measurements undertaken by University of Western Australia.

Vibratory Rollers - Cosmetic Damage

Within the carpark, the minimum safe working distance for cosmetic damage for vibratory rolling will be verified by measurements and this distance will be maintained between the plant and all surrounding buildings. At the southernmost part of the car park area, static rolling methods will be used in lieu of vibratory methods within the critical safe distance, as required.

For the asphalted areas on Phillip Street, Queen Street, Station Street and the Phillip Street and Lethbridge Street work that require rolling, only static rollers would be used.

Vibratory Rollers – Human Comfort

The vibratory roller used within the carpark would operate within the within the minimum human response working distance identified by Table 14 with the closest residential receivers at 34-36 Phillip Street located approximately 60 m away from the southern boundary of the car park.

The identified human response distances are considered to be quite conservative. Based on vibration measurements undertaken for a 10-tonne vibratory roller, ACA estimates a VDV at the closest residence of $<0.2 \text{ m/s}^{1.75}$, which is below the Low Probability of Adverse Comment threshold identified in Table 14. On this basis it is considered that there would be minimal risk of human comfort vibration impacts on residents from the use of vibratory rolling within the car park area.

The CNVS does not specify VDV ranges to be considered for offices, however the AVTG notes that there would be a Low Probability of Adverse Comment when VDV remains below 0.4 to $0.8 \text{ m/s}^{1.75}$ in offices. Given the roller is a mobile source that would move around the site, it is estimated that the upper range VDV ($0.8 \text{ m/s}^{1.75}$) would be generally met when a distance of approximately 15-20 m is maintained between the vibratory roller and the surrounding buildings. Within this distance it is proposed to use static rolling methods.

Vibration monitoring trials would be undertaken on the car park site at the commencement of the works to confirm vibration levels and safe working distances for the vibratory roller.

Hydraulic Hammers

During the service installation works on Station Street a 5-tonne excavator with small hydraulic hammer would be used. The construction footprint shows that these hammering works would not occur within approximately 7 m from the closest commercial building (91 Station Street, which is currently vacant) or within approximately 20 m from the St Marys Railway Station Parcel Office (Heritage Receiver). At these distances vibration levels from a small hydraulic hammer are predicted to not exceed 1 mm/s PPV . Therefore, no material risk of exceedance of the screening criteria for cosmetic building damage for commercial or heritage receivers is predicted for the identified hydraulic hammering works.

Additionally, it is considered there would be no material risk of human comfort vibration exceedances from the identified hammering works.

8.2.1. CNVS Additional Mitigation Measures – Groundborne Noise & Vibration

Given Ward's proposed vibration controls, further specific additional mitigation measures relating to groundborne noise or vibration are not considered necessary, beyond the standard measures defined by the CNVS. Application of the standard measures (outlined in Section 9) in addition to the controls discussed above would be expected to be sufficient to ensure vibration effects on the occupants of nearby buildings are satisfactorily managed.

Based on the use of a 7-tonne vibratory roller within the car park area, Ward has provided notifications to the receivers that fall within the potential building damage setback distance recognised by TfNSW, as indicated by Figure 7.



Figure 7 Vibratory Roller Building Damage Risk – Yellow Line Indicates 15 m Buffer for Commercial Buildings; Pink Line Indicates 41 m Buffer for Heritage Items

Note: The Heritage distance buffer has been calculated based off the distance required to meet the respective vibration level for standard buildings. This is provided for information purposes only. As discussed in Section 9.1.5 the identified heritage structures have not been assessed as being structurally unsound and therefore are not considered particularly vibration sensitive on account of their heritage classifications. Anticipated vibration levels are significantly lower than any threshold or criteria for commercial buildings. As such, no specific vibration risk for the heritage items has been identified.

The receivers identified by Figure 7 have been notified by Ward regarding potential vibration effects and have been provided offers of dilapidation surveys in accordance with Condition E84. These receivers are:

- 47-49 Phillip Street (Centrelink)
- 51A Phillip Street (Bridging the Gap)
- 53 Phillip Street (Commercial)
- 36-38 Queen Street (Commercial)
- 34 Queen Street (Commercial)
- 30-32 Queen Street (Commercial)

- 24-26 Queen Street (Commercial)
- 4 Queen Street (Commercial)
- 8 Station Street (Coles Supermarket)

Additionally, whilst not considered to be at any particular risk of damage, the St Marys Railway Station Group has been notified regarding the potential for vibration effects on the St Marys Railway Station Parcel Office, as this Heritage building falls within the 41 m buffer calculated for potential heritage building damage.

It is noted that for works undertaken on the Phillip Street and Lethbridge Street works, the work methodologies proposed are not anticipated to trigger for screening criteria for cosmetic damage.

9. MITIGATION MEASURES

A range of environmental requirements and control measures are identified to minimise impacts to identified receivers.

Additionally, should complaints be received, or non-conformances are identified the project mitigation measures will be reviewed.

Table 19 – Construction Noise and Vibration Mitigation Measures

Action Required	Applies To	Details	Responsibility
Management Measures			
Implementation of any project specific mitigation measures required	Airborne noise Ground-borne noise and vibration	In addition to the measures set out in this table, any project specific mitigation measures identified in the environmental assessment documentation (e.g. EA, REF, submissions or representations report) or approval or licence conditions must be implemented.	Project Manager Environmental Manager
Implement community consultation measures	Airborne noise Ground-borne noise and vibration	A register of all noise and vibration sensitive receivers (NSRs) would be kept on site. The register would include the following details for each NSR: <ul style="list-style-type: none"> • Address of receiver • Category of receiver (e.g. Residential, Commercial etc.) • Contact name and phone number The following community consultation is required and is being implemented: <ul style="list-style-type: none"> ▪ Community notification (letter box drops) in accordance with CoA E57 which will include <ul style="list-style-type: none"> ▪ Pressive schedule of works for no less than three months 	Environmental Manager Community Manager

Action Required	Applies To	Details	Responsibility
		<ul style="list-style-type: none"> ▪ A description of the potential works, location and duration of out of hours works ▪ The noise characteristics and likely noise levels ▪ Likely mitigation and management measures ▪ Door knock to address respite for identified receivers in DNVIS ▪ Specific notification prior to the commencement of out of hours works for identified receivers within the DNVIS 	
Implement community consultation measures	Vibration	Owners and occupiers of properties at risk of exceeding the screening criteria for cosmetic damage will be notified before works that generate vibration commences in the vicinity of those properties. If the potential exceedance is to occur more than once or extend over a period of 24 hours, owners and occupiers will be provided a schedule of potential exceedances on a monthly basis for the duration of the potential exceedances, unless otherwise agreed by the owner and occupier	Project Manager Community Manager
Implement community consultation measures	Noise	Maintain positive, cooperative relationships with schools, childcare centres, local residents and building owners. This will be managed through the management measures identified in Section 4 of the CEMP	Community Manager
Site Inductions	Airborne noise Ground-borne noise and vibration	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: <ul style="list-style-type: none"> • All relevant project specific and standard noise and vibration mitigation measures • Relevant licence and approval conditions • Permissible hours of work • Any limitations on high noise generating activities • Location of nearest sensitive receivers • Construction employee parking areas • Designated loading/unloading areas and procedures • Site opening/closing times (including deliveries) • Environmental incident procedures 	Project Manager

Action Required	Applies To	Details	Responsibility
Behavioural practices	Airborne noise	No swearing or unnecessary shouting or loud stereos/radios; on site. No dropping of materials from height; throwing of metal items; and slamming of doors. No excessive revving of plant and vehicle engines Controlled release of compressed air.	Supervisor
Monitoring	Airborne noise Ground-borne noise and vibration	A noise monitoring program is to be carried out for the duration of the works in accordance with the DNVIS	Environmental Manager
Attended vibration measurements	Ground-borne vibration	Attended vibration measurements are required at the commencement of vibration generating activities to confirm that vibration levels satisfy the criteria for that vibration generating activity. Where there is potential for exceedances of the criteria further vibration site law investigations would be undertaken to determine the site-specific safe working distances for that vibration generating activity. Continuous vibration monitoring with audible and visible alarms would be conducted at the nearest sensitive receivers whenever vibration generating activities need to take place inside the applicable safe-working distances.	Environmental Manager
Respite		Respite between work packages will be managed by SM-WSA and TfNSW. Ward will comply with directions from SM-WSA / TfNSW. For this scope of works, respite will be provided for high noise activities such as saw cutting and hammering.	TfNSW Environmental Officer
Source Controls			
Construction hours and scheduling	Airborne noise Ground-borne noise and vibration	Where feasible and reasonable, construction would be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels would be scheduled during less sensitive time periods.	Project Manager Supervisor
Construction respite period	Ground-borne noise and vibration Airborne noise	High noise and vibration generating activities may only be carried out in continuous blocks, not exceeding 3 hours each, with a minimum respite	Supervisor Environmental Manager

Action Required	Applies To	Details	Responsibility
		period of one hour between each block3.	
Equipment selection	Airborne noise Ground-borne noise and vibration	Use quieter and less vibration emitting construction methods where feasible and reasonable such as: (a) use of regularly serviced low sound power equipment; (c) use of non-tonal reversing alarms; and (c) use of alternative construction and demolition techniques For example, when piling is required, bored piles rather than impact-driven piles will minimise noise and vibration impacts. Similarly, diaphragm wall construction techniques, in lieu of sheet piling, will have significant noise and vibration benefits.	Supervisor
Maximum noise levels	Airborne-noise	The noise levels of plant and equipment must have operating Sound Power Levels compliant with the criteria in Table 13 (of the CNVS).	Environmental Manager
Rental plant and equipment	Airborne-noise	The noise levels of plant and equipment items are to be considered in rental decisions and in any case cannot be used on site unless compliant with the criteria in Table 13 (of the CNVS).	Supervisor
Plan worksites and activities to minimise noise and vibration	Airborne noise Ground-borne vibration	Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.	Supervisor
Non-tonal reversing alarms	Airborne noise	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.	Project Manager Supervisor
Minimise disturbance arising from delivery of goods to construction sites	Airborne-noise	Loading and unloading of materials/deliveries is to occur as far as possible from NSRs. Select site access points and roads as far as possible away from NSRs Dedicated loading/unloading areas to be shielded if close to NSRs Delivery vehicles to be fitted with straps rather than chains for unloading, wherever feasible and reasonable	Supervisor
Path Controls			

Action Required	Applies To	Details	Responsibility
Shield stationary noise sources such as pumps, compressors, fans etc	Airborne-noise	Stationary noise sources would be enclosed or shielded whilst ensuring that the occupational health and safety of workers is maintained. Appendix F of AS 2436: 1981 lists materials suitable for shielding.	Supervisor
Shield sensitive receivers from noisy activities	Airborne-noise	Use structures to shield residential receivers from noise such as site shed placement; earth bunds; fencing; erection of operational stage noise barriers (where practicable) and consideration of site topography when situating plant.	Supervisor
Shield sensitive receivers from noisy activities	Airborne-noise	At source control, temporary noise barriers (including the arrangement of plant and equipment) around noisy equipment and activities such as rock hammering and concrete cutting;	Supervisor
Shield receivers from construction activities	Airborne-noise	Perimeter noise controls will be implemented in accordance with recommendations by the noise assessments (DNVIS). Note sound curtains to be used at the Station Street laydown as a mitigation to receivers on Station Street	Supervisor

10. CONSTRUCTION NOISE AND VIBRATION MONITORING PROGRAM

The Construction Noise and Vibration Monitoring Program has been developed by Acoustics Consultants Australia. The Noise and Vibration Monitoring Program is included with Appendix F of the DNVIS.

11. REPORTING AND RECORD KEEPING

All monitoring records will be retained throughout the delivery of the Project. Monitoring records will be completed to record:

- Date and time of measurements
- Name of person undertaking the measurements
- Type and model number of instrument
- Time of day, length of measurement and measurement time intervals
- Monitoring location and mounting method
- Measurement location details and number of measurements at each location
- Operation and load conditions of the vibrating plant under investigation
- Possible vibration influences from other sources (e.g. domestic vibrations, other mechanical plant, traffic etc.).



If a complaint is received, the vibration mitigation measures will be reviewed and implemented as required.

APPENDIX A. DETAILED NOISE & VIBRATION IMPACT STATEMENT

Includes:

St Marys Temporary Bus Interchange Early Works Detailed Noise and Vibration Impact Statement (DNVIS) (Report 11.00323)

St Marys Bus Exchange Early Works Addendum Detailed Noise and Vibration Impact Statement (DNVIS) – Stormwater Variation (Report 11.00323R_AD-01)

St Marys Bus Interchange Early Works Addendum Detailed Noise and Vibration Impact Statement (DNVIS) – Lethbridge Variation (Report 11.00323R_AD2-01)



**ST MARY'S TEMPORARY BUS
INTERCHANGE EARLY WORKS
DETAILED NOISE & VIBRATION
IMPACT STATEMENT (DNVIS)**

Report 11.00323R-03

prepared for Ward Civil Engineering Pty Ltd
on 24/11/2021



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BASIS OF REPORT

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

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from ACA. ACA disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

REFERENCE	DATE	PREPARED	REVIEWED	AUTHORISED
11.00323R-01	19/09/2021	SF	MdlM	SF
11.00323R-02	07/10/2021	SF	MdlM	SF
11.00323R-03	18/11/2021	SF	MdlM	SF

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Report 11.00323R-03

1. INTRODUCTION

Acoustics Consultants Australia (ACA) has been engaged by Ward Civil & Engineering Pty Ltd (Ward) to prepare a Detailed Noise and Vibration Impact Statement (DNVIS) for the Advanced and Enabling Works (AEW) in relation to the St Marys Temporary Bus Interchange (TBI), which form part of the Sydney Metro Western Sydney Airport (SMWSA) Project (SSI 10051).

Primarily, this document has been prepared to fulfil the requirements of the Critical State Significant Infrastructure (CSSI) Approval Condition E47 that requires a DNVIS and Condition C13 that requires a Construction Noise and Vibration Monitoring Program. This DNVIS forms part of the Construction Environmental Management Plan (CEMP), or equivalent document, in accordance with the Sydney Metro Construction Environmental Management Framework (CEMF).

The included assessments have been undertaken in accordance with the provisions of the NSW Interim Construction Noise Guideline – (ICNG), the Sydney Metro – Western Sydney Airport Construction Noise & Vibration Strategy (Ver 4.2, 8 September 2020) – (CNVS) and relevant Conditions of Approval as set out in the Department of Planning, Industry and Environment's Critical State Significant Infrastructure Approval for Sydney Metro – Western Sydney Airport (SSI 10051).

The AEW – St Marys TBI scope is not subject to an Environment Protection Licence (EPL).

The AEW – St Marys TBI works are proposed to generally occur within standard construction hours, however, the planning approval allows for alternate working hours for the works that cannot be completed during standard hours, provided the works are managed appropriately.

This document details Noise Management Level (NML) exceedances and mitigation requirements for the standard hours works and the proposed out-of-hours works. The extent of works undertaken outside of standard hours would be dependent on relevant approvals and be subject to specific negotiated respite measures, as permissible under the CSSI Approval.

The main objectives of this DNVIS are to minimise unreasonable noise and vibration impacts on residents and businesses, and to avoid structural damage to buildings or heritage items as a result of construction vibration.

This DNVIS aims to support active community communication and maintain positive, cooperative relationships with local residents, businesses and building owners. The mitigation measures proposed in this DNVIS have been determined in consultation with the potentially affected members of the community.

It is noted that ongoing community engagement and management of such relationships is primarily managed via the Sydney Metro – Western Sydney Airport Community Communications Strategy.

A copy of this DNVIS must be provided to the ER before commencement of the works.

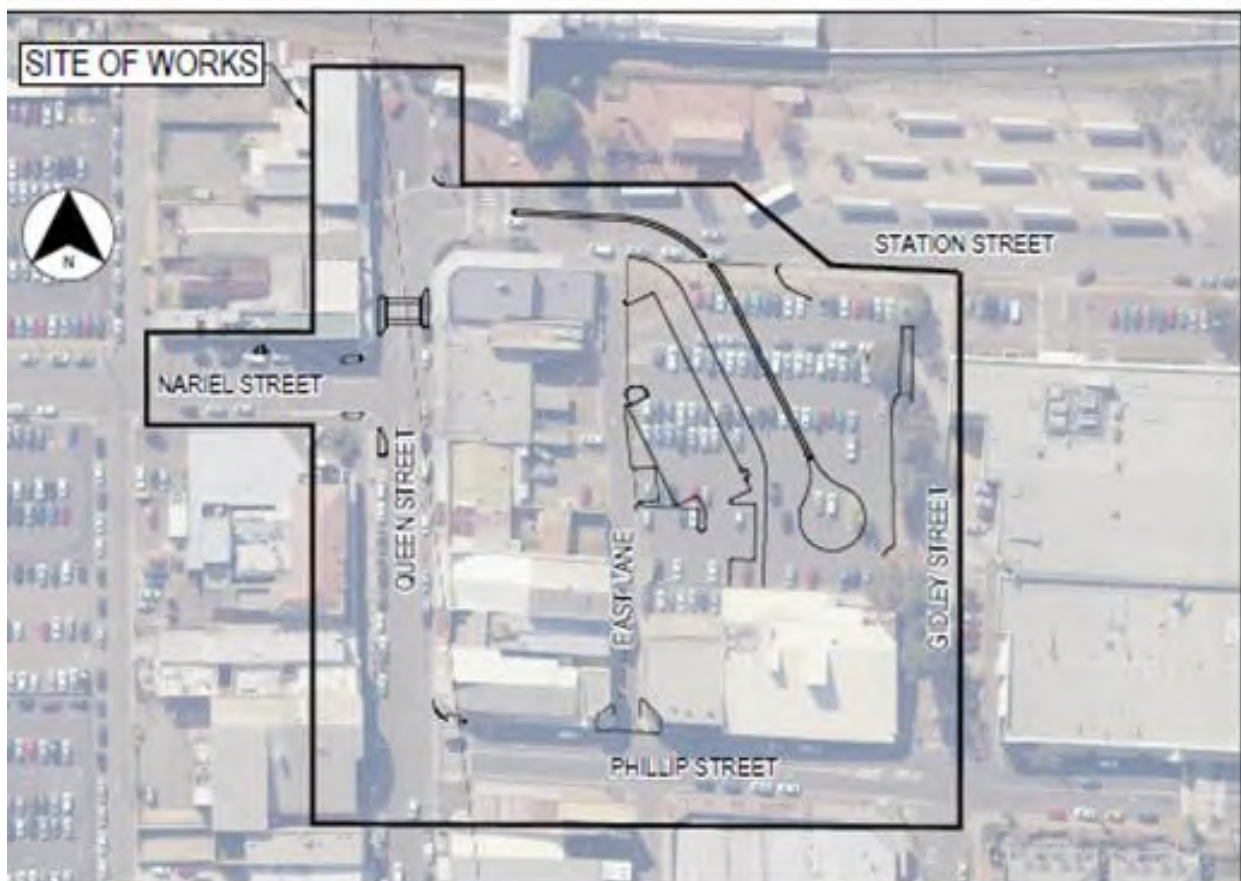
2. SITE DESCRIPTION

The primary works area is currently a council managed public car park (Station Street). The primary work area is primarily an existing hard stand area, with a grass nature strip and pedestrian path adjacent to Station Street. The car park provides limited duration public parking. The remaining work areas are located on surrounding local roads.

The site is located within the Penrith City Council LGA and is zoned B4 Mixed Use with the surrounding area a combination of R4 (high density residential), R2 (low density residential), R3 (medium density residential) and SP2 (Infrastructure Railway) immediately to the north to site.

St Marys Station is located immediately to the north on the opposite side of Station Street

Figure 2-1 St Mary's Bus Exchange Early Works – Overview



3. PROJECT DESCRIPTION

The key features of Ward's scope of works are to complete the AEW – St Marys TBI which is being constructed off Station Street within an existing car parking facility. The works will involve:

- Establishment of an ancillary facility in a vacant parcel of land off Station Street, St Marys;
- Construct the permanent and temporary pavements for the St Marys TBI;
- Mill and place asphalt overlay to the existing pavement on Station Street to match existing levels and carpark to required levels;
- Raised pedestrian crossings on Queen Street and at grade pedestrian crossing on Nariel Street and pram ramps;
- Bus stops on Phillip Street;
- Reconfiguration of existing carpark on East Lane;
- Utility relocations;
- Drainage installation;
- Install road furniture;
- Install CCTV Surveillance;
- Install wayfinding signage;
- Relocate bus shelters for customers and shades for kiss-and-ride passengers;
- Install street lighting;
- Lane resurfacing on Phillip Street/ Queen Street and Nariel Street; and
- Construction of dedicated driver facility (DDF) unit in the temporary bus interchange.

This Scope of works is depicted in **Figures 3-1** and **3-2**.

ST MARY'S TEMPORARY BUS INTERCHANGE EARLY WORKS
DETAILED NOISE & VIBRATION IMPACT STATEMENT (DNVIS)

Figure 3-1 Key Features for the St Marys TBI Works



Figure 3-2 Key features for the Nariel St Scope of Works



4. RELEVANT CONDITIONS OF APPROVAL

The Sydney Metro Western Sydney Airport Approval includes several Conditions that relate to noise and vibration. These Conditions are interrelated with the requirements of the DNVIS and accordingly have been considered by this assessment.

The specific requirements of the DNVIS are set out under Condition E47, as follows:

E47 - Detailed Noise and Vibration Impact Statements (DNVIS) must be prepared for any work that may exceed the NMLs, vibration criteria and / or ground-borne noise levels specified in Conditions E43 and E44 at any residence outside construction hours identified in Condition E38, or where receivers will be highly noise affected or subject to vibration levels above those otherwise determined as appropriate by a suitably qualified structural engineer under Condition E87. The DNVIS must include specific mitigation measures identified through consultation with affected sensitive land user(s) and the mitigation measures must be implemented for the duration of the works. A copy of the DNVIS must be provided to the ER before the commencement of the associated works. The Planning Secretary and the EPA may request a copy (ies) of the DNVIS.

Table 4-1 summarises the DNVIS requirements set out in the CNVS and **Table 4-2** summarises the various noise and vibration Approval Conditions and where reference to these is made by this DNVIS.

Table 4-1 DNVIS Requirements per CNVS

DNVIS Requirements	Where Addressed
Identify all Noise and Vibration Sensitive Receivers (NSRs) which may be affected by the project.	Section 6
Conduct background noise monitoring at representative NSRs to determine the rating background noise levels (RBLs) in accordance with the procedures presented in the EPA's Noise Policy for Industry, where RBLs have not been established in previous project stages.	Section 7
Determine the appropriate noise and vibration management levels of each NSR.	Section 8 / 9
Determine the source noise levels (Sound Power Levels) of each noise generating plant and equipment item required to undertake the construction scenario. Note: Sound Power Levels for each plant and equipment would be less than the maximum allowable levels found in Table 13 and Table 14.	Section 8
Clearly indicate which mitigation measures identified in Section 4 have been/are to be incorporated into the noise assessment. Noise mitigation measures to be implemented will vary for reasons such as safety and space constraints, these are to be identified and the calculations adjusted accordingly.	Section 8

DNVIS Requirements	Where Addressed
<i>For location specific construction scenarios and where applicable for generic scenarios, include the effects of noise shielding provided by site offices, residential fences, noise barriers or natural topographic features.</i>	Section 8
<i>Where applicable include the effects of noise reflections and ground attenuation.</i>	Section 8
<i>Calculate the LAeq noise or range of levels from construction scenarios at sensitive receiver groups, with the use of noise contour maps where appropriate and/or at 10 m, 25 m, 50 m, 75 m, 100 m and 200 m for more general construction activities.</i>	Section 8 Appendix D Appendix E
<i>Compare these against the goals identified for each NSR and identify predicted exceedances.</i>	Appendix D
<i>For night-time activities, calculate exceedances over the:</i> <ul style="list-style-type: none"> <i>o LAeq, 15min 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and</i> <i>o LAFmax 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater.</i> <i>Where exceedances are predicted to occur, undertake a detailed maximum noise level event assessment in accordance with the Noise Policy for Industry (EPA, 2017).</i>	Appendix D
<i>On completion of all DNVIS reports for the subjective classification of the noise impact is to be evaluated and documented as:</i> <ul style="list-style-type: none"> <i>o Low Impact</i> <i>o Moderate Impact</i> <i>o High Impact</i> 	Section 11
<i>As a result of noise classification and/or the noise level exceedances at sensitive receivers provided by the DNVIS reports, appropriate reasonable and feasible noise mitigation is to be adopted and implemented. For sites where works are predicted to significantly exceed noise goals and impact on receivers for a significant period of time, additional reasonable and feasible noise mitigation measures such as those outlined in Section 5 would be considered if practical to reduce the noise levels and impact on sensitive receivers.</i>	Section 11 Appendix D

Table 4-2 Approval Conditions Relating to Noise and Vibration

Approval Conditions	Where Addressed
<p>E37 - Land Use Survey</p> <p><i>A detailed land use survey must be undertaken to confirm sensitive land use(s) (including critical working areas such as operating theatres and precision laboratories) potentially exposed to construction noise and vibration and construction ground-borne noise. The survey may be undertaken on a progressive basis but must be undertaken in any one area before the commencement of work which generates construction noise, vibration or ground-borne noise in that area. The results of the survey must be included in the Detailed Noise and Vibration Impact Statements required under Condition E47.</i></p>	Section 6
<p>E38 - Construction Hours</p> <p><i>Work must only be undertaken during the following hours:</i></p> <p>(a) 7:00am to 6:00pm Mondays to Fridays, inclusive;</p> <p>(b) 8:00am to 1:00pm Saturdays; and</p> <p>(c) at no time on Sundays or public holidays.</p>	Section 5
<p>E39 - Highly Noise Intensive Work</p> <p><i>Except as permitted by an EPL or approved in accordance with the Out-of-Hours Works Protocol required by Condition E42, highly noise intensive work that result in an exceedance of the applicable NML at the same receiver must only be undertaken:</i></p> <p>(a) between the hours of 8:00 am to 6:00 pm Monday to Friday;</p> <p>(b) between the hours of 8:00 am to 1:00 pm Saturday; and</p> <p>(c) if continuously, then not exceeding three (3) hours, with a minimum cessation of work of not less than one (1) hour.</p> <p><i>For the purposes of this condition, 'continuously' includes any period during which there is less than one (1) hour between ceasing and recommencing any of the work.</i></p>	Section 8

Approval Conditions	Where Addressed
<p>E41- Variation to Work Hours</p> <p><i>Notwithstanding Conditions E38 and E39 work may be undertaken outside the hours specified in the following circumstances:</i></p> <p><i>(a) Safety and Emergencies, including:</i></p> <p><i>(i) for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or</i></p> <p><i>(ii) 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</i></p> <p><i>(b) Low impact, including:</i></p> <p><i>(i) construction that causes LAeq(15 minute) noise levels:</i></p> <ul style="list-style-type: none"> <i>• no more than 5 dB(A) above the rating background level at any residence in accordance with the ICNG, and</i> <i>• no more than the 'Noise affected' NMLs specified in Table 3 of the ICNG at other sensitive land user(s); and</i> <p><i>(ii) construction that causes:</i></p> <ul style="list-style-type: none"> <i>• continuous or impulsive vibration values, measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.2 of Assessing Vibration: a technical guideline (DEC, 2006), or</i> <i>• intermittent vibration values measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.4 of Assessing Vibration: a technical guideline (DEC, 2006); or</i> <p><i>(c) By Approval, including:</i></p> <p><i>(i) where different construction hours are permitted or required under an EPL in force in respect of the CSSI; or</i></p> <p><i>(ii) works which are not subject to an EPL that are approved under an Out-of-Hours Work Protocol as required by Condition E42; or</i></p> <p><i>(iii) negotiated agreements with directly affected residents and sensitive land user(s);</i></p>	<p>Section 5</p>

Approval Conditions	Where Addressed
<p>E42 - Out-of-Hours Work Protocol – Work not subject to an EPL</p> <p><i>An Out-of-Hours Work Protocol must be prepared to identify a process for the consideration, management and approval of work (not subject to an EPL) that is outside the hours defined in Conditions E38 and E39. The Protocol must be approved by the Planning Secretary before commencement of the out-of-hours work. The Protocol must be prepared in consultation with the ER. The Protocol must provide:</i></p> <ul style="list-style-type: none"> <i>(a) justification for why out-of-hours work need to occur;</i> <i>(b) identification of low and high-risk activities and an approval process that considers the risk of activities, proposed mitigation, management, and coordination, including where:</i> <ul style="list-style-type: none"> <i>(i) the ER reviews all proposed out-of-hours activities and confirms their risk levels;</i> <i>(ii) low risk activities that can be approved by the ER; and</i> <i>(iii) high risk activities that are approved by the Planning Secretary;</i> <i>(c) a process for the consideration of out-of-hours work against the relevant NML and vibration criteria;</i> <i>(d) a process for selecting and implementing mitigation measures for residual impacts in consultation with the community at each affected location, including respite periods consistent with the requirements of Condition E56. The measures must take into account the predicted noise levels and the likely frequency and duration of the out-of-hours works that sensitive land user(s) would be exposed to, including the number of noise awakening events;</i> <i>(e) procedures to facilitate the coordination of out-of-hours work including those approved by an EPL or undertaken by a third party, to ensure appropriate respite is provided; and</i> <i>(f) notification arrangements for affected receivers for all approved out-of-hours works and notification to the Planning Secretary of approved low risk out-of-hours works.</i> <p><i>This condition does not apply if the requirements of Condition E41 are met.</i></p> <p><i>Note: Out-of-hours work is any work that occurs outside the construction hours identified in Condition E38 and E39.</i></p>	<p>Section 5 Section 8</p>

Approval Conditions	Where Addressed
<p>E43 - Construction Noise Management Levels and Vibration Criteria</p> <p>Mitigation measures must be implemented with the aim of achieving the following construction noise management levels and vibration criteria:</p> <p>(a) construction 'Noise affected' noise management levels established using the Interim Construction Noise Guideline (DECC, 2009);</p> <p>(b) preferred vibration criteria established using the Assessing vibration: a technical guideline (DEC, 2006) (for human exposure);</p> <p>(c) Australian Standard AS 2187.2 - 2006 "Explosives - Storage and Use - Use of Explosives" (for human exposure);</p> <p>(d) BS 7385 Part 2-1993 "Evaluation and measurement for vibration in buildings Part 2" as they are "applicable to Australian conditions"; and</p> <p>(e) the vibration limits set out in the German Standard DIN 4150-3: Structural Vibration-effects of vibration on structures (for structural damage).</p> <p>Any work identified as exceeding the noise management levels and / or vibration criteria must be managed in accordance with the Noise and Vibration CEMP Sub-plan.</p> <p>Note that in accordance with the Sydney Metro Staging Plan, a noise and vibration sub-plan is not required for this scope of works. Noise and vibration impacts will be managed under the Project CEMP and relevant management procedures.</p> <p>Note: The ICNG identifies 'particularly annoying' activities that require the addition of 5 dB(A) to the predicted level before comparing to the construction Noise Management Level.</p>	<p>Section 8</p>
<p>E44 - All reasonable and feasible mitigation measures must be applied when the following residential ground-borne noise levels are exceeded:</p> <p>(a) evening (6:00 pm to 10:00 pm) — internal LAeq(15 minute): 40 dB(A); and</p> <p>(b) night (10:00 pm to 7:00 am) — internal LAeq(15 minute): 35 dB(A).</p> <p>The mitigation measures must be outlined in the Noise and Vibration CEMP Sub-plan, including in any Out-of-Hours Work Protocol, required by Condition E42.</p>	<p>Section 9 Section 11</p>

Approval Conditions	Where Addressed
<p>E45 - Noise generating work in the vicinity of potentially-affected community, religious, educational institutions and noise and vibration-sensitive businesses and critical working areas (such as theatres, laboratories and operating theatres) resulting in noise levels above the NMLs must not be timetabled within sensitive periods, unless other reasonable arrangements with the affected institutions are made at no cost to the affected institution.</p>	<p>Section 6 Section 8</p>
<p>E46 - Construction Noise and Vibration Mitigation and Management Industry best practice construction methods must be implemented where reasonably practicable to ensure that noise and vibration levels are minimised around sensitive land use(s). Practices may include, but are not limited to:</p> <p>(a) use of regularly serviced low sound power equipment;</p> <p>(b) at source control, temporary noise barriers (including the arrangement of plant and equipment) around noisy equipment and activities such as rock hammering and concrete cutting;</p> <p>(c) use of non-tonal reversing alarms; and</p> <p>(d) use of alternative construction and demolition techniques.</p>	<p>Section 11</p>
<p>E47 - Detailed Noise and Vibration Impact Statements (DNVIS) must be prepared for any work that may exceed the NMLs, vibration criteria and / or ground-borne noise levels specified in Conditions E43 and E44 at any residence outside construction hours identified in Condition E38, or where receivers will be highly noise affected or subject to vibration levels above those otherwise determined as appropriate by a suitably qualified structural engineer under Condition E87. The DNVIS must include specific mitigation measures identified through consultation with affected sensitive land user(s) and the mitigation measures must be implemented for the duration of the works. A copy of the DNVIS must be provided to the ER before the commencement of the associated works. The Planning Secretary and the EPA may request a copy (ies) of the DNVIS.</p>	<p>Throughout</p>
<p>E48 - Owners and occupiers of properties at risk of exceeding the screening criteria for cosmetic damage must be notified before works that generate vibration commences in the vicinity of those properties. If the potential exceedance is to occur more than once or extend over a period of 24 hours, owners and occupiers must be provided a schedule of potential exceedances on a monthly basis for the duration of the potential exceedances, unless otherwise agreed by the owner and occupier. These properties must be identified and considered in the Noise and Vibration CEMP Sub-plan</p>	<p>Section 9</p>

Approval Conditions	Where Addressed
<p>E49 - Where sensitive land use(s) are identified in Appendix B as exceeding the highly noise affected criteria during typical case construction, mitigation measures must be implemented with the objective of reducing typical case construction noise below the highly noise affected criteria at each relevant sensitive landuse(s). Activities that would exceed highly noise affected criteria during typical case construction must not commence until the measures identified in this condition have been implemented, unless otherwise agreed with the Planning Secretary.</p> <p>Note: Mitigation measures may include path barrier controls such as acoustic sheds and/or noise walls, at-property treatment, or a combination of path and at-property treatment.</p>	Section 8
<p>E50 - For all construction sites where acoustic sheds are installed, the sheds must be designed, constructed and operated to minimise noise emissions. This would include the following considerations:</p> <p>(a) all significant noise producing equipment that would be used during the night-time would be inside the sheds, where feasible and reasonable;</p> <p>(b) noise generating ventilation systems such as compressors, scrubbers, etc, would be located inside the sheds and external air intake/discharge ports would be appropriately acoustically treated; and</p> <p>(c) the doors of acoustic sheds would be kept closed during the night-time period. Where night-time vehicle access is required at sites with nearby residences, the shed entrances would be designed and constructed to minimise noise breakout.</p>	n/a
<p>E51 - Where Condition E49 determines that at-property treatment (temporary or permanent) is the appropriate measure to reduce noise impacts, this at-property treatment must be offered to landowners of residential properties for habitable living spaces, unless other mitigation or management measures are agreed to by the landowner.</p> <p>Landowners must be advised of the range of options that can be installed at or in their property and given a choice as to which of these they agree to have installed.</p> <p>A copy of all guidelines and procedures that will be used to determine at-property treatment at their residence must be provided to the landowner.</p>	n/a
<p>E52 - Any offer for at-property treatment or the application of other noise mitigation measures in accordance with Condition E51, does not expire until the noise impacts specified in Condition E49, affecting that property are completed, even if the landowner initially refuses the offer.</p> <p>Note: If an offer has been made but is not accepted, this does not preclude the commencement of construction under Condition E49.</p>	n/a

Approval Conditions	Where Addressed
<p>E53 - <i>The implementation of at-property treatment does not preclude the application of other noise and vibration mitigation and management measures including temporary and long-term accommodation.</i></p>	Section 8
<p>E54 - Construction Vibration Mitigation – Heritage Items</p> <p><i>Vibration testing must be conducted during vibration generating activities that have the potential to impact on Heritage items to verify minimum working distances to prevent cosmetic damage. In the event that the vibration testing and attended monitoring shows that the preferred values for vibration are likely to be exceeded, the Proponent must review the construction methodology and, if necessary, implement additional mitigation measures. Such measures must include, but not be limited to, review or modification of excavation techniques.</i></p>	Section 9
<p>E55 - <i>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 items.</i></p>	Section 9
<p>E56 - Utility Coordination and Respite</p> <p><i>All 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:</i></p> <ul style="list-style-type: none"> <i>(a) reschedule any work to provide respite to impacted noise sensitive land use(s) so that the respite is achieved in accordance with Condition E57; or</i> <i>(b) consider the provision of alternative respite or mitigation to impacted noise sensitive land use(s); and</i> <i>(c) provide documentary evidence to the ER in support of any decision made by the Proponent in relation to respite or mitigation.</i> <p><i>The consideration of respite must also include all other approved Critical SSI, SSI and SSD projects which may cause cumulative and / or consecutive impacts at receivers affected by the delivery of the CSSI.</i></p> 	Section 8

Approval Conditions	Where Addressed
<p>E57 – Out-of-Hours Works – Community Consultation on Respite</p> <p><i>In order to undertake out-of-hours work outside the work hours specified under Condition E38, appropriate respite periods for the out-of-hours work must be identified 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:</i></p> <ul style="list-style-type: none"> <i>(a) a progressive schedule for periods no less than three (3) months, of likely out-of-hours work;</i> <i>(b) a description of the potential work, location and duration of the out-of-hours work;</i> <i>(c) the noise characteristics and likely noise levels of the work; and</i> <i>(d) likely mitigation and management measures which aim to achieve the relevant NMLs under Condition E43 (including the circumstances of when respite or relocation offers will be available and details about how the affected community can access these offers).</i> <p><i>The outcomes of the community consultation, the identified respite periods and the scheduling of the likely out-of-hour work must be provided to the ER, EPA and the Planning Secretary prior to the out-of-hours work commencing.</i></p> <p><i>Note: Respite periods can be any combination of days or hours where out-of-hours work would not be more than 5 dB(A) above the RBL at any residence.</i></p>	<p>Section 8</p>

5. DESCRIPTION OF PROPOSED CONSTRUCTION WORKS

The St Marys Bus Interchange Enabling Works Project involves predominantly standard hours works within the carpark. Additionally, some works within standard hours and out of hours periods on some road intersections surrounding the car park will be required. The works outside of standard hours are required to be undertaken at these times to limit any conflicts with traffic on the road network.

Staging Plans provided by Ward outlining the works are included in **Appendix B**. These form the basis of this assessment.

5.1. Proposed Works Schedule

The staging plans identify numerous sub-stages. For the purposes of assessment, construction noise predictions have been undertaken for 19 key sub-stages. A summary of the works to be undertaken and the representative 19 key sub-stages considered by this assessment are set out in **Table 8-5**.

5.2. Proposed Construction Hours

Works would predominantly be completed within standard hours, with some extensions as permissible under the CSSI Approval.

The construction hours for the Project are defined by the CSSI planning approval. The standard construction hours of work are defined by Condition E38, consistent with the CNVS, are:

- (a) 7:00am to 6:00pm Mondays to Fridays, inclusive;
- (b) 8:00am to 1:00pm Saturdays; and
- (c) at no time on Sundays or public holidays.

5.3. Out of Hours Works

The CNVS notes the nature of infrastructure projects means evening and night works are likely to be required throughout construction due to various considerations including avoiding sensitive periods for sensitive receivers, delivery of oversized plant or structures, emergency works, or other activities that require the temporary closure of roads.

All out of hours works (except in emergency situations) will be managed under the Sydney Metro Out of Hours Works Protocol as required under CSSI Condition E42, which applies to out of hours work not subject to an EPL. Note that this Protocol was still in development during the development of this DNVIS.

Where works are proposed to be undertaken outside of the standard hours, specific respites and management measures for those works have been considered in consultation with the community as required.

In accordance with the Sydney Metro Out of Hours Work Protocol, an out of hours application will be submitted to Sydney Metro, and independent Environmental Representative for relevant endorsements and approval when out of hours works are planned.

The Community Communication Strategy will also support Ward's application for commencing out of hours work. It will detail how the community will be notified in advance of planned activities, kept informed of works progress and how potential noise impacts will be managed.

6. SENSITIVE RECEIVERS

In accordance with Condition E37, Ward has undertaken a land use survey of the area surrounding the works. The land use survey was undertaken on 7 September 2021. This survey was undertaken to inform this DNVIS. This has identified a mix of commercial and residential uses in the immediate areas surrounding the works areas. No critical working areas such as operating theatres and precision laboratories have been identified.

Figure 6-1 shows the representative residential receivers surrounding the works areas considered by this assessment and **Figure 6-2** shows the representative non-residential (commercial) receivers surrounding the works areas. Receiver addresses are summarised in **Appendix D**.

Figure 6-1 Representative Residential Receivers Surrounding the Works

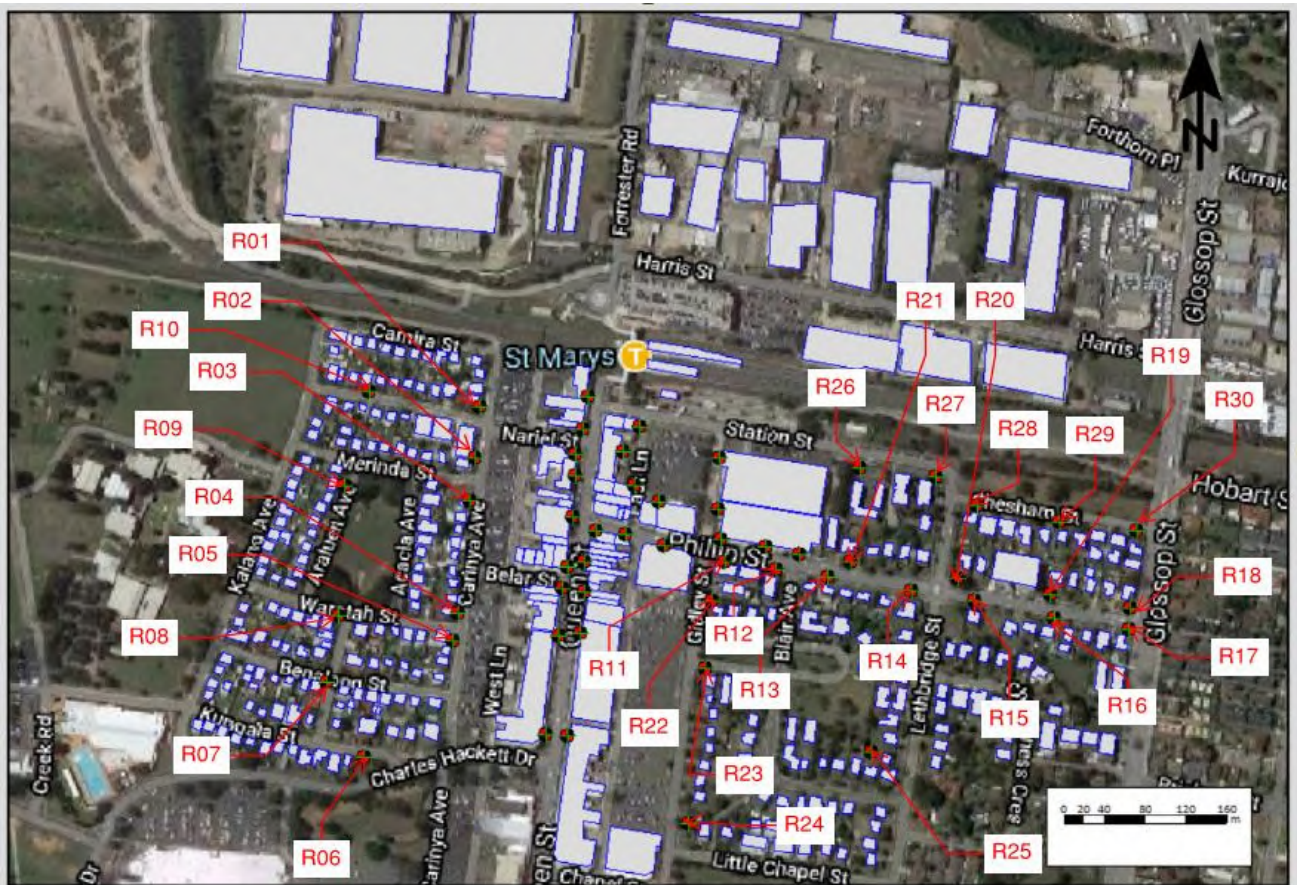


Figure 6-2 Representative Non-Residential Receivers Surrounding the Works



Note: Receiver C10 is the St Mary's Hotel which includes a residential component on the first floor. For the purposes of assessment, the first floor has been considered a residential use. Receiver C26 is a Childcare Centre located within the Station Plaza building – this has a semi-enclosed play area to the east of the building.

7. EXISTING NOISE ENVIRONMENT

The noise and vibration assessment undertaken as part of the Sydney Metro - Western Sydney Airport Environmental Impact Statement (EIS) is documented in the EIS Technical Paper 2 (*Sydney Metro - Western Sydney Airport Technical Paper 2: Noise and Vibration*).

The EIS study defined Noise Catchment Areas (NCAs) for the wider project. The sensitive receivers potentially affected by the St May's Bus Exchange Early Works are located with NCA3.

Table 7-1 sets out the existing ambient and background noise levels considered by this assessment. The levels for the Day, Evening and Night periods are consistent with the survey results identified by the EIS.

Table 7-1 Summary of NCA3 Unattended Noise Monitoring Results – Determined by EIS

Location	Rating Background Level - RBL (L_{A90} dBA)			Ambient Noise Level (L_{Aeq} dBA)		
	Day	Evening	Night	Day	Evening	Night
NM02	37	37	36	55	59	51

Time periods defined as follows – Day: 7.00am to 6.00pm Monday to Saturday, 8.00am to 6.00pm Sunday; Evening: 6.00pm to 10.00pm; and Night: 10.00pm to 7.00am Monday to Saturday, 10.00pm to 8.00am Sunday.

Consistent with the EIS study, the Rating Background Noise Levels (RBLs) shown have been considered in determining the construction noise criteria, as discussed in **Section 8**.

8. AIRBORNE CONSTRUCTION NOISE

8.1. Airborne Construction Noise Criteria

8.1.1. NSW Interim Construction Noise Guideline (ICNG)

The CNVS notes that Construction Noise Management Levels (NMLs) for all Sydney Metro projects should be determined in accordance with the procedures nominated in the DECCW's "*Interim Construction Noise Guideline*" dated July 2009 (ICNG).

The noise criteria set out in the ICNG have been considered in the assessment of potential impacts from the project works. **Table 8-1** summarises the construction noise criteria recommended by the ICNG for residential receivers and **Table 8-2** summarises the criteria for non-residential receivers. **Table 8 2** additionally includes the construction noise criteria for relevant special use receivers (other sensitive land uses) not identified by the ICNG.

Table 8-1 ICNG Airborne Construction Noise Criteria – Noise at Residences¹

Time of Day	Management Level $L_{Aeq,15min}$	How to Apply
Recommended Standard Hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or Public Holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq,15min}$ is greater than the noise affected level, the proponent would apply all feasible and reasonable work practices to minimise noise. The proponent would also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the proponent would consider very carefully if there is any other feasible and reasonable way to reduce noise to below this level. If no quieter work method is feasible and reasonable, and the works proceed, the proponent would communicate with the impacted residents by clearly explaining the duration and noise level of the works, and by describing any respite periods that will be provided.
Outside recommended standard hours	Noise affected RBL + 5 dB	A strong justification would typically be required for works outside the recommended standard hours. The proponent would apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dBA above the noise affected level, the proponent would negotiate with the community. For guidance on negotiating agreements see Section 7.2.2 of the ICNG
Note 1:	Adopted from the ICNG.	
Note 2:	Noise levels apply at the property boundary that is most exposed to construction noise (or receiver building façade that is most exposed to construction noise, noting that noise levels may be higher at upper floors of the noise affected receiver buildings). 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 8-2 ICNG Airborne Construction Noise Criteria – Other Sensitive Land Uses

Land Use	Management Level $L_{Aeq, 15min}$ (applies when properties are being used)	Reference
Classrooms at schools and other educational	Internal noise level: 45 dBA ¹	ICNG ⁵
Hospital wards and operating theatres	Internal noise level: 45 dBA ²	ICNG ⁵
Places of worship	Internal noise level: 45 dBA ³	ICNG ⁵
Active recreation areas	External noise level: 65 dBA	ICNG ⁵
Passive recreation areas	External noise level: 60 dBA	ICNG ⁵
Commercial premises (offices, etc)	External noise level: 70 dBA	ICNG ⁵
Industrial premises	External noise level: 75 dBA	ICNG ⁵
Childcare Centres (Sleeping areas)	Internal noise level: 35 dBA ⁴	AAAC ⁶
Childcare Centres (External areas)	Internal noise level: 55 dBA ⁴	AAAC ⁶

Notes: 1, 2, 3: External Noise Management Levels (NML) of $L_{Aeq, 15min}$ 55 dBA are considered by this assessment, assuming 10dB attenuation achieved by façades with open window(s);

4: Based on visual inspection of the childcare centre on Station Street, external Noise Management Levels (NML) of $L_{Aeq, 15min}$ 60 dBA are considered by this assessment, assuming 25 dB attenuation achieved by the building elements with closed/fixed window(s) for the indoor sleeping areas and 5 dB attenuation for the external play area;

5: Management Levels specified by Interim Construction Noise Guideline;

6: Management Level based on Australian Acoustical Consultants (AAAC) Technical Guideline on Child Care Centre Noise Assessments.

With consideration to the out of hours periods identified by the Sydney Metro Construction Noise and Vibration Standard, the resultant project specific NMLs set are out in **Table 8-3**.

Table 8-3 Airborne Noise Management Levels (External Levels)

Location	Standard Hours (Day)		OOHW (Day)		OOHW (Evening)		OOHW (Night)	
	RBL	NML	RBL	NML	RBL	NML	RBL	NML
Residential	37	47	37	42	37	42	36	41
School (Classrooms)	n/a	55	n/a	55	n/a	55	n/a	55
Commercial (Offices)	n/a	70	n/a	70	n/a	70	n/a	70
Childcare Centre (External Play Areas)	n/a	60	n/a	60	n/a	60	n/a	60
Childcare Centre (External to Sleeping Areas)	n/a	60	n/a	60	n/a	60	n/a	60

Notes: RBL - Rating Background Noise Level; NML - Noise Management Level; Non-residential criteria only apply when receiver building is in use. Noise levels apply at the property boundary that is most exposed to construction noise (or receiver building façade 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. It is anticipated that the recommended internal noise levels would be readily achieved at the Station Street childcare centre if the identified external levels are achieved.

8.1.2. Sydney Metro Construction Noise & Vibration Standard (CNVS)

In addition to the ICNG, the noise criteria set out in the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (CNVS) have been considered.

The CNVS recognises that works requiring the use of heavy machinery can generate high noise and vibration levels and in urban areas there is often limited setback distance between these noise sources and nearby buildings and receivers. Under such circumstances, typically there is limited opportunity to practicably mitigate the noise and vibration effects in a cost-effective manner. Therefore, potential disturbance impacts are usually minimised as much as practicable through management techniques. For residential receivers, depending on how far the predicted airborne construction noise level is above RBL, the CNVS recommends the adoption of the management measures set out in **Table 8-4**. Full definitions of the identified management measures are set out in the CNVS.

Table 8-4 Additional Airborne Noise Management Measures (Residential)

Time Period		Mitigation Measures			
		Predicted $L_{Aeq,15min}$ Noise Level Above NML			
		0 to 10 dB	10 to 20 dB	20 to 30 dB	> 30 dB
Standard Hours	Mon-Fri (7.00am - 6.00pm)	LB	LB, M	LB, M, SN	LB, M, SN
	Sat (8.00am - 1.00pm)				
	Sun/Pub Hol (Nil)				
OOH (Evening)	Mon-Fri (6.00pm - 10.00pm)	LB, M	LB, M, SN	LB, M, SN, RO	LB, M, SN, IB, PC, RO, SN
	Sat (1.00pm - 10.00pm)				
	Sun/Pub Hol (8.00am - 6.00pm)				
OOH (Night)	Mon-Fri (10.00pm - 7.00am)	LB, M	LB, M, SN, RO	LB, M, SN, IB, PC, RO, AA	LB, M, SN, IB, PC, RO, SN, AA
	Sat (10.00pm - 8.00am)				
	Sun/Pub Hol (6.00pm - 7.00am)				

Notes: AA – Alternative Accommodation; M – Monitoring; IB – Individual Briefings; LB – Letterbox drops; RO – Project Specific Respite Offer; PC – Phone Calls and emails; SN – Specific Notifications. Full definitions of these Additional Mitigation Measures are set out in Table 15 of the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (Ver 4.2, 08/09/2020).

8.1.3. Highly Noise Intensive Work

Condition E39 requires the following regarding highly noise intensive work:

Except as permitted by an EPL or approved in accordance with the Out-of-Hours Works Protocol required by Condition E42, highly noise intensive work that result in an exceedance of the applicable NML at the same receiver must only be undertaken:

- (a) between the hours of 8:00 am to 6:00 pm Monday to Friday;
- (b) between the hours of 8:00 am to 1:00 pm Saturday; and
- (c) if continuously, then not exceeding three (3) hours, with a minimum cessation of work of not less than one (1) hour.

For the purposes of this condition, 'continuously' includes any period during which there is less than one (1) hour between ceasing and recommencing any of the work.

8.1.4. Sleep Disturbance at Residences

Section 4.3 of the ICNG provides the following with respect to sleep disturbance at residences:

Where construction works are planned to extend over more than two consecutive nights, and a quantitative assessment method is used, the analysis should cover the maximum noise level, and the extent and the number of times that the maximum noise level exceeds the RBL. Some guidance indicating the potential for sleep disturbance is in the NSW Environmental Criteria for Road Traffic Noise (EPA 1999) (ECRTN).

Section 2.9 of the CNVS sets out the Sydney Metro sleep disturbance and maximum noise event requirements, as follows:

Maximum noise level events from construction activities during the night-time period can trigger both awakenings and disturbance to sleep stages. The approach to managing events that cause sleep disturbance shall be consistent with the Noise Policy for Industry (EPA, 2017). Where night-time noise levels at a residential location exceed the:

- *$L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, or the*
- *L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,*

a detailed maximum noise level event assessment is to be undertaken.

The detailed assessment will cover the maximum noise level, the extent to which the maximum noise level exceeds the RBL, and the number of times this happens during the night-time period.

Maximum noise level event assessments should be based on the L_{AFmax} descriptor on an event basis under 'fast' time response. The detailed assessment will consider all feasible and reasonable noise mitigation measures with a goal of achieving the above trigger levels for night-time activities.

ACA notes that the EPA has conducted an independent and comprehensive review of the most recent research on sleep disturbance and maximum noise levels and a synopsis of this research is included in the *NSW Road Noise Policy (RNP)* and previously in the ECRTN. The EPA concluded that from the research on sleep disturbance to date:

- *Maximum internal noise levels below 50-55dBA are unlikely to awaken people from sleep;*
- *One or two noise events per night with maximum internal noise levels of 65-70dBA are not likely to affect health and wellbeing significantly.*

The 55 dBA maximum noise level may be considered to be equivalent to an external maximum noise level of 65 dBA, considering the 10 dB attenuation typically achieved through partially open windows.

Based on the above, this DNVIS considers the external screening level of L_{AFmax} 52 dBA in accordance with the CNVS and additionally considers the external noise criterion of L_{AFmax} 65 dBA referenced by the RNP.

8.2. Airborne Construction Noise Assessment

At any particular location, the potential impacts can vary greatly depending on factors such as the relative proximity of sensitive receivers, the overall duration of the construction works, the intensity of the works, the time at which the construction works are undertaken and the character of the emissions.

8.2.1. Construction Stages

Assessment of airborne noise impacts from the construction activities have been determined by modelling the noise sources, receiver locations, topographical features and buildings.

Key details regarding the construction site layouts, the likely plant and equipment and hours of operation were informed by the Design and Construction Teams. This information is presented in **Appendix B** and forms the basis for all modelling assumptions used in this assessment.

Table 8-5 provides a summary of the works to be undertaken and the timeframes at which the works would occur. As shown in **Table 8-5** predominantly the main car park area works would be undertaken during standard hours, with the one exception being potholing that would also be undertaken out-of-hours. It is anticipated that the out-of-hours component of this activity would be completed within two to three night-shifts.

The external works on Nariel, Queen, Phillip and Station Streets would need to be undertaken during the night-time period, however, each of the identified external work sub-stages would be completed within one or two night-shifts and therefore any noise and vibration effects arising from these activities would not be prolonged.

Table 8-5 Key Works Stages and Timeframes

Model ID	Stage	Activity	Standard Hours	Out-of-Hours Day	Out-of-Hours Evening	Out-of-Hours Night
Main Car Park Area Works						
01	SE – Site Establishment	Setup Environmental Controls/Tree Protection Install ATF Fencing	Yes	No	No	No
02	1A	Potholing	Yes	Yes	Yes	Yes
03	1A	Demo Car Park - Removal of asphalt and curb removal	Yes	No	No	No

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Model ID	Stage	Activity	Standard Hours	Out-of-Hours Day	Out-of-Hours Evening	Out-of-Hours Night
04	1B	Pavement Box Out	Yes	No	No	No
05	1B	Pavement Box Out Service Installation - Stormwater	Yes	No	No	No
-	1B	Pavement Box Out Service Installation - Electrical Services	Yes	No	No	No
06	2A	Sub base installation Pavement works	Yes	No	No	No
-	2A	Kerb Construction	Yes	No	No	No
-	2B	Pavement Final Trim	Yes	No	No	No
-	2B	Landscape Prep Works	Yes	No	No	No
-	2B	AC Prep Works	Yes	No	No	No
-	2B	Driver Facility Installation	Yes	No	No	No
-	2B	Bus Shelter Installation	Yes	No	No	No
07	2B	Asphalt Works - Mill and Correct in Car Park	Yes	No	No	No
08	3	Stamped Asphalt	Yes	No	No	No
-	3A	Line Marking	Yes	No	No	No
-	3A	Signage Installation	Yes	No	No	No
External Works						
-	1A - Nariel and Queen St	Set up ATF Fencing/Satellite Site Compounds	No	No	No	Yes
09	1A - Nariel and Queen St	Potholing	No	No	No	Yes
10	1A - Nariel and Queen St	Remove Parking Lanes	No	No	No	Yes
11	1A - Nariel and Queen St	Kerb Demolition	No	No	No	Yes

Model ID	Stage	Activity	Standard Hours	Out-of-Hours Day	Out-of-Hours Evening	Out-of-Hours Night
12	1A - Nariel and Queen St	Kerb/Pram Ramp Construction	No	No	No	Yes
13	1A - Nariel and Queen St	Raised Crossing Construction	No	No	No	Yes
14	1A - Nariel and Queen St	Tree Removal	No	No	No	Yes
15	1B - Nariel and Phillip St	Excavate/Box out and Re-instate Footpath Corners	No	No	No	Yes
15	1B - Nariel and Phillip St	Asphalt Works to Corners	No	No	No	Yes
16	2A - Nariel and Phillip St	Line Marking	No	No	No	Yes
17	2C - Nariel and Phillip St	Service Installation - Electrical Services	Yes	No	No	No
18	2C - Nariel and Phillip St	Asphalt Works	Yes	No	No	No
19	3 - Main Car Park and Station St	Main Compound- F Type Barrier Installation, Median on Station St & Stamped Asphalt along East Lane & Main Car Park	Yes	No	No	Yes

8.2.2. Construction Equipment

For the purposes of this assessment, the construction equipment and sound power levels set out in **Appendix C** have been considered across the identified works areas as shown in the Staging Plans provided in **Appendix B** and as summarised in **Table 8-5**. The sound power levels in **Appendix C** have been determined by measurements undertaken by ACA on other similar projects, or have been adopted from other similar CSSI projects. A summary of the construction plant sound power levels is provided in **Table 8-6**.

Table 8-6 Construction Equipment and Sound Power Levels

Construction Equipment	Sound Power Level - SWL (L_{Aeq} dBA)
5t Excavator with Bucket	95
5t Excavator with Hammer	115
7-8t Excavator with Bucket	100
7-8t Excavator with Hammer	115
14t Excavator with Bucket / Ripper	105
14t Excavator with Hammer	118
20t Excavator with Bucket	105
20t Franna	98
2t Tipper	105
8t Smooth Drum Roller	107
All Terrain Forklift	96
CC10 Steam Roller*	109
CC10 Vibratory Roller*	109
Chainsaw*	114
Circular Saw/Grinder*	105
Concrete Agitator	109
Concrete Saw	118
Core Drill	118
Delivery / Hiab / Rigid Truck / Semi / Bogie	105
Dry Vac	103
Hand Tools / Form Work Tools	90
Jackhammer	113
Jumping Jack / Compactor	106
Kerb Placing Machine	109
Line Marking Gernie	90
Line Marking Truck	108
Milling Machine / Profiler	117
Paver	114
Plate Compactor	109
Positrack	90

Construction Equipment	Sound Power Level - SWL (L _{Aeq} dBA)
Traffic Control Utes	90
Water Blaster*	110
Watercart	107
Wet Vac	103

Note: Sources marked with an asterisk (e.g. concrete saws, grinders, hydraulic hammers, profilers, vibratory rollers) can emit noise with special audible (annoying) characteristics. In accordance with the ICNG and the CNVS, predicted noise levels for these stages incur a +5 dB penalty to for account for the additional annoyance that could arise. This penalty has been applied to the predicted levels.

8.2.3. Construction Noise Modelling

Construction noise emissions from the works have been modelled using the SoundPLAN (Version 8-2) environmental noise prediction software. This program is used and recognised internationally and is also recognised by NSW regulatory authorities as a preferred computer noise model. Factors that are addressed in the noise modelling are:

- Construction equipment sound power levels;
- Location of construction equipment;
- Screening from existing structures;
- Receiver locations, including multiple storey receivers;
- Ground topography;
- Noise attenuation due to geometric spreading;
- Ground absorption; and
- Atmospheric absorption.

8.2.4. Construction Noise Predictions

The predicted worst-case construction noise levels at the identified representative receivers for the 19 representative construction sub stages modelled are set out in a series of tables in **Appendix D**. Additionally, the Additional Mitigation Measures that are required to be considered by the CNVS are identified in **Appendix D**.

A series of predicted noise contours is provided in **Appendix E**.

The predictions represent the typical-worst case noise levels that may be expected to arise at the external facades of the receiver buildings when groups of noise sources operate simultaneously. It should be noted that construction noise levels would frequently be lower than the worst-case levels

considered for significant periods of time. This would be apparent as works move around the sites and are therefore more distant/more shielded from receivers and when less noisy activities are being undertaken.

The results show the airborne noise NLMs have potential to be exceeded at various localities and times depending on the works schedule. Given the likelihood of exceedances, the Sydney Metro standard mitigation measures will be applied throughout all of the identified work stages.

8.2.5. CNVS Additional Mitigation Measures – Airborne Construction Noise

Table 8-4 (based on Table 17 of the CNVS) sets out the Additional Mitigation Measures (AMMs) to be considered in the case of exceedances of the airborne noise criteria.

The airborne noise predictions indicate that at the closest residential and non-residential receivers some monitoring, and letterbox drop notifications are required.

Figure 8-1 indicates the area over which the NMLs may be exceeded at various times during the works. All residents and commercial receivers within the area identified will be provided with regular letterbox drop notifications regarding the works, as required by the CNVS.

For the works undertaken within the car park area the modelling indicates the potential for the daytime NML to be exceeded by >10 dB at the closest residential receivers located at:

- R11 - 34-36 Phillip St,
- R22 - 2 Gidley St and 4 Gidley St (Nado),
- R26 - 3 Station St,
- R27 - 2 Station St, 1 Station St, and
- C10 - St Mary's Hotel, 37 Queen St.

In accordance with the CVNS, noise monitoring will be undertaken at these locations to confirm construction noise levels periodically during the car parks works.

Additionally, for the works undertaken on Nariel St and Queen St, the modelling indicates the potential for the daytime NML to be exceeded by >10 dB at the closest residential receivers located on Carinya Avenue, Carmira St, Nariel St and Merinda St. To confirm construction noise levels during the external works, noise monitoring will be undertaken at the potentially worst affected locations, these being:

- R02 - 67 Carinya Avenue,
- R01 - 69 Carinya Avenue, and
- C10 - St Mary's Hotel, 37 Queen St

The nominated monitoring locations are shown on **Figure 8-1**. As noted above noise levels at any particular location would vary according to the location of the works and the work activity. It will not be necessary to monitor at all the identified locations at for all activities. Monitoring will be undertaken at the locations identified on a case-by-case basis, with a focus on the most noise-affected locations, based on on-site subjective evaluation.

The results of the noise monitoring at the identified locations would be reviewed as the works proceed and would be compared against the NML. Where necessary the results would be used to inform the construction team of any notable exceedances, over the levels set out in **Appendix D** and would be used to identify any recommended modifications to work methods or to identify the requirements for additional specific amelioration measures.

Figure 8-1 NML Exceedance Letterbox Drop Area and Nominated Noise Monitoring Locations



The highlighted Additional Mitigation Measure (AMM) triggers shown in tables set out in **Appendix D** are based on the exceedance of the $L_{Aeq,15min}$ NMLs. The tables identify some AMM triggers of Respite Offer and Alternative Accommodation (AA). To determine whether it is justified to provide the identified RO and AA measures, consideration must also be given to the duration of the works, i.e. how long the impact will last.

Given the scheduling of the works, it would be expected that the identified impacts would occur for typically only one or two nights at any one location before they are completed, and therefore the actual duration of impact would not be prolonged at any particular receiver location. On this basis, it is considered that offers of RO and AA are not justified.

It should be noted that the non-residential Additional Mitigation Measures are only applicable when the receiver building is in use.

Ward has and will continue to consult with the potentially affected receivers identified by this assessment, in particular the C10 (St Mary's Hotel) and R11 (34-36 Phillip St) prior to the works to determine if any particular concerns regarding noise impacts may be addresses during the scheduling.

8.2.1. Highly Noise Affected Receivers

The modelling indicates the potential for some relatively high noise levels during the works. The highest levels are anticipated at C10 (St Mary's Hotel at 37 Queen St), R11 (34-36 Phillip St), R22 (2 Gidley St and 4 Gidley St (Nado)), R26 (3 Station St), R27 (2 Station St, 1 Station St), R02 (67 Carinya Avenue), R01 (69 Carinya Avenue). These receivers may be expected to be highly noise affected at times during the works, that is, noise levels may be expected to exceed the NML by > 20 dB externally to these receivers. However, as discussed above, the durations of these high noise levels would be only for relatively short durations, of typically one or two nights in any one location.

During the development of the DNVIS Ward has consulted with the most potentially affected receivers and will continue to consult with the community during the works and consider any community feedback during the works scheduling.

Details of the focussed community consultation undertaken is provided in a Community Consultation report provided in **Appendix H**. Notably, the community consultation report has identified very few community concerns have been raised by the local residents consulted.

The report has, however, identified two concerns as follows:

- One resident at [REDACTED] raised concerns over noise interfering with a baby's sleep. Ward's community engagement consultants will undertake regular follow ups with this resident, prior to and during works that may result in high noise levels at the property and will consider the resident's feedback during programming.
- One resident at [REDACTED] has reported hearing issues (finds sharp and loud noises distressing). Ward's community engagement consultants will undertake regular follow ups with this resident, prior to and during works that may result in high noise levels at the property and will consider the resident's feedback during programming. Additionally, an offer to provide noise-cancelling /white noise earphones to the resident will be made if required.

Additionally, the community consultation has identified that the potentially most affected receivers are understanding with respect to the potential for increased noise levels during the works. It identifies that almost all receivers consulted accepted that construction was taking place and did not object to nightworks, understanding that the works are necessary.

As permissible under Condition 39, highly noise intensive work that results in an exceedance of the applicable NML at the same receiver must be approved in accordance with the Out-of-Hours Works Protocol required by Condition E42.Receiver Consultation in Accordance with E57.

In accordance with Conditions E57, in order to undertake out-of-hours work outside the work hours specified under Condition E38, appropriate respite periods for the out-of-hours work must be identified in consultation with the community at each affected location on a regular basis.

As identified above, Ward has undertaken consultation with the potentially most impacted receivers. This consultation has included provision of the following information regarding the works:

- schedule for periods of likely out-of-hours work;
- description of the potential work, location and duration of the out-of-hours work;
- the noise characteristics and likely noise levels of the work; and
- mitigation and management measures that will be implemented to minimise noise impacts.

The Community Consultation report provided in **Appendix H** has identified very few community concerns regarding noise and in accordance with E57, Ward will consider the outcomes of the community consultation during scheduling.

The outcomes of this community consultation including any identified respite periods will be provided to the ER, EPA and the Planning Secretary prior to the out-of-hours work commencing.

8.3. Sleep Disturbance

Maximum noise level events from construction activities during the night-time period can trigger both awakenings and disturbance to sleep stages. The CNVS approach to managing events that cause sleep disturbance is consistent with the Noise Policy for Industry (EPA, 2017). A detailed maximum noise level event assessment is to be undertaken where night-time noise levels at a residential location exceed the:

- $L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, or the
- L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater.

The CNVS notes the maximum noise level event assessments should be based on the L_{AFmax} descriptor on an event basis under 'fast' time response. The detailed assessment will consider all feasible and reasonable noise mitigation measures with a goal of achieving the above trigger levels for night-time activities.

To assess the likelihood of sleep disturbance, **Table D-11 (Appendix D)** sets out the predicted maximum noise levels for each stage and identifies where exceedances may occur during works undertaken in the night period.

It is noted that the CNVS AMMs are based on the degree to which the $L_{Aeq,15min}$ level exceeds the RBL and not the L_{Amax} level. The AMMs based on the $L_{Aeq,15min}$ assessment, as discussed in **Section 8.2.5** would be expected to adequately address potential sleep disturbance impacts.

As discussed in Section 8.1.4. this DNVIS considers the external screening level of L_{AFmax} 52 dBA in accordance with the CNVS and additionally considers the external noise criterion of L_{AFmax} 65 dBA

referenced by the RNP.

The results in **Table D-11** conservatively consider the use of concrete saws, in the event that a saw cut may be required for contingency during the night works. As discussed, Ward generally proposes to restrict saw use to prior to 10.00pm and therefore the maximum levels identified are unlikely to, or at least would very rarely occur. Typically, the maximum noise levels experienced by receivers would be expected to be at least 5-10 dB less than those reported.

During the out of hours night works within the primary works car park area (potholing works), the greatest potential sleep disturbance impacts may be expected to occur at C10 (St Mary's Hotel at 37 Queen St), R11 (34-36 Phillip St), R22 (2 Gidley St and 4 Gidley St (Nado)), R26 (3 Station St). It is noted, however, that with windows closed, internal noise levels would not be expected to exceed the internal noise levels identified by the RNP at these locations.

During the out of hours night works on Nariel Street, Queen Street, Phillip Street and Station Street, the greatest potential sleep disturbance impacts may be expected to occur at C10 (St Mary's Hotel), Carinya Avenue receivers R01-R05, R10 (14 Nariel Street), Phillip Street receivers R11-R13 / R21, R22 (2 Gidley St and 4 Gidley St (Nado)) and Station Street receivers R26/R27. With windows closed, internal noise levels would not be expected to exceed the internal noise levels identified by the RNP at these locations.

9. GROUNDBORNE CONSTRUCTION NOISE & VIBRATION

9.1. Construction Vibration Criteria

The effects of vibration in buildings can be divided into three main categories; those in which the occupants or users of the building are inconvenienced or possibly disturbed (human comfort), those where the building contents may be affected (effects on building contents) and those in which the integrity of the building or the structure itself may be prejudiced (structural damage).

9.1.1. Human Comfort

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

British Standard 6472-1992 "Guide to evaluation of human exposure to vibration in building" nominates guideline values for various categories of disturbance, the most stringent of which are the levels of building vibration associated with a "low probability of adverse comment" from occupants.

BS 6472-1992 provides guideline values for continuous, transient and intermittent events that are based on a Vibration Dose Value (VDV), rather than a continuous vibration level. The vibration dose value is dependent upon the level and duration of the short-term vibration event, as well as the number of events occurring during the daytime or night-time period.

The vibration dose values recommended in BS 6472-1992 for which various levels of adverse comment from occupants may be expected are presented in **Table 9 -1** (based on CNVS Table 4).

Table 9-1 Vibration Dose Values re Expected Adverse Comment in Residential Buildings

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	0.13	0.26	0.51

With respect to VDV, ACA notes that there can be practical difficulties in the prediction and measurement of this parameter, particularly given the limited available measured data. ACA considers the Peak Particle Velocity (PPV) levels as recognised by AVTG is an acceptable substitution (as per table C1.1 of the AVTG – i.e. Residential Daytime: 0.28 to 0.56 mm/s PPV; Residential Night: 0.2 to 0.4 mm/s PPV; Commercial: 0.56 to 1.1 mm/s PPV).

This is a common approach in the industry and allows alignment with structural damage vibration guide values and provides an opportunity for the same vibration equipment to measure for comfort and damage.

9.1.2. Effects on Building Contents

People can perceive floor vibration at levels well below those likely to cause damage to building contents or affect the operation of typical equipment found in most buildings that is not particularly vibration sensitive.

For most receivers, the controlling vibration criterion is the human comfort criterion, and it is therefore not normally required to set separate criteria in relation to the effect of construction vibration on typical building contents.

Where appropriate, objectives for the satisfactory operation of vibration sensitive critical instruments or manufacturing processes should be sourced from manufacturer's data and/or other published objectives.

9.1.3. Structural Damage

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.

There are currently no Australian Standards or guidelines to provide guidance on assessing the potential for building damage from vibration. It is common practice to derive goal levels from international standards. British Standard BS7385:1993 and German Standard DIN4150:1999 both provide goal levels, below which vibration is considered insufficient to cause building damage.

It is noted that the CNVS references the British Standard BS7385:1993, however, the Conditions of Approval also specifies German Standard DIN 4150-3: *Structural vibration – Effects of vibration on structures* (DIN 4150). Of these, DIN4150 is the more stringent and has therefore been considered by this DNVIS.

Table 9-2 summarises the recommended limits outlined in DIN 4150 to ensure minimal risk of cosmetic damage to residential and industrial buildings. Achieving the DIN 4150 vibration levels would also result in compliance with the British Standard BS7385:1993.

Table 9-2 Recommended Vibration Limits for Minimal Risk of Cosmetic Damage

Type of Building	Guideline Values for Velocity, v_i , in mm/s Vibration at the Foundation at a Frequency of			Plane of Floor of Uppermost Storey
	1 Hz to 10 Hz	10 Hz to 50Hz	50 Hz to 100 Hz	Frequency Mixture
Buildings used for commercial purposes, industrial buildings, and buildings of similar design	20	20 - 40	40 - 50	40
Dwellings and buildings of similar design and/or occupancy	5	5 - 15	15 - 20	15
Structures that, because of their particular sensitivity to vibration, cannot be classified and are of great intrinsic value (e.g. listed buildings under preservation order)	3	3 - 8	8 - 10	8

On this basis, conservative general vibration screening levels (Peak Particle Velocity (PPV)) are provided for intermittent vibration sources as follows:

- reinforced or framed structures: 20 mm/s
- unreinforced or light framed structures 5 mm/s.

At locations where the predicted and/or measured vibration levels are greater than shown above, monitoring should be performed during construction. A more detailed analysis of the building structure, vibration source, dominant frequencies and dynamic characteristics of the structure would also be performed to determine the applicable safe vibration level.

Additionally, Condition E84 requires that before commencement of construction, all buildings identified as being at risk of damage must be inspected and a building condition survey undertaken by a suitably qualified and experienced person.

Due to the current difficulties in conducting internal building inspections due to Covid-19 restrictions, Ward generally proposes to minimise any building inspection requirements by minimising the potential for cosmetic damage effects. This is discussed further in **Section 9-3**.

9.1.4. Guidelines for Heritage Structures

Heritage buildings and structures would be assessed as per the screening criteria as they should not be assumed to be more sensitive to vibration unless they are found to be structurally unsound. If a heritage building or structure is found to be structurally unsound (following inspection) the more conservative cosmetic damage criteria of 2.5 mm/s peak component particle velocity (from DIN 4150) would be considered.

Table 9-3 outlines the heritage listed items within the vicinity of the project, none of which have been assessed as being structurally unsound.

Table 9-3 Heritage Items

Heritage Item / Location	Register Listings	Significance	Location
St Marys Railway Station	State Heritage Register and State Rail S170 register under the Heritage Act	State	North of Site
St Marys Railway Station Parcel Office	Penrith City Council LEP (01249)	Local	North of Site

9.1.5. Guidelines for Sensitive Scientific & Medical Equipment

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

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 Table 6 and Figure 3 of the CNVS.

The land use survey undertaken by ward has not identified any uses that may be expected to include sensitive scientific or medical equipment.

9.1.6. Other Vibration Sensitive Structures & Utilities

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 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 with the structure or utility's owner in order to determine acceptable vibration levels.

In lieu of specific vibration criteria being provided by the asset owner, screening criteria would be adopted from guidance provided in DIN 4150-3 for buried pipework. The screening criteria is outlined in **Table 9-4**.

Table 9-4 Guideline Values for Vibration Velocity to be used when Evaluating the Effects of Vibration on Buried Pipework

Pipe Material	Guideline Values for Velocity Measured on the Pipe, v_i , in mm/s
Steel (including welded pipes)	100
Clay, concrete, reinforced concrete, pre-stressed concrete, metal (with or without flange)	80
Masonry, plastic	50

9.1.7. CNVS Additional Mitigation Measures – Groundborne Construction Vibration

In addition to the vibration criteria discussed above, the CNVS requires the consideration of Additional Mitigation Measures, in the case of appreciable levels of vibration occurring at sensitive receivers.

Table 9-5 (based on Table 17 of the CNVS) sets out the Additional Mitigation Measures (AMMs) to be applied in the case of exceedances of the groundborne vibration management levels.

Table 9-5 Additional Mitigation Measures - Ground-Borne Vibration

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

Notes: AA – Alternative Accommodation; M – Monitoring; IB – Individual Briefings; LB – Letterbox drops; RO – Project Specific Respite Offer; PC – Phone Calls and emails; SN – Specific Notifications. Full definitions of these Additional Mitigation Measures are set out in Table 15 of the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (Ver 4.2, 08/09/2020). The 'maximum' vibration value is taken as the 'Maximum Peak Velocity (mm/s)' value identified in Table C1.1 in the Assessing Vibration: A technical guideline (DEC 2006).

9.2. Groundborne Construction Noise Criteria

9.2.1. ICNG Groundborne Construction Noise Criteria

Groundborne (regenerated) noise is noise generated by vibration transmitted through the ground into a structure. Groundborne noise caused, for example by underground works such as tunnelling, can be more noticeable than airborne noise. The following groundborne noise levels for residences are nominated in the ICNG and indicate when management actions would be implemented. These levels recognise the temporary nature of construction and are only applicable when groundborne noise levels are higher than airborne noise levels.

The groundborne noise management levels considered by this assessment are shown in **Table 9-6**.

Table 9-6 Ground-Borne Noise Management Levels

Receiver Type	Standard Hours (Day)	OOHW (Day)	OOHW (Evening)	OOHW (Night)
	$L_{Aeq,15min}$ dBA	$L_{Aeq,15min}$ dBA	$L_{Aeq,15min}$ dBA	$L_{Aeq,15min}$ dBA
Residential	45	40	40	35
Commercial	50 when in use			
Childcare	40 when in use			
School	45 when in use			

Note: The Groundborne Noise Management Levels for non-residential uses only apply when the building is in use.

The daytime criteria are applicable to both residential and commercial receivers, whereas the evening and night-time criteria are only applicable to residential receivers. The Groundborne Noise Management Levels for non-residential uses only apply when the receiver building is in use.

The internal noise levels are to be assessed at the centre of the most-affected habitable room.

With respect to groundborne noise, Condition E44 requires the following:

All reasonable and feasible mitigation measures must be applied when the following residential ground-borne noise levels are exceeded:

(a) evening (6:00 pm to 10:00 pm) — internal $L_{Aeq(15\text{ minute})}$: 40 dB(A); and

(b) night (10:00 pm to 7:00 am) — internal $L_{Aeq(15\text{ minute})}$: 35 dB(A).

The mitigation measures must be outlined in the Noise and Vibration CEMP Sub-plan, including in any Out-of-Hours Work Protocol, required by Condition E42.

9.2.2. CNVS Additional Mitigation Measures – Groundborne Construction Noise

Table 9-7 (based on Table 15 of the CNVS) sets out the AAMs to be applied in the case of exceedances of the groundborne noise management levels.

Table 9-7 Additional Groundborne Noise Management Measures (Residential)

Time Period		Mitigation Measures			
		Predicted $L_{Aeq,15min}$ Noise Level Above NML			
		0 to 10 dB	10 to 20 dB	20 to 30 dB	> 30 dB
Standard Hours	Mon-Fri (7.00am - 6.00pm)	LB	LB, M	LB, M, SN	LB, M, SN
	Sat (8.00am - 1.00pm)				
	Sun/Pub Hol (Nil)				
OOH (Evening)	Mon-Fri (6.00pm - 10.00pm)	LB, M	LB, M, SN	LB, M, SN, RO	LB, M, SN, IB, PC, RO, SN
	Sat (1.00pm - 10.00pm)				
	Sun/Pub Hol (8.00am - 6.00pm)				
OOH (Night)	Mon-Fri (10.00pm - 7.00am)	LB, M	LB, M, SN, RO	LB, M, SN, IB, PC, RO, AA	LB, M, SN, IB, PC, RO, SN, AA
	Sat (10.00pm - 8.00am)				
	Sun/Pub Hol (6.00pm - 7.00am)				

Notes: AA – Alternative Accommodation; M – Monitoring; IB – Individual Briefings; LB – Letterbox drops; RO – Project Specific Respite Offer; PC – Phone Calls and emails; SN – Specific Notifications. Full definitions of these Additional Mitigation Measures are set out in Table 15 of the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (Ver 4.2, 08/09/2020).

9.3. Groundborne Construction Noise & Vibration Assessment

Certain construction activities require the use of vibration intensive equipment that have potential to adversely impact the closest sensitive receivers.

With respect to groundborne noise, ACA notes that for the proposed surface works airborne noise levels would dominate over groundborne noise. It is considered that management of airborne noise impacts in addition to management of vibration impacts would satisfactorily manage any groundborne noise effects. Accordingly, this assessment does not consider groundborne noise effects any further.

Minimum working distances to sensitive receivers for cosmetic building damage and human response have been identified for vibration generating plant that may be used during the works. If equipment operates closer to a sensitive receiver, vibration from construction works may potentially exceed the vibration guidelines provided in **Sections 9.1.3** and **9.1.1**. It should be noted, however, the minimum working distances are conservative and indicative. Actual distances may be expected to vary depending on the activity/operator, equipment particularities, local ground conditions and receiver conditions (e.g. building footings).

Table 9-8 shows the vibration generating plant that would be used and the associated minimum working distances. The setback distances are noted to be generally consistent with those recognised by TfNSW. The TfNSW guidelines do not include reference distances for plate compactors or jumping

jacks. The distances identified for these items are based on measurements undertaken by the University of Western Australia which are consistent with ACA's experience.

Vibration monitoring trials would be undertaken on site at the commencement of the works to confirm vibration levels and safe working distances for all vibration generating equipment.

Table 9-8 Recommended Minimum Working Distances for Vibration Intensive Equipment

Plant Item	Minimum Distance – Cosmetic Damage (BS 7385)	Cosmetic damage (DIN 4150) Heritage and other Sensitive Structures	Minimum Distance – Human Response (OE&H Vibration Guideline)
5t Excavator with Small (300kg) Hydraulic Hammer	2	5	7
14t Excavator with Medium (900kg) Hydraulic Hammer	7	19	23
Vibratory Roller (7 tonne)	15	41	100
CC10 Vibratory Roller (2 tonne)	5	14	15 to 20
60kg Plate Compactor	2	4	7
Jumping Jack	2	4	7
Jackhammer	1 m (nominal)	2	3

Note 1: Hydraulic hammer & vibratory roller distances are consistent with the TfNSW Construction Noise and Vibration Strategy (V 4.1).
Note 2: Plate compactor distances are based on measurements undertaken by University of Western Australia.

As previously discussed, due to the current difficulties in undertaking internal building inspections / dilapidation surveys owing to current Covid-19 restrictions, Ward proposes to minimise internal building inspections as far as is practicable. For this purpose, it is proposed to limit the use of all vibration generating plant to outside of the minimum working distances for cosmetic damage indicated by **Table 9-8**. In particular the following controls will be implemented.

Vibratory Rollers - Cosmetic Damage

Within the carpark, the minimum safe working distance for cosmetic damage for vibratory rolling will be verified by measurements and this distance will be maintained between the plant and all surrounding buildings. At the southernmost part of the car park area, static rolling methods will be used in lieu of vibratory methods within the critical safe distance, as required.

For the asphalted areas on Phillip Street, Queen Street and Station Street that require rolling, only static rollers would be used.

Vibratory Rollers – Human Comfort

The vibratory roller used within the carpark would operate within the within the minimum human response working distance identified by **Table 9-8**, with the closest residential receivers at 34-36 Phillip Street located approximately 60 m away from the southern boundary of the car park.

The identified human response distances are considered to be quite conservative. Based on vibration measurements undertaken for a 10-tonne vibratory roller, ACA estimates a VDV at the closest residence of $<0.2 \text{ m/s}^{1.75}$, which is below the Low Probability of Adverse Comment threshold identified in **Table 9-1**. On this basis it is considered that there would be minimal risk of human comfort vibration impacts on residents from the use of vibratory rolling within the car park area.

The CNVS does not specify VDV ranges to be considered for offices, however the AVTG notes that there would be a Low Probability of Adverse Comment when VDV remains below 0.4 to 0.8 $\text{m/s}^{1.75}$ in offices. Given the roller is a mobile source that would move around the site, it is estimated that the upper range VDV (0.8 $\text{m/s}^{1.75}$) would be generally met when a distance of approximately 15-20 m is maintained between the vibratory roller and the surrounding buildings. Within this distance it is proposed to use static rolling methods.

Vibration monitoring trials would be undertaken on the car park site at the commencement of the works to confirm vibration levels and safe working distances for the vibratory roller.

Hydraulic Hammers

During the service installation works on Station Street a 5-tonne excavator with small hydraulic hammer would be used. The construction footprint shows that these hammering works would not occur within approximately 7 m from the closest commercial building (91 Station Street, which is currently vacant) or within approximately 20 m from the St Marys Railway Station Parcel Office (Heritage Receiver). At these distances vibration levels from a small hydraulic hammer are predicted to not exceed 1 mm/s PPV. Therefore, no material risk of exceedance of the screening criteria for cosmetic building damage for commercial or heritage receivers is predicted for the identified hydraulic hammering works.

Additionally, it is considered there would be no material risk of human comfort vibration exceedances from the identified hammering works.

9.3.1. CNVS Additional Mitigation Measures – Groundborne Noise & Vibration

Given Ward's proposed vibration controls, further specific additional mitigation measures relating to groundborne noise or vibration are not considered necessary, beyond the standard measures defined by the CNVS. Application of the standard measures (outlined in **Section 11**) in addition to the controls discussed above would be expected to be sufficient to ensure vibration effects on the occupants of nearby buildings are satisfactorily managed.

Based on the use of a 7-tonne vibratory roller within the car park area, Ward has provided notifications to the receivers that fall within the potential building damage setback distance recognised by TfNSW, as indicated by **Figure 9-1**.

Figure 9-1 Vibratory Roller Building Damage Risk – Yellow Line Indicates 15 m Buffer for Commercial Buildings; Pink Line Indicates 41 m Buffer for Heritage Items



Note: The Heritage distance buffer has been calculated based off the distance required to meet the respective vibration level for standard buildings. This is provided for information purposes only. As discussed in Section 9.1.5 the identified heritage structures have not been assessed as being structurally unsound and therefore are not considered particularly vibration sensitive on account of their heritage classifications. Anticipated vibration levels are significantly lower than any threshold or criteria for commercial buildings. As such, no specific vibration risk for the heritage items has been identified.

The receivers identified by **Figure 9-1** have been notified by Ward regarding potential vibration effects and have been provided offers of dilapidation surveys in accordance with Condition E84. These receivers are:

- 47-49 Phillip Street (Centrelink)
- 51A Phillip Street (Bridging the Gap)
- 53 Phillip Street (Commercial)
- 36-38 Queen Street (Commercial)
- 34 Queen Street (Commercial)
- 30-32 Queen Street (Commercial)
- 24-26 Queen Street (Commercial)
- 4 Queen Street (Commercial)
- 8 Station Street (Coles Supermarket)

Additionally, whilst not considered to be at any particular risk of damage, the St Marys Railway Station Group has been notified regarding the potential for vibration effects on the St Marys Railway Station Parcel Office, as this Heritage building falls within the 41 m buffer calculated for potential heritage building damage.

10. CONSTRUCTION ROAD TRAFFIC NOISE

10.1. Construction Road Traffic Noise Guidelines

Criteria for off-site road traffic noise applicable to existing residences affected by additional traffic on existing local roads generated by land use developments are specified in the NSW Road Noise Policy (RNP). Whilst these criteria do not specifically apply to construction traffic movements, they have been conservatively considered and are summarised in **Table 10-1**.

Table 10-1 RNP Criteria for Road Traffic Noise

Type of Development	Daytime (07:00-22:00)	Night (22:00-07:00)
Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	L _{Aeq,15 hour} 60 (external)	L _{Aeq,9 hour} 55 (external)
Existing residences affected by additional traffic on existing local roads generated by land use developments	L _{Aeq,1 hour} 55 (external)	L _{Aeq,1 hour} 50 (external)

Note: The identified criteria do not apply to vehicle movements within the Project Site. For the purpose of assessment, any noise generated by on-site vehicle movements is considered as construction noise and assessed holistically with on-site mobile plant in accordance with the ICNG.

As required by the RNP, an initial screening test should first be applied by evaluating whether noise levels would increase by more than 2 dB (an increase in the number vehicles of approximately 60%) due to construction traffic or a temporary reroute due to a road closure.

Where noise levels increase by more than 2 dB further assessment is required using the criteria presented in the RNP, as shown in **Table 10-1**. A 2 dB increase is typically considered not noticeable.

10.2. Construction Road Traffic Assessment

Ward estimates that a maximum of 10 heavy vehicle movements per hour would be required during the peak construction phase.

Considering the high existing volume of traffic on the adjacent roads, the noise impact generated by construction delivery vehicles arriving and leaving the site would be expected to result in an increase in road traffic noise levels of significantly less than 2 dB which is in compliance with the established criteria.

On this basis, no material construction traffic noise impacts are expected.

11. CONSTRUCTION NOISE & VIBRATION MITIGATION MEASURES

11.1. CNVS Additional Mitigation Measures

The CNVS sets out standard construction noise and vibration mitigation measures to be implemented on all Sydney Metro projects by default in order to minimise the potential noise and vibration impacts at the surrounding Noise Sensitive Receivers. These will be implemented by Ward where feasible and reasonable and are summarised in **Table 11-1**. A summary of roles and responsibilities is provided in **Table 11-2**.

Table 11-1 Standard Mitigation Measures to Reduce Construction Noise and Vibration

Action Required	Applies To	Details
Management Measures		
Implementation of any project specific mitigation measures required	Airborne noise Ground-borne noise and vibration	In addition to the measures set out in this table, any project specific mitigation measures identified in the environmental assessment documentation (e.g. EA, REF, submissions or report) or approval or licence conditions must be implemented.
Implement community consultation measures	Airborne noise Ground-borne noise and vibration	A register of all noise and vibration sensitive receivers (NSRs) would be kept on site. The register would include the following details for each NSR: <ul style="list-style-type: none"> • Address of receiver • Category of receiver (e.g. Residential, Commercial etc.) • Contact name and phone number
Site Inductions	Airborne noise Ground-borne noise and vibration	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: <ul style="list-style-type: none"> • All relevant project specific and standard noise and vibration mitigation measures • Relevant licence and approval conditions • Permissible hours of work • Any limitations on high noise generating activities • Location of nearest sensitive receivers • Construction employee parking areas • Designated loading/unloading areas and procedures • Site opening/closing times (including deliveries) • Environmental incident procedures

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DETAILED NOISE & VIBRATION IMPACT STATEMENT (DNVIS)

Behavioural practices	Airborne noise	No swearing or unnecessary shouting or loud stereos/radios; on site. No dropping of materials from height; throwing of metal items; and slamming of doors. No excessive revving of plant and vehicle engines Controlled release of compressed air.
Monitoring	Airborne noise Ground-borne noise and vibration	A noise monitoring program is to be carried out for the duration of the works in accordance with the Construction Noise and Vibration Management Plan and any approval and licence conditions.
Attended vibration measurements	Ground-borne vibration	Attended vibration measurements are required at the commencement of vibration generating activities to confirm that vibration levels satisfy the criteria for that vibration generating activity. Where there is potential for exceedances of the criteria further vibration site law investigations would be undertaken to determine the site-specific safe working distances for that vibration generating activity. Continuous vibration monitoring with audible and visible alarms would be conducted at the nearest sensitive receivers whenever vibration generating activities need to take place inside the applicable safe-working distances.
Source Controls		
Construction hours and scheduling	Airborne noise Ground-borne noise and vibration	Where feasible and reasonable, construction would be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels would be scheduled during less sensitive time periods.
Construction respite period	Ground-borne noise and vibration Airborne noise	High noise and vibration generating activities ² may only be carried out in continuous blocks, not exceeding 3 hours each, with a minimum respite period of one hour between each block ³ .
Equipment selection	Airborne noise Ground-borne noise and vibration	Use quieter and less vibration emitting construction methods where feasible and reasonable. For example, when piling is required, bored piles rather than impact-driven piles will minimise noise and vibration impacts. Similarly, diaphragm wall construction techniques, in lieu of sheet piling, will have significant noise and vibration benefits.
Maximum noise levels	Airborne-noise	The noise levels of plant and equipment must have operating Sound Power Levels compliant with the criteria in Table 13 (of the CNVS).
Rental plant and equipment	Airborne-noise	The noise levels of plant and equipment items are to be considered in rental decisions and in any case cannot be used on site unless compliant with the criteria in Table 13 (of the CNVS).

ST MARY'S TEMPORARY BUS INTERCHANGE EARLY WORKS
DETAILED NOISE & VIBRATION IMPACT STATEMENT (DNVIS)

Plan worksites and activities to minimise noise and vibration	Airborne noise Ground-borne vibration	Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.
Non-tonal reversing alarms	Airborne noise	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.
Minimise disturbance arising from delivery of goods to construction sites	Airborne-noise	<p>Loading and unloading of materials/deliveries is to occur as far as possible from NSRs</p> <p>Select site access points and roads as far as possible away from NSRs</p> <p>Dedicated loading/unloading areas to be shielded if close to NSRs</p> <p>Delivery vehicles to be fitted with straps rather than chains for unloading, wherever feasible and reasonable</p>
Path Controls		
Shield stationary noise sources such as pumps, compressors, fans etc	Airborne-noise	<p>Stationary noise sources would be enclosed or shielded whilst ensuring that the occupational health and safety of workers is maintained.</p> <p>Appendix F of AS 2436: 1981 lists materials suitable for shielding.</p>
Shield sensitive receivers from noisy activities	Airborne-noise	<p>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 siting plant.</p>

Table 11-2 Roles and Responsibilities

Role	Definition and Responsibilities
Project Environment Manager	<ul style="list-style-type: none"> Oversee the implementation of all noise and vibration management initiatives including coordinating responses to noise and vibration complaints. Manage review and continual improvement of the DNVIS/CNVMP. Ensure that sufficient resources are allocated for the implementation of the DNVIS/CNVMP. Consider and advise senior management on compliance obligations regarding noise and vibration. 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.
Site Supervisor	<ul style="list-style-type: none"> Ensure that all requirements of the DNVIS/CNVMP are effectively implemented. Ensure all appropriate noise and vibration mitigation measures are implemented.
EHS Coordinators	<ul style="list-style-type: none"> Assist the Project Environment Manager and Construction Managers in implementing the DNVIS/CNVMP. Oversee noise and vibration training including inductions, toolbox talks and specific technical training on monitoring equipment. Ensure all appropriate noise and vibration mitigation measures are implemented. Monitoring and reporting on compliance.
Site Engineers	<ul style="list-style-type: none"> Assist the Construction Manager in implementing the DNVIS/CNVMP.
Project Noise and Vibration Consultant	<ul style="list-style-type: none"> Provide Ward with specialist noise and vibration input and advice including development of the CNVMP, DNVIS and discussions regarding progressive construction works. Undertaking noise and vibration monitoring when required. Assisting in community consultation when required.
Construction Manager	<ul style="list-style-type: none"> Manage the delivery of the construction process, in relation to noise and vibration management across the site together with the Environment Manager. Ensure that all requirements of the DNVIS/CNVMP are effectively implemented, including all subcontractors
Stakeholder and Community Relations Manager	<ul style="list-style-type: none"> Manage notifications and consultation for noise and vibration and liaise with the Environment Manager about management of noise and vibration complaints. Assist in coordinating responses to noise and vibration complaints.

11.2. CNVS Additional Mitigation Measures

Based on the predictions, all reasonable and feasible mitigation measures to minimise noise and vibration from construction will be implemented. This includes the Standard Mitigation Measures (SMM) set out in **Table 11-1** and the Additional Mitigation Measures (AMM) required by the CNVS, as set out in **Section 8.2.5** and **Appendix D**.

11.3. Construction Noise & Vibration Monitoring Program

Conditions C13 - C15 specify in detail requirements for monitoring. These matters are addressed in the Construction Noise & Vibration Monitoring Program provided in **Appendix F**.

12. NOISE IMPACT SUBJECTIVE CLASSIFICATION

Standard Hours Works within Primary Works Area (Main Carpark)

With respect to the standard hours works within the main carpark area, residential receivers are generally well removed and shielded from the works and the residential NML exceedances are generally less than 10-20 dB. There is potential for the NML to be exceeded by >20 dB at R11 (34-36 Phillip Street), but the construction noise at this receiver would be expected to be no greater than the traffic levels from existing vehicle movements on Phillip Street.

The closest commercial receiver NML exceedances are less than 10-20 dB and these levels may be expected to arise at the rear building facades only, which from inspection may be expected to be less noise sensitive than their street facing facades.

The potentially affected receivers have been consulted regarding the forthcoming works, with Ward's community engagements consultants undertaking door knocking and briefings at the most affected addresses. The community consultation report (included in Appendix H) summarises the receiver notifications. This identifies that no particular concerns regarding noise from the early works were received from the potentially most affected local residents.

Considering the above, the standard hours works within the main carpark area are generally considered **low impact**.

Notwithstanding this, the standard and additional mitigation measures identified by this DNVIS will be provided.

Out-of-Hours Works within Primary Works Area (Main Carpark)

Within the main carpark area, the only works to be undertaken outside standard hours is potholing. This is predicted to have potential for exceedances above the NML by >20 dB at R11 (34-36 Phillip Street), R22 (2 Gidley Street) and C10 (St Marys Hotel) but the construction noise at these receivers would be expected to be no greater than occasional traffic noise levels from existing vehicle movements on the local roads. At these receivers predicted maximum construction noise levels may also exceed the sleep disturbance levels, however similar levels may be expected from occasional traffic noise levels from existing vehicle movements on the local roads. To mitigate the potential impacts, the use of concrete saws will be limited to prior to 10.00pm.

The closest commercial receivers would not be expected to be operational during the potholing works.

The potentially most affected receivers have been consulted regarding the forthcoming works, with Ward's community engagements consultants undertaking door knocking and briefings at the most affected addresses. The community consultation report (included in Appendix H) summarises the receiver notifications. This identifies that no particular concerns regarding noise from the early works was received from the potentially most affected local residents.

Considering the above, the out of hours works within the main carpark area are generally considered **low impact**.

The standard and additional mitigation measures identified by this DNVIS will be provided.

Standard Hours Works – External Works Areas

With respect to the standard hours works on Nariel Street, Queen Street, Phillip Street and Station Street, the residential NML exceedances are generally less than 10-20 dB. There is potential for the NML to be exceeded by >20 dB at times at R2 (65-67 Carinya Avenue), R11 (34-36 Phillip Street), R12 (36A Phillip Street), R22 (2 Gidley Street) and C10 (St Marys Hotel). However, the construction noise levels would naturally fluctuate during the works being undertaken, the works would not be prolonged and for most of the time the levels would be significantly lower than reported.

The closest commercial receivers would also experience elevated noise levels as the works progress, however, given the nature of the works, the impacts would not be prolonged and for most of the time the levels would be significantly lower than reported.

The potentially affected receivers have been consulted regarding the forthcoming works, with Ward's community engagements consultants undertaking door knocking and briefings at the most affected addresses. The community consultation report (included in Appendix H) summarises the receiver notifications. This identifies that no particular concerns regarding noise from the early works was received from the potentially most affected local residents.

Considering the above, the standard hours works within the main carpark area are generally considered **low impact**.

The standard and additional mitigation measures identified by this DNVIS will be provided.

Out-of-Hours Works – External Works Areas

The out of hours works on Nariel Street, Queen Street, Phillip Street and Station Street, may be expected to result in residential NML exceedances at times >20dB at R1 (69 Carinya Avenue), R2 (65-67 Carinya Avenue), R3 (59 Carinya Avenue), R11 (34-36 Phillip Street), R12 (36A Phillip Street), R22 (2 Gidley Street), R26 (3 Station Street) and C10 (St Marys Hotel). However, the construction noise levels would naturally fluctuate during the works being undertaken, the works would not be prolonged and for most of the time the levels would be significantly lower than reported.

At these receivers predicted maximum construction noise levels may also exceed the sleep disturbance levels. To mitigate the potential impacts, the use of concrete saws will be limited to prior to 10.00pm. Additionally, the standard and additional mitigation measures identified by this DNVIS will be provided.

The closest commercial receivers would also experience elevated noise levels as the works progress, however, most of the commercial receivers, with the exception of the St Marys Hotel, would not be operational during the out of hours works.

The potentially affected receivers have been consulted regarding the forthcoming works, with Ward's community engagements consultants undertaking door knocking and briefings at the most affected

addresses. The community consultation report (included in Appendix H) summarises the receiver notifications. This identifies that no particular concerns regarding noise from the early works was received from the potentially most affected local residents.

Considering the above, the standard hours works within the main carpark area are generally considered **moderate impact**.

The standard and additional mitigation measures identified by this DNVIS will be provided.

As a result of noise classification and/or the noise level exceedances at sensitive receivers provided by this DNVIS, appropriate reasonable and feasible noise mitigation is to be adopted and implemented during the works. For sites where works are predicted to significantly exceed noise goals and impact on receivers for a significant period of time, additional reasonable and feasible noise mitigation measures such as those outlined in Appendix D would be implemented to reduce the noise levels and impact on sensitive receivers.

The following key controls will be implemented:

- High noise works will be restricted to daytime hours as far as practicable.
- Where concrete sawing is required to be undertaken out-of-hours, this activity will be restricted to prior to 10.00pm.
- As far as practicable and safe to do so, sound curtains will be used around works sites to reduce construction noise emissions.
- Noise monitoring will be undertaken throughout the works to verify construction noise levels and inform the construction team where, if necessary, construction methods require modification to reduce noise levels.
- Vibration monitoring will be undertaken at the commencement of work involving vibration generating equipment to confirm safe working distances and compliance with German Standard DIN4150:1999.
- Static rollers will be used in lieu of vibratory rollers on the external roads to minimise any vibration impacts.
- Periodic letterbox notifications will be provided to update local residents and business owners regarding the progress of the works
- Community Consultation in accordance with the CNVS and the Out of Hours Works Protocol (SM-21-00306108) will be undertaken at potentially affected receivers and feedback from the receivers will be considered during scheduling of the works.

13. CONCLUSION

Acoustics Consultants Australia (ACA) has prepared on behalf of Ward Civil & Engineering Pty Ltd (Ward) this Detailed Noise and Vibration Impact Statement (DNVIS) for the St Mary's Bus Exchange Early Works (SMBE-EW), which form part of the Sydney Metro Western Sydney Airport (SMWSA) Project (SSI 10051).

Primarily, this document has been prepared to fulfil the requirements of the Critical State Significant Infrastructure (CSSI) Approval Condition E47(a) that requires a DNVIS and Condition C13(a) that requires a Construction Noise and Vibration Monitoring Program. This DNVIS forms part of the Construction Environmental Management Plan (CEMP), or equivalent document, in accordance with the Sydney Metro Construction Environmental Management Framework (CEMF).

The included assessments have been undertaken in accordance with the provisions of the NSW Interim Construction Noise Guideline – (ICNG), the Sydney Metro – Western Sydney Airport Construction Noise & Vibration Strategy (Ver 4.2, 8 September 2020) – (CNVS) and relevant Conditions of Approval as set out in the Department of Planning, Industry and Environment's Critical State Significant Infrastructure Approval for Sydney Metro – Western Sydney Airport (SSI 10051).

The SMBE-EW is not subject to an Environment Protection Licence (EPL).

The SMBE-EW works are proposed to generally occur within standard construction hours, however, the planning approval allows for alternate working hours for the works that cannot be completed during standard hours, provided the works are managed appropriately.

This document details Noise Management Level (NML) exceedances and mitigation requirements for the standard hours works and the proposed out-of-hours works. The extent of works undertaken outside of standard hours would be dependent on relevant approvals and be subject to specific negotiated respite measures, as permissible under the CSSI Approval.

The main objectives of this DNVIS are to minimise unreasonable noise and vibration impacts on residents and businesses, and to avoid structural damage to buildings or heritage items as a result of construction vibration. This DNVIS aims to support active community communication and maintain positive, cooperative relationships with local residents, businesses and building owners. It is noted that ongoing community engagement and management of such relationships is primarily managed via the Sydney Metro – Western Sydney Airport Community Communications Strategy.

During the development of the DNVIS Ward has undertaken focussed community consultation with the most potentially affected receivers and has considered their feedback. Notably, as identified by the community consultation report, no notable concerns have been raised by the local residents consulted. The community consultation has identified that the potentially most affected receivers are understanding with respect to the potential for increased noise levels during the works.

It is expected that noise and vibration impacts can be effectively managed through the adoption of the measures identified by this DNVIS.

The key conclusions are as follows:

- Construction traffic noise is expected to be no more than 2 dB above current traffic noise levels.
- With the incorporation of specific controls, construction vibration is expected to comply with human comfort values nominated in this assessment and on this basis the risk of building damage (even cosmetic) is negligible to all building structures including heritage.
- Given Ward's proposed vibration controls, no specific additional mitigation measures relating to groundborne noise or vibration are considered necessary, beyond the standard measures defined by the CNVS. Application of the measures outlined by this DNVIS would be expected to be sufficient to ensure vibration effects on the occupants of nearby buildings are satisfactorily managed.
- Airborne noise levels may be expected to exceed criteria at times at several receivers. These exceedances may be effectively managed through a combination of standard mitigation measures and additional mitigation measures required by the CNVS, principally through letterbox notifications, and verification monitoring. The following key controls will be implemented:
 - High noise works will be restricted to daytime hours as far as practicable.
 - Where concrete sawing is required to be undertaken out-of-hours, this activity will be restricted to prior to 10.00pm.
 - As far as practicable and safe to do so, sound curtains will be used around works sites to reduce construction noise emissions.
 - Noise monitoring will be undertaken throughout the works to verify construction noise levels and inform the construction team where, if necessary, construction methods require modification to reduce noise levels.
 - Vibration monitoring will be undertaken at the commencement of work involving vibration generating equipment to confirm safe working distances and compliance with German Standard DIN4150:1999.
 - Static rollers will be used in lieu of vibratory rollers on the external roads to minimise any vibration impacts.
 - Periodic letterbox notifications will be provided to update local residents and business owners regarding the progress of the works
 - Community Consultation in accordance with the CNVS and the Out of Hours Works Protocol (SM-21-00306108) will be undertaken at potentially affected receivers and feedback from the receivers will be considered during scheduling of the works.

APPENDIX A: Glossary of Noise & Vibration Terms

1 Sound Level (or Noise Level)

Sound may be defined as any pressure variation that the human ear can detect. The human ear responds to a wide range of changes in sound pressure. As the greatest sound pressures to which the human ear responds are 10,000,000 times greater than the lowest, the decibel (dB) scale, by the use of logarithms is used to express sound pressure levels more conveniently.

The standard reference sound pressure used to define a Sound Pressure Level is 2×10^{-5} Pascals (Pa).

The decibel is defined as ten times the logarithmic ratio of two pressures. The smallest perceptible change is approximately 1 dB.

Sound Pressure Level is typically abbreviated as SPL, L_p , or L.

2 "A" Weighted Sound Pressure Level

The most common frequency rating is 'A-Weighting'. The A-weighting frequency response curve is designed to approximate the sensitivity of the human ear. The symbol L_A represents A-weighted Sound Pressure Level - The overall broadband level of a sound/noise is typically expressed as a dB(A) level.

Human hearing is most sensitive mid frequencies sounds (500 Hz to 4000 Hz), and less sensitive at higher and lower frequencies. Therefore, the level expressed in dB(A) correlates strongly with the perceived loudness of the sound/noise.

A change in sound pressure level of 1-2 dB is barely noticeable to most people, whilst a 3-5 dB change is perceived as a small but noticeable change in loudness. A 10 dB change is perceived as an approximate doubling or halving in loudness. The table below present the sound pressure levels of some common sources.

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

In addition to A-weighting, other less commonly applied frequency weightings include B, C and D weightings. Unweighted or Linear levels are sound levels measured without any weighting. These are expressed as simply dB, or dB(lin) or dB(Z).

3 Sound Power Level

The rate at which a noise source emits acoustic energy is defined by its Sound Power Level. Sound Power Levels are also expressed in decibel units (dB or dB(A)). Sound Power is typically identified as SWL or LW. The standard reference sound power used to define a Sound Power Level is 1×10^{-12} Watts (W).

4 Statistical Noise Levels

Environmental noise levels from various sources in the environment will vary in level over time. Statistical exceedance levels are typically expressed as L_{AN} levels (i.e. the A-weighted sound pressure level exceeded for N% of a specific measurement period).

The most commonly used statistical noise levels are as follows:

L_{Amax}	Maximum noise level over a sample period (typically measured on fast time-weighting response).
L_{A1}	Noise level exceeded for 1% of a sample period (typically 15-minute interval).
L_{A10}	Noise level exceeded for 10% of a sample period (typically 15-minute interval).
L_{A90}	Noise level exceeded for 90% of a sample period. This noise level is commonly used to describe the background noise level (in the absence of the source under investigation).
L_{Aeq}	A-weighted equivalent noise level. This is equivalent to the steady sound level containing the same amount of acoustical energy as the time-varying sound. Often referred to as the average noise level.
ABL	Assessment Background Level. This is the single figure background level representing each assessment period (day, evening and night) for each day. It is determined by calculating the lowest 10th percentile background noise level (L_{A90}) for each period.
RBL	Rating Background Level. This is the median value of the ABL values for each period (day, evening, night), determined over several days of measurements.

Common Vibration Terms

Hertz (Hz) – Units in which frequency is expressed. Synonymous with cycles per second.

Decibel – Ratios of identical quantities are expressed in decibel or dB units. The number of dB is “ratio” against some standard or reference value in terms of the base 10 logarithm of that ratio. In measuring acoustic or vibration power (as in PSD or ASD of random vibration), the number of dB = $10 \text{ Log}_{10} (P/P_0)$. P_0 , the reference level, equals 0 dB. In measuring the more common voltage-like quantities such as acceleration, the number of dB = $20 \text{ Log}_{10} (E/E_0)$ E_0 , the reference level, equals 0 dB.-

Displacement – A vector quantity that specifies the change of position of a body or particle with respect to a reference frame.

Velocity – A vector quantity that specifies the time derivative of displacement.

Acceleration – Acceleration is rate of change of velocity with time usually along a specified axis, usually expressed in m/s^2

Peak – Extreme value of a varying quantity, measured from the zero or mean value. Also, a maximum spectral value.

Peak-to-peak value – The algebraic difference between extreme values (as $D = 2X$).

Duration of a shock pulse is how long it lasts. Time is usually measured between instants when the amplitude is greater than 10% of the peak value.

Amplitude – The magnitude of variation (in a changing quantity) from its zero value. Always modify it with an adjective such as **peak, RMS, average**, etc. May refer to displacement, velocity, acceleration.

Crest factor – Of an oscillating quantity. The ratio of the peak value to the r.m.s. value.

VDV – The Vibration Dose Value is the accumulation of energy measured over a given time period, proportional to the root mean quad of acceleration. This is usually measured in each of the three axes of motion. In most cases, vibration tends to be higher in the Z (vertical) axis. This is measured with units of $m/s^{1.75}$.

PPV – Peak Particle Velocity is the instantaneous peak of the resultant vector sum of all three axes of motion. Results are expressed in terms of velocity normally mm/s.

Peak Acceleration – This is the peak acceleration level measured in each of the three axes of motion. In some cases, this can also be combined in a vector sum. This is measured in m/s^2 .

Accelerometer – A sensor or transducer or pickup for converting acceleration to an electrical signal. Two common types are piezoresistive and piezoelectric.

Charge amplifier – An amplifier which converts a charge input signal (as from an accelerometer) into an output voltage; a charge-to-voltage converter.

Geophone – A sensor or transducer or pickup for converting velocity to an electrical signal.



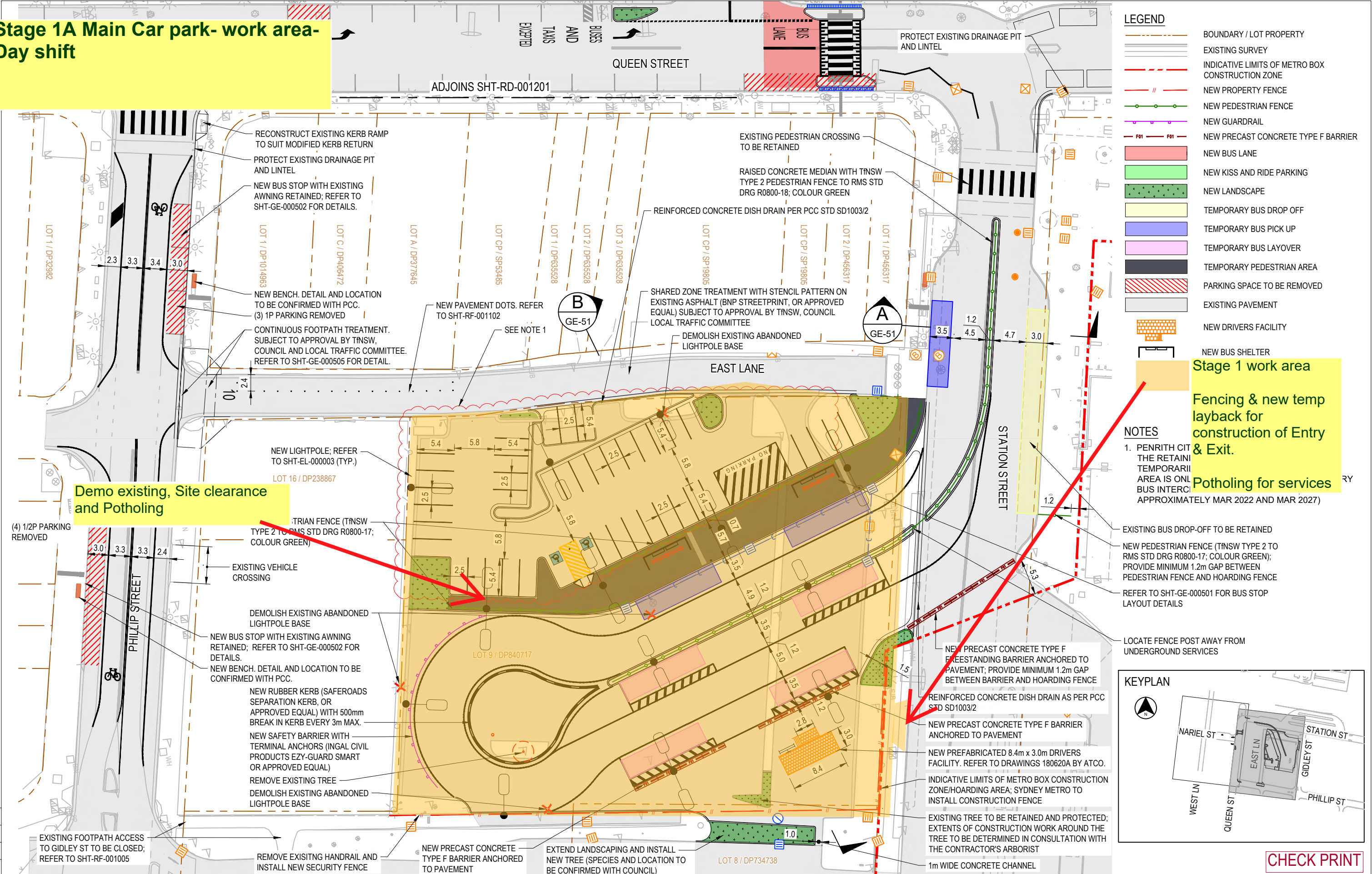
APPENDIX B

St Mary's Bus Exchange Early Works Staging Plans
(Provided by Ward Civil Engineering Pty Ltd)



Stage 1A Main Car park- work area- Day shift

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LEGEND

- BOUNDARY / LOT PROPERTY
- EXISTING SURVEY
- INDICATIVE LIMITS OF METRO BOX CONSTRUCTION ZONE
- NEW PROPERTY FENCE
- NEW PEDESTRIAN FENCE
- NEW GUARDRAIL
- F01 F01 NEW PRECAST CONCRETE TYPE F BARRIER
- NEW BUS LANE
- NEW KISS AND RIDE PARKING
- NEW LANDSCAPE
- TEMPORARY BUS DROP OFF
- TEMPORARY BUS PICK UP
- TEMPORARY BUS LAYOVER
- TEMPORARY PEDESTRIAN AREA
- PARKING SPACE TO BE REMOVED
- EXISTING PAVEMENT
- NEW DRIVERS FACILITY
- NEW BUS SHELTER

NOTES

1. PENRITH CITY COUNCIL TO RETAIN TEMPORARY AREA IS ONLY BUS INTERCHANGE APPROXIMATELY MAR 2022 AND MAR 2027)

Stage 1 work area

Fencing & new temp layback for construction of Entry & Exit.

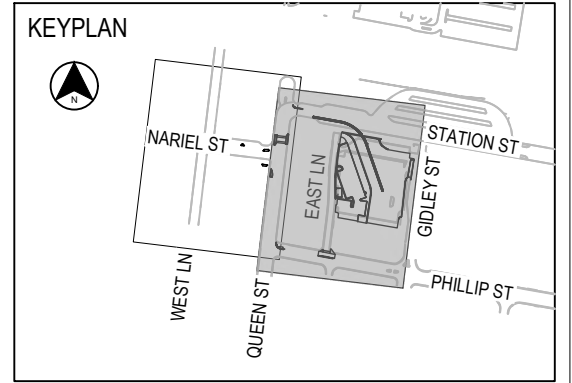
Potholing for services

EXISTING BUS DROP-OFF TO BE RETAINED

NEW PEDESTRIAN FENCE (TNSW TYPE 2 TO RMS STD DRG R0800-17; COLOUR GREEN); PROVIDE MINIMUM 1.2m GAP BETWEEN PEDESTRIAN FENCE AND HOARDING FENCE

REFER TO SHT-GE-000501 FOR BUS STOP LAYOUT DETAILS

LOCATE FENCE POST AWAY FROM UNDERGROUND SERVICES



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Demo existing, Site clearance and Potholing

(4) 1/2P PARKING REMOVED

NEW LIGHTPOLE; REFER TO SHT-EL-000003 (TYP.)

LOT 16 / DP238867

NEW PEDESTRIAN FENCE (TNSW TYPE 2 TO RMS STD DRG R0800-17; COLOUR GREEN)

EXISTING VEHICLE CROSSING

DEMOLISH EXISTING ABANDONED LIGHTPOLE BASE

NEW BUS STOP WITH EXISTING AWNING RETAINED; REFER TO SHT-GE-000502 FOR DETAILS.

NEW BENCH. DETAIL AND LOCATION TO BE CONFIRMED WITH PCC.

NEW RUBBER KERB (SAFEROADS SEPARATION KERB, OR APPROVED EQUAL) WITH 500mm BREAK IN KERB EVERY 3m MAX.

NEW SAFETY BARRIER WITH TERMINAL ANCHORS (INGAL CIVIL PRODUCTS EZY-GUARD SMART OR APPROVED EQUAL)

REMOVE EXISTING TREE

DEMOLISH EXISTING ABANDONED LIGHTPOLE BASE

EXISTING FOOTPATH ACCESS TO GIDLEY ST TO BE CLOSED; REFER TO SHT-RF-001005

REMOVE EXISTING HANDRAIL AND INSTALL NEW SECURITY FENCE

RECONSTRUCT EXISTING KERB RAMP TO SUIT MODIFIED KERB RETURN

PROTECT EXISTING DRAINAGE PIT AND LINTEL

NEW BUS STOP WITH EXISTING AWNING RETAINED; REFER TO SHT-GE-000502 FOR DETAILS.

CONTINUOUS FOOTPATH TREATMENT. SUBJECT TO APPROVAL BY TNSW, COUNCIL AND LOCAL TRAFFIC COMMITTEE. REFER TO SHT-GE-000505 FOR DETAIL.

NEW PAVEMENT DOTS. REFER TO SHT-RF-001102

SEE NOTE 1

REINFORCED CONCRETE DISH DRAIN PER PCC STD SD1003/2

SHARED ZONE TREATMENT WITH STENCIL PATTERN ON EXISTING ASPHALT (BNP STREETPRINT, OR APPROVED EQUAL) SUBJECT TO APPROVAL BY TNSW, COUNCIL LOCAL TRAFFIC COMMITTEE

DEMOLISH EXISTING ABANDONED LIGHTPOLE BASE

EAST LANE

STATION STREET

PHILLIP STREET

LOT 1 / DP32982

LOT 1 / DP1014963

LOT C / DP406472

LOT A / DP377645

LOT CP / SP53465

LOT 1 / DP93528

LOT 2 / DP93528

LOT 3 / DP93528

LOT CP / SP19805

LOT CP / SP19805

LOT 2 / DP456317

LOT 1 / DP456317

LOT 9 / DP840717

LOT 8 / DP734738

NEW PRECAST CONCRETE TYPE F FREESTANDING BARRIER ANCHORED TO PAVEMENT; PROVIDE MINIMUM 1.2m GAP BETWEEN BARRIER AND HOARDING FENCE

REINFORCED CONCRETE DISH DRAIN AS PER PCC STD SD1003/2

NEW PRECAST CONCRETE TYPE F BARRIER ANCHORED TO PAVEMENT

NEW PREFABRICATED 8.4m x 3.0m DRIVERS FACILITY. REFER TO DRAWINGS 180620A BY ATCO.

INDICATIVE LIMITS OF METRO BOX CONSTRUCTION ZONE/HOARDING AREA; SYDNEY METRO TO INSTALL CONSTRUCTION FENCE

EXISTING TREE TO BE RETAINED AND PROTECTED; EXTENTS OF CONSTRUCTION WORK AROUND THE TREE TO BE DETERMINED IN CONSULTATION WITH THE CONTRACTOR'S ARBORIST

1m WIDE CONCRETE CHANNEL

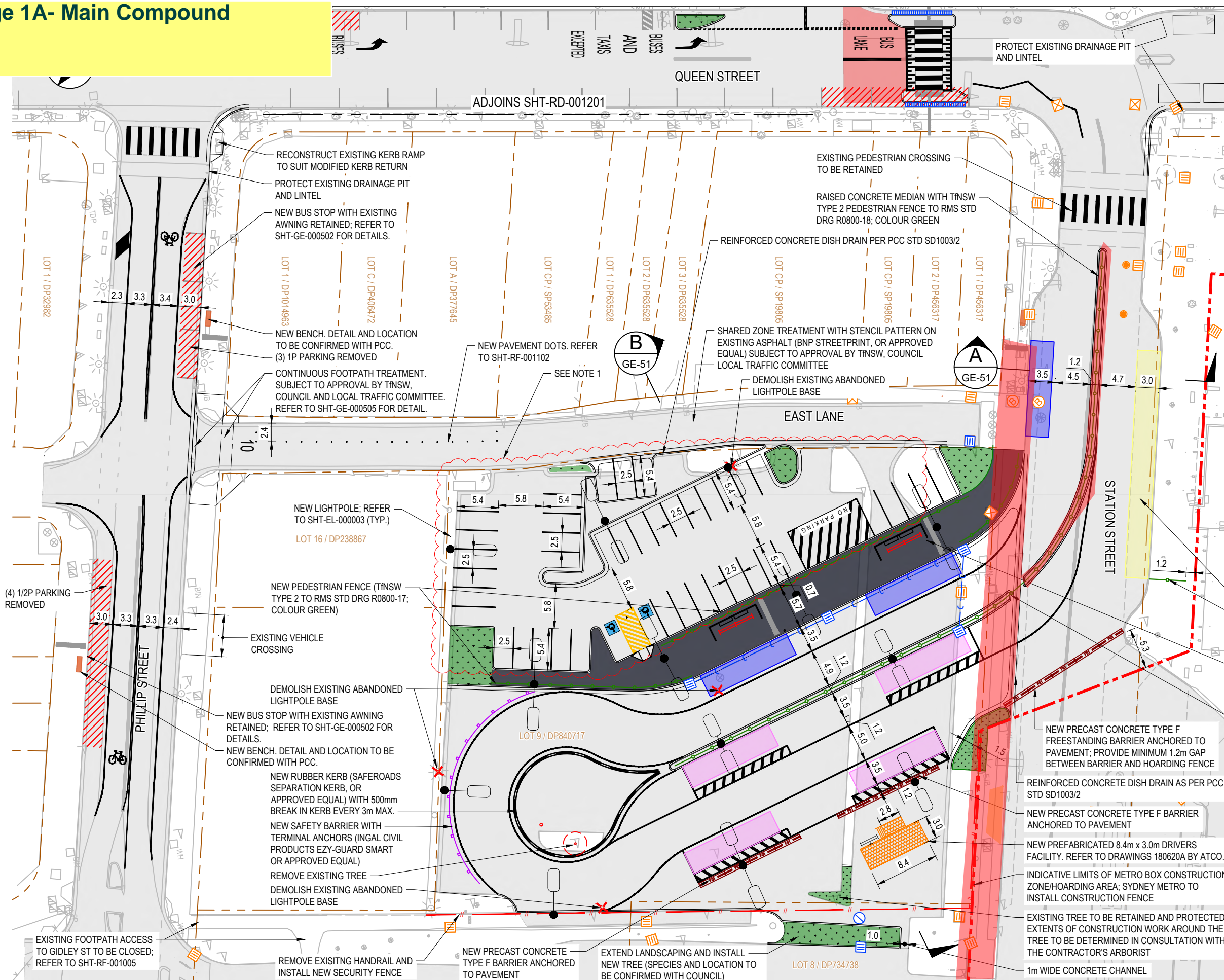
EXTEND LANDSCAPING AND INSTALL NEW TREE (SPECIES AND LOCATION TO BE CONFIRMED WITH COUNCIL)

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EXTERNAL REFERENCE FILES		REV	DATE	AMENDMENT / REVISION DESCRIPTION		SCALES ON A3 SIZE DRAWING		DRAWINGS / DESIGN PREPARED BY		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>DISCIPLINE</th> <th>PRELIM</th> <th>INITIAL</th> <th>FINAL</th> <th>DATE</th> </tr> <tr> <td>M. PANCITO</td> <td></td> <td></td> <td></td> <td>22.04.21</td> </tr> <tr> <td>V. ECCLES</td> <td></td> <td></td> <td></td> <td>22.04.21</td> </tr> <tr> <td>S. ANDREWS</td> <td></td> <td></td> <td></td> <td>22.04.21</td> </tr> <tr> <td>V. ECCLES</td> <td></td> <td></td> <td></td> <td>22.04.21</td> </tr> <tr> <td>C. VAVOULAS</td> <td></td> <td></td> <td></td> <td>22.04.21</td> </tr> <tr> <td>S. CHAVA</td> <td></td> <td></td> <td></td> <td>22.04.21</td> </tr> </table>		DISCIPLINE	PRELIM	INITIAL	FINAL	DATE	M. PANCITO				22.04.21	V. ECCLES				22.04.21	S. ANDREWS				22.04.21	V. ECCLES				22.04.21	C. VAVOULAS				22.04.21	S. CHAVA				22.04.21	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2">TNSW REGISTRATION No. DS2021/000076</td> <td colspan="2">PART 1</td> </tr> <tr> <td>ISSUE STATUS</td> <td>EDMS No.</td> <td>SHEET No.</td> <td>ISSUE</td> </tr> <tr> <td>DETAILED DESIGN</td> <td>-</td> <td>SHT-RD-001202</td> <td>2</td> </tr> </table>		TNSW REGISTRATION No. DS2021/000076		PART 1		ISSUE STATUS	EDMS No.	SHEET No.	ISSUE	DETAILED DESIGN	-	SHT-RD-001202	2
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Stage 1A- Main Compound

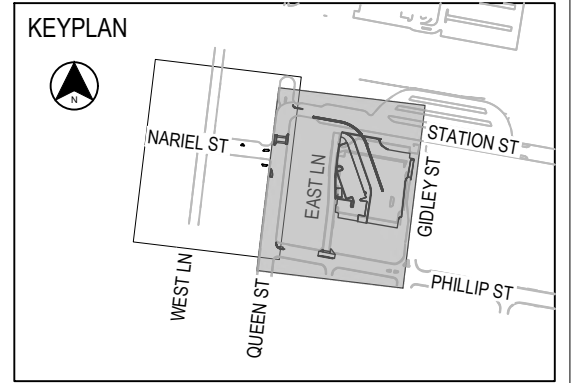
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LEGEND

- BOUNDARY / LOT PROPERTY
- EXISTING SURVEY
- INDICATIVE LIMITS OF METRO BOX CONSTRUCTION ZONE
- NEW PROPERTY FENCE
- NEW PEDESTRIAN FENCE
- NEW GUARDRAIL
- NEW PRECAST CONCRETE TYPE F BARRIER
- NEW BUS LANE
- NEW KISS AND RIDE PARKING
- NEW LANDSCAPE
- TEMPORARY BUS DROP OFF
- TEMPORARY BUS PICK UP
- TEMPORARY BUS LAYOVER
- TEMPORARY PEDESTRIAN AREA
- PARKING SPACE TO BE REMOVED
- EXISTING PAVEMENT
- NEW DRIVERS FACILITY
- NEW BUS SHELTER
- Potholing for services

- ### NOTES
1. PENRITH CITY COUNCIL MAY MANAGE AND USE THE RETAINED VENESS PLACE CAR PARK AREA TEMPORARILY FOR PUBLIC CAR PARKING. THIS AREA IS ONLY AVAILABLE WHILE THE TEMPORARY BUS INTERCHANGE IS IN OPERATION (BETWEEN APPROXIMATELY MAR 2022 AND MAR 2027)
 - EXISTING BUS DROP-OFF TO BE RETAINED
 - NEW PEDESTRIAN FENCE (TNSW TYPE 2 TO RMS STD DRG R0800-17; COLOUR GREEN); PROVIDE MINIMUM 1.2m GAP BETWEEN PEDESTRIAN FENCE AND HOARDING FENCE
 - REFER TO SHT-GE-000501 FOR BUS STOP LAYOUT DETAILS
 - LOCATE FENCE POST AWAY FROM UNDERGROUND SERVICES
 - NEW PRECAST CONCRETE TYPE F FREESTANDING BARRIER ANCHORED TO PAVEMENT; PROVIDE MINIMUM 1.2m GAP BETWEEN BARRIER AND HOARDING FENCE
 - REINFORCED CONCRETE DISH DRAIN AS PER PCC STD SD1003/2
 - NEW PRECAST CONCRETE TYPE F BARRIER ANCHORED TO PAVEMENT
 - NEW PREFABRICATED 8.4m x 3.0m DRIVERS FACILITY. REFER TO DRAWINGS 180620A BY ATCO.
 - INDICATIVE LIMITS OF METRO BOX CONSTRUCTION ZONE/HOARDING AREA; SYDNEY METRO TO INSTALL CONSTRUCTION FENCE
 - EXISTING TREE TO BE RETAINED AND PROTECTED; EXTENTS OF CONSTRUCTION WORK AROUND THE TREE TO BE DETERMINED IN CONSULTATION WITH THE CONTRACTOR'S ARBORIST
 - 1m WIDE CONCRETE CHANNEL



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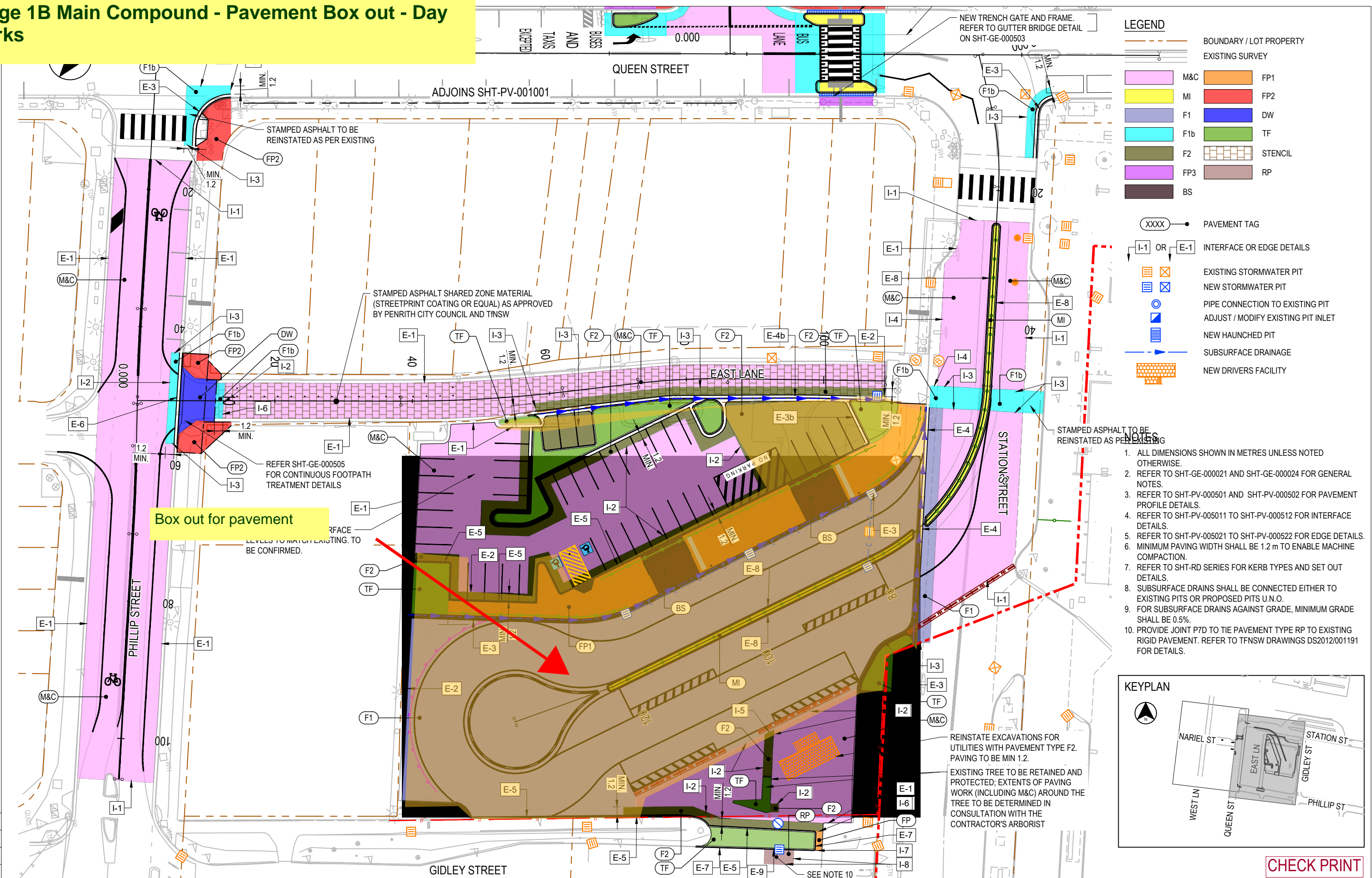
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		1	03.03.21	ISSUED FOR 80% DETAILED DESIGN			S. CHAVA			V. ECCLES		SHEET No. SHT-RD-001202	
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										C. MAVOULAS		© Transport for NSW	
										S. CHAVA			

REVISION IN PROGRESS

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Stage 1B Main Compound - Pavement Box out - Day works

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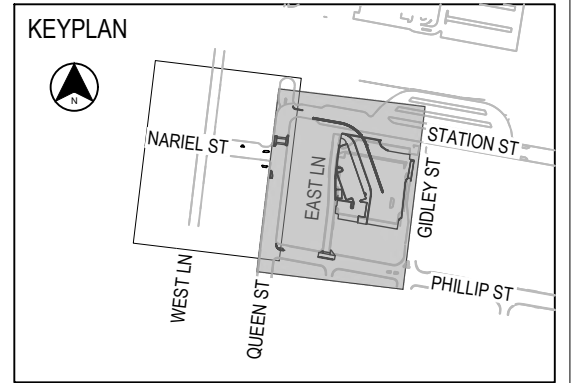


LEGEND

	BOUNDARY / LOT PROPERTY		M&C		FP1
	EXISTING SURVEY		MI		FP2
			F1		DW
			F1b		TF
			F2		STENCIL
			FP3		RP
			BS		

- PAVEMENT TAG
- INTERFACE OR EDGE DETAILS
- EXISTING STORMWATER PIT
- NEW STORMWATER PIT
- PIPE CONNECTION TO EXISTING PIT
- ADJUST / MODIFY EXISTING PIT INLET
- NEW HAUNCHED PIT
- SUBSURFACE DRAINAGE
- NEW DRIVERS FACILITY

1. ALL DIMENSIONS SHOWN IN METRES UNLESS NOTED OTHERWISE.
2. REFER TO SHT-GE-000021 AND SHT-GE-000024 FOR GENERAL NOTES.
3. REFER TO SHT-PV-000501 AND SHT-PV-000502 FOR PAVEMENT PROFILE DETAILS.
4. REFER TO SHT-PV-0005011 TO SHT-PV-0005012 FOR INTERFACE DETAILS.
5. REFER TO SHT-PV-0005021 TO SHT-PV-0005022 FOR EDGE DETAILS.
6. MINIMUM PAVING WIDTH SHALL BE 1.2 m TO ENABLE MACHINE COMPACTION.
7. REFER TO SHT-RD SERIES FOR KERB TYPES AND SET OUT DETAILS.
8. SUBSURFACE DRAINS SHALL BE CONNECTED EITHER TO EXISTING PITS OR PROPOSED PITS U.N.O.
9. FOR SUBSURFACE DRAINS AGAINST GRADE, MINIMUM GRADE SHALL BE 0.5%.
10. PROVIDE JOINT P7D TO TIE PAVEMENT TYPE RP TO EXISTING RIGID PAVEMENT. REFER TO TFNSW DRAWINGS DS2012/001191 FOR DETAILS.



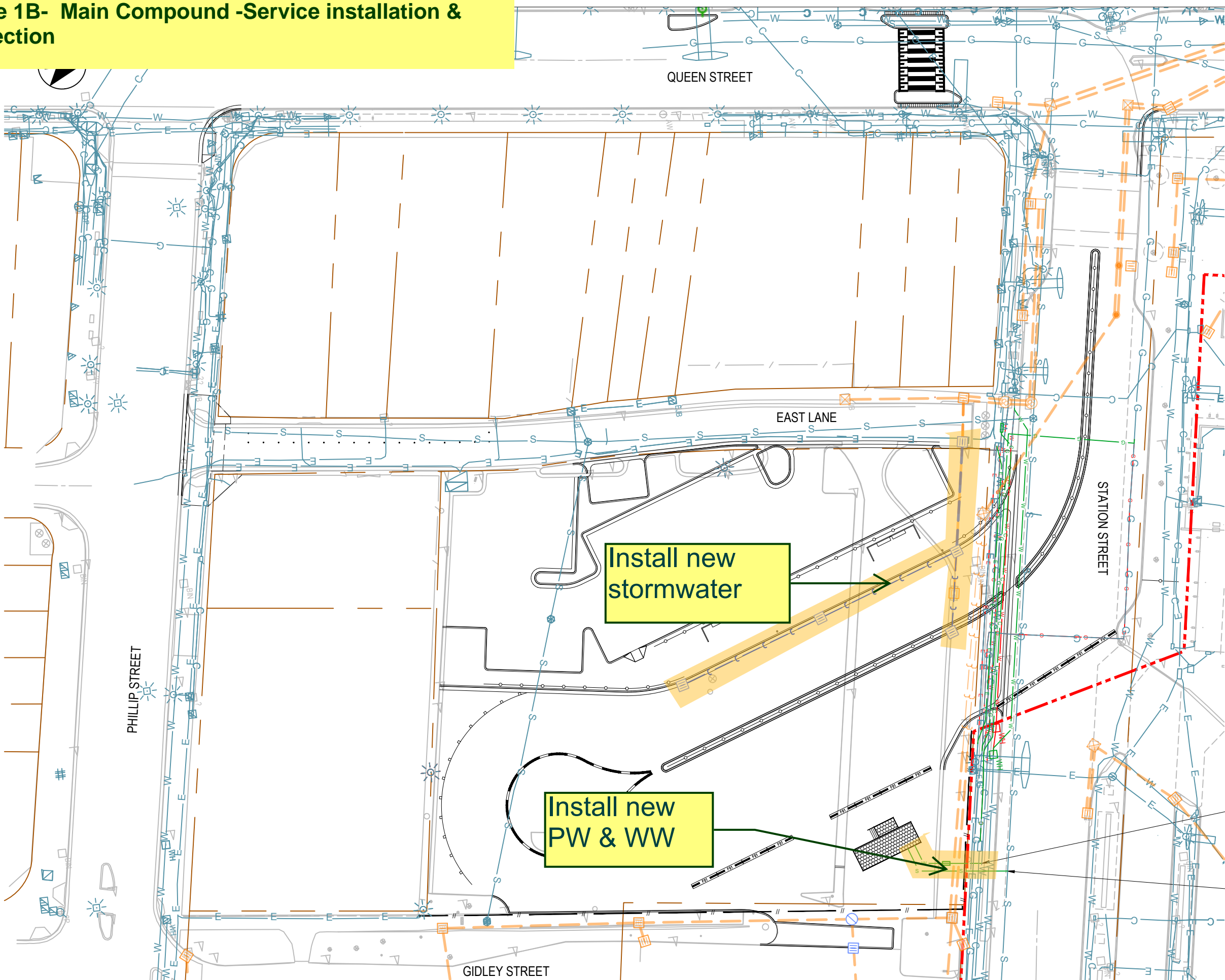
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Stage 1B- Main Compound -Service installation & Protection

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LEGEND	
	EXISTING PROPERTY BOUNDARY
	INDICATIVE LIMITS OF METRO BOX CONSTRUCTION ZONE
	EXISTING RETAINED
	ABANDON / REMOVED
	NEW DESIGN
	NEW WORKS COMPLETED BY OTHERS
	NEW SANITARY SEWER SERVICE
	NEW WATER SERVICE
	NEW WATER METER
	UTILITY PROTECTION
	EXISTING STORMWATER PIT AND PIPE
	NEW STORMWATER PIT AND PIPE
	CONCRETE ENCASE NEW PIPE
	CONCRETE ENCASE EXISTING PIPE
	DRIVERS FACILITY

- NOTES**
- CONTRACTOR TO UNDERTAKE THEIR OWN DBYD AND POTHOLING INVESTIGATION PRIOR TO CONSTRUCTION ACTIVITIES.
 - PRIVATE SEWER MAIN AND FITTINGS SHALL BE PVC-U, MINIMUM SN8, SERIES 1, COLOUR GREY, AND IN ACCORDANCE WITH AS1260 AND WSA02-2002.
 - PRIVATE WATER MAIN AND FITTINGS SHALL BE POLYETHYLENE PE100 PIPE, MINIMUM PN 16, SERIES 1, COLOUR BLACK WITH BLUE STRIPES, AND IN ACCORDANCE WITH AS4130 AND WSA03-2011.
 - REFER TO SHT-EL-000003 FOR ELECTRICAL SERVICE TO DRIVERS FACILITY AND TEMPORARY BUS INTERCHANGE AREA.
 - CONNECTIONS SHOWN ARE INDICATIVE ONLY. CONTRACTOR TO FILE NECESSARY APPLICATIONS TO RELEVANT AUTHORITIES.

Install new stormwater

Install new PW & WW

PROVIDE NEW 25mm WATER SUPPLY WITH 600mm MINIMUM COVER. SEE NOTE 3. CONNECT TO EXISTING SYDNEY WATER MAIN WITH SYDNEY WATER APPROVED WATER METER. SEE NOTE 5.

PROVIDE NEW 150mm SEWER MAIN AT 1.65% MINIMUM WITH 600mm MINIMUM COVER. SEE NOTE 2. CONNECT TO EXISTING SYDNEY WATER SEWER MAIN. UTILITY RELOCATIONS MAY BE REQUIRED TO INSTALL NEW SEWER SERVICE. SEE NOTE 5.

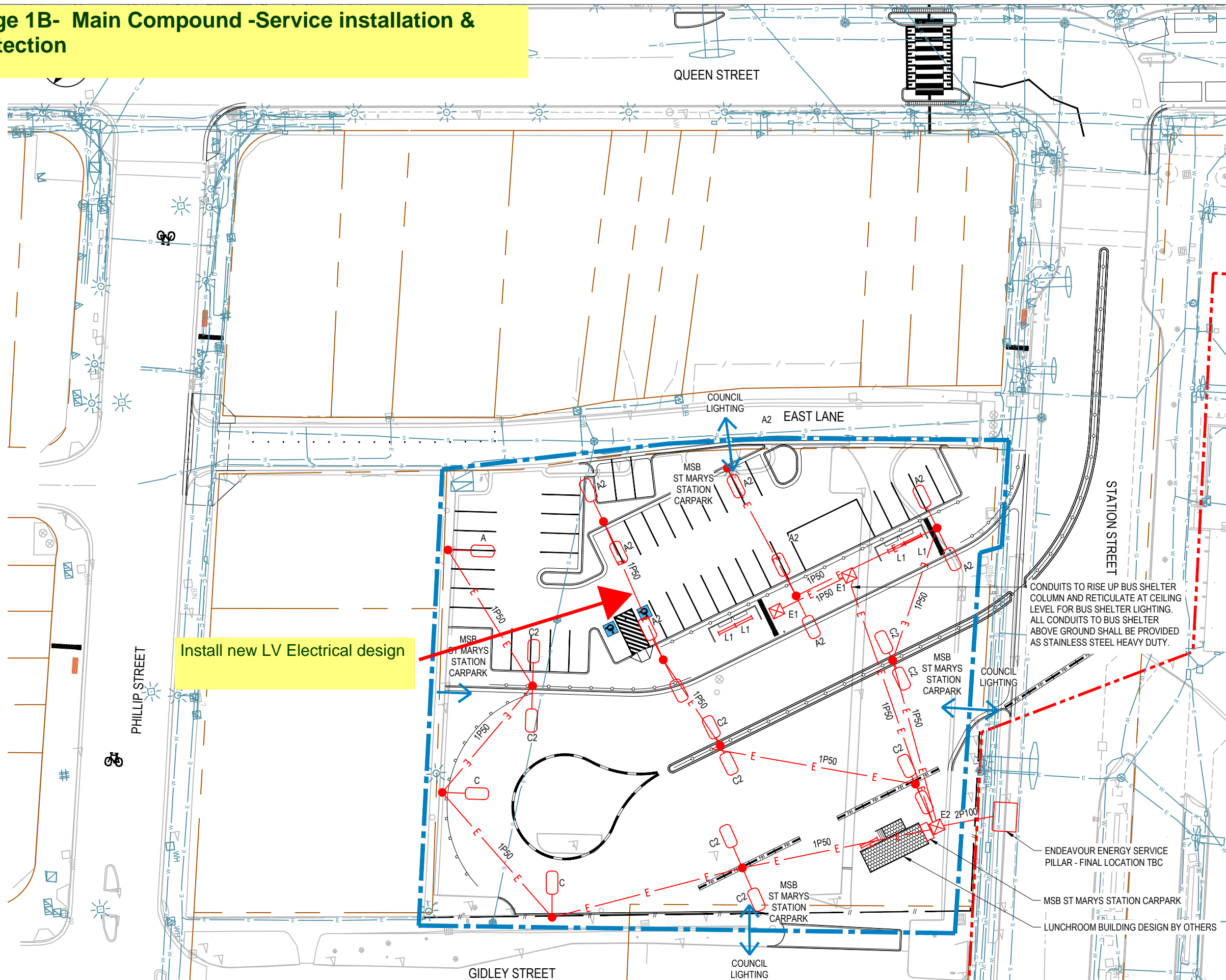
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DRAWING FILE LOCATION / NAME PW/P0054029-SHT-HY-001001.DWG		DESIGN LOT CODE -	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING -		PLOT DATE / TIME 26-May-21 / 9:30:25 PM	PLOT BY MICHAEL PANCITO	CLIENT PENRITH CITY COUNCIL STATION STREET ST MARYS CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION HYDRAULIC SERVICES PLAN	A3	
EXTERNAL REFERENCE FILES	REV 0 1	DATE 03.03.21 22.04.21	AMENDMENT / REVISION DESCRIPTION ISSUED FOR 80% DETAILED DESIGN IFT	VWR No. S. CHAVA S. CHAVA	APPROVAL	SCALES ON A3 SIZE DRAWING 2.5 0 2.5 5 7.5m 1 : 500 FULL SIZE A3	DRAWINGS / DESIGN PREPARED BY M. PANCITO V. ECCLES C. ZHAO V. ECCLES C. MAVOULAS S. CHAVA	DISCIPLINE M. PANCITO V. ECCLES C. ZHAO V. ECCLES C. MAVOULAS S. CHAVA	DATE 22.04.21 22.04.21 22.04.21 22.04.21 22.04.21 22.04.21
REVISION IN PROGRESS			CO-ORDINATE SYSTEM GDA 94 MGA ZONE 56		HEIGHT DATUM AHD		Transport for NSW PREPARED FOR GREATER SYDNEY DIVISION ON BEHALF OF SYDNEY METRO WEST. SYDNEY AIRPORT		
TNSW REGISTRATION No. DS2021/000076			ISSUE STATUS FOR INFORMATION ONLY		EDMS No. -		SHEET No. SHT-HY-001001 1		

Stage 1B- Main Compound -Service installation & Protection

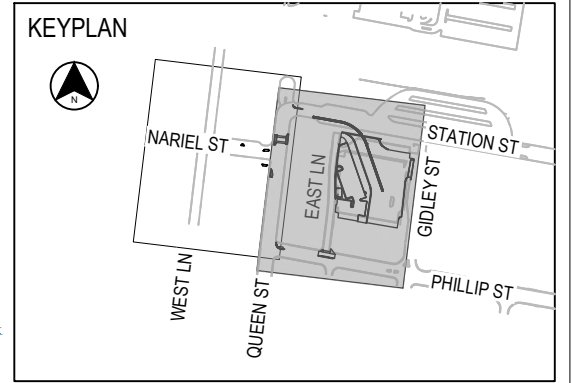
Last saved by: MICHAEL.PANCITO(2021-05-26) Last Plotted: 20



- LEGEND**
- INDICATIVE LIMITS OF METRO BOX CONSTRUCTION ZONE
 - BOUNDARY / LOT PROPERTY
 - EXISTING SURVEY
 - EXISTING UTILITIES RETAINED
 - NEW LOW VOLTAGE ELECTRICAL CABLE INSTALLED IN HDUPVC ORANGE CONDUITS
 - MSB MAIN SWITCHBOARD
 - DB DISTRIBUTION BOARD
 - S SERVICES BOARD BY OTHER TRADES FCXXX DENOTES FIELD CABINET XXXX
 - SP SERVICE PILLAR
 - E1 X CABLE PIT - 300x300x600, CLASS C TYPE
 - E2 X CABLE PIT - 600x600x900, CLASS C TYPE
- NOTES**
- NOTE ON CABLE PITS:
INTERNAL DIMENSIONS (DxWxL mm)
TO AS 3996:209

Install new LV Electrical design

CONDUITS TO RISE UP BUS SHELTER COLUMN AND RETICULATE AT CEILING LEVEL FOR BUS SHELTER LIGHTING. ALL CONDUITS TO BUS SHELTER ABOVE GROUND SHALL BE PROVIDED AS STAINLESS STEEL HEAVY DUTY.



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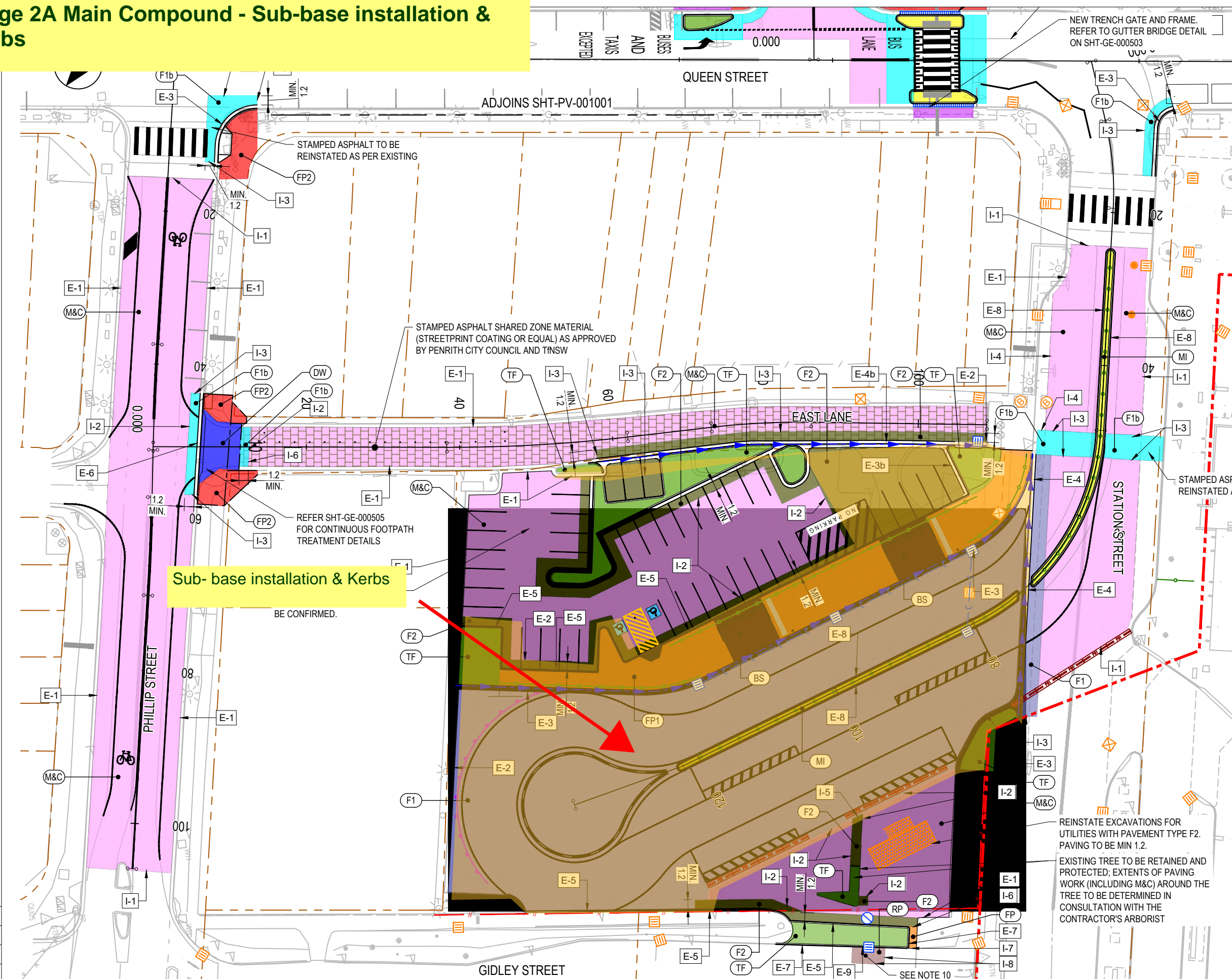
THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED 50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME PW/P0054029-SHT-EL-000003.DWG		DESIGN LOT CODE -	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING -		PLOT DATE / TIME 26-May-21 / 9:27:33 PM	PLOT BY MICHAEL.PANCITO	CLIENT PENRITH CITY COUNCIL	PENRITH CITY COUNCIL STATION STREET ST MARYS CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION ELECTRICAL SITE PLAN		A3																																										
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REVISION IN PROGRESS

Stage 2A Main Compound - Sub-base installation & Kerbs

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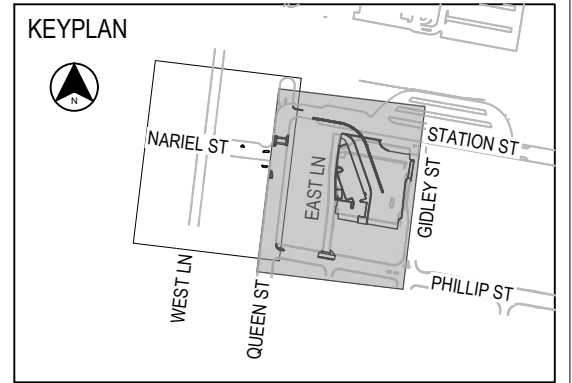


LEGEND

	BOUNDARY / LOT PROPERTY		M&C		FP1
	EXISTING SURVEY		MI		FP2
			F1		DW
			F1b		TF
			F2		STENCIL
			FP3		RP
			BS		

	PAVEMENT TAG
	INTERFACE OR EDGE DETAILS
	EXISTING STORMWATER PIT
	NEW STORMWATER PIT
	PIPE CONNECTION TO EXISTING PIT
	ADJUST / MODIFY EXISTING PIT INLET
	NEW HAUNCHED PIT
	SUBSURFACE DRAINAGE
	NEW DRIVERS FACILITY

- ALL DIMENSIONS SHOWN IN METRES UNLESS NOTED OTHERWISE.
- REFER TO SHT-GE-00021 AND SHT-GE-00024 FOR GENERAL NOTES.
- REFER TO SHT-PV-000501 AND SHT-PV-000502 FOR PAVEMENT PROFILE DETAILS.
- REFER TO SHT-PV-0005011 TO SHT-PV-0005012 FOR INTERFACE DETAILS.
- REFER TO SHT-PV-0005021 TO SHT-PV-0005022 FOR EDGE DETAILS.
- MINIMUM PAVING WIDTH SHALL BE 1.2 m TO ENABLE MACHINE COMPACTION.
- REFER TO SHT-RD SERIES FOR KERB TYPES AND SET OUT DETAILS.
- SUBSURFACE DRAINS SHALL BE CONNECTED EITHER TO EXISTING PITS OR PROPOSED PITS U.N.O.
- FOR SUBSURFACE DRAINS AGAINST GRADE, MINIMUM GRADE SHALL BE 0.5%.
- PROVIDE JOINT P7D TO TIE PAVEMENT TYPE RP TO EXISTING RIGID PAVEMENT. REFER TO TFNSW DRAWINGS DS2012/001191 FOR DETAILS.



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EXTERNAL REFERENCE FILES	REV 0 1	DATE 03.03.21 22.04.21	AMENDMENT / REVISION DESCRIPTION ISSUED FOR 80% DETAILED DESIGN IFT	WVR No. S. CHAVA S. CHAVA	APPROVAL	SCALES ON A3 SIZE DRAWING 1:500 FULL SIZE A3																
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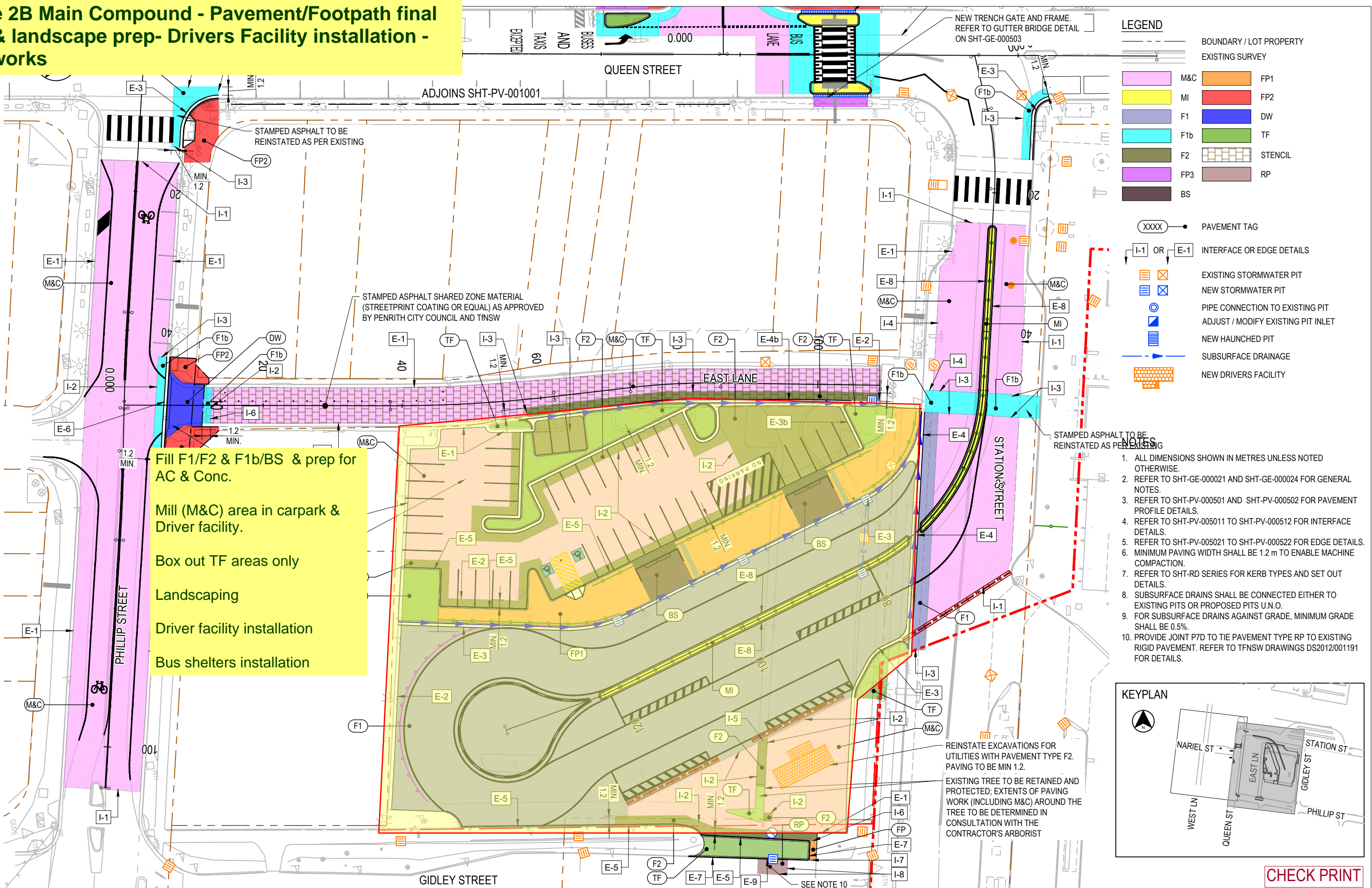
Transport for NSW

PREPARED FOR
GREATER SYDNEY DIVISION
ON BEHALF OF
SYDNEY METRO WEST, SYDNEY AIRPORT

PENRITH CITY COUNCIL STATION STREET ST MARYS CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION PAVEMENT PLAN		A3
TNSW REGISTRATION No. DS2021/000076	ISSUE STATUS DETAILED DESIGN	SHEET No. SHT-PV-001002 1
EDMS No. -	ISSUE No. 1	PART 1
		SHEET 2 OF 2
		© Transport for NSW

Stage 2B Main Compound - Pavement/Footpath final trim & landscape prep- Drivers Facility installation - Day works

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Fill F1/F2 & F1b/BS & prep for AC & Conc.

Mill (M&C) area in carpark & Driver facility.

Box out TF areas only

Landscaping

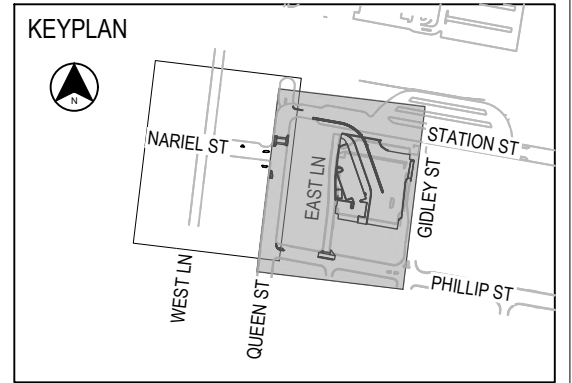
Driver facility installation

Bus shelters installation

LEGEND

- BOUNDARY / LOT PROPERTY
- EXISTING SURVEY
- M&C
- MI
- F1
- F1b
- F2
- FP3
- BS
- FP1
- FP2
- DW
- TF
- STENCIL
- RP
- XXXX - PAVEMENT TAG
- I-1 OR E-1 - INTERFACE OR EDGE DETAILS
- EXISTING STORMWATER PIT
- NEW STORMWATER PIT
- PIPE CONNECTION TO EXISTING PIT
- ADJUST / MODIFY EXISTING PIT INLET
- NEW HAUNCHED PIT
- SUBSURFACE DRAINAGE
- NEW DRIVERS FACILITY

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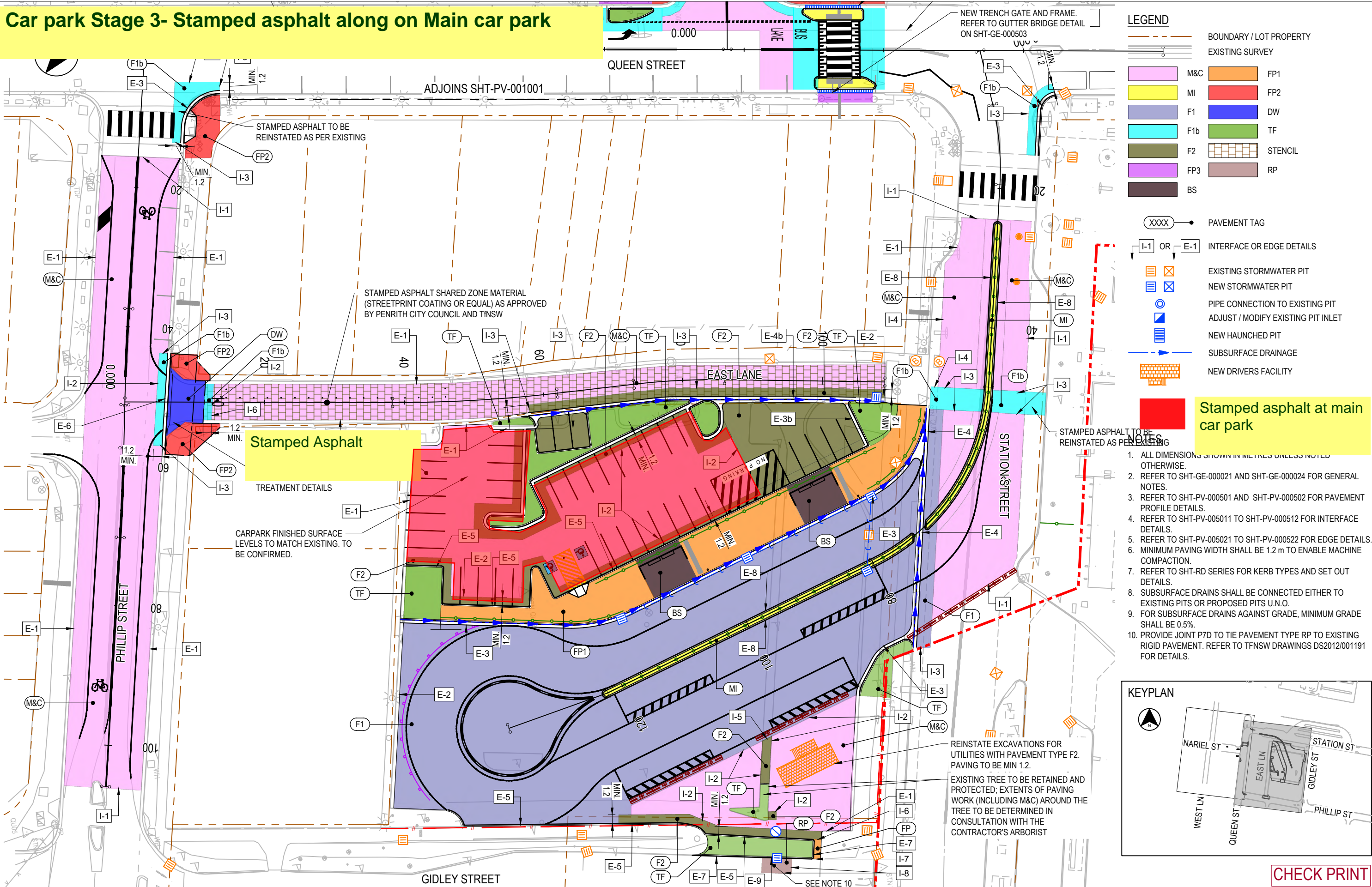
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Main Car park Stage 3- Stamped asphalt along on Main car park

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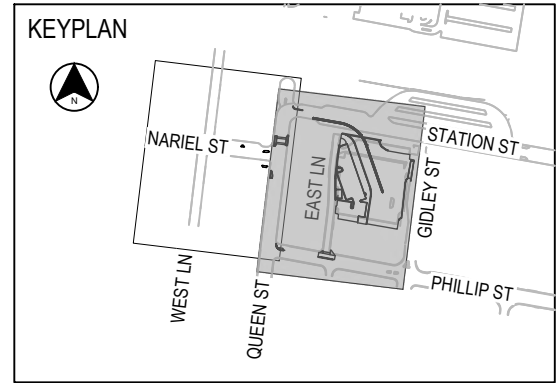
LEGEND

	BOUNDARY / LOT PROPERTY		FP1
	EXISTING SURVEY		FP2
	M&C		DW
	MI		TF
	F1		RP
	F1b		STENCIL
	F2		BS
	FP3		

- PAVEMENT TAG
- INTERFACE OR EDGE DETAILS
- EXISTING STORMWATER PIT
- NEW STORMWATER PIT
- PIPE CONNECTION TO EXISTING PIT
- ADJUST / MODIFY EXISTING PIT INLET
- NEW HAUNCHED PIT
- SUBSURFACE DRAINAGE
- NEW DRIVERS FACILITY

Stamped asphalt at main car park

1. ALL DIMENSIONS SHOWN IN METRES UNLESS NOTED OTHERWISE.
2. REFER TO SHT-GE-000021 AND SHT-GE-000024 FOR GENERAL NOTES.
3. REFER TO SHT-PV-000501 AND SHT-PV-000502 FOR PAVEMENT PROFILE DETAILS.
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10. PROVIDE JOINT P7D TO TIE PAVEMENT TYPE RP TO EXISTING RIGID PAVEMENT. REFER TO TNSW DRAWINGS DS2012/001191 FOR DETAILS.



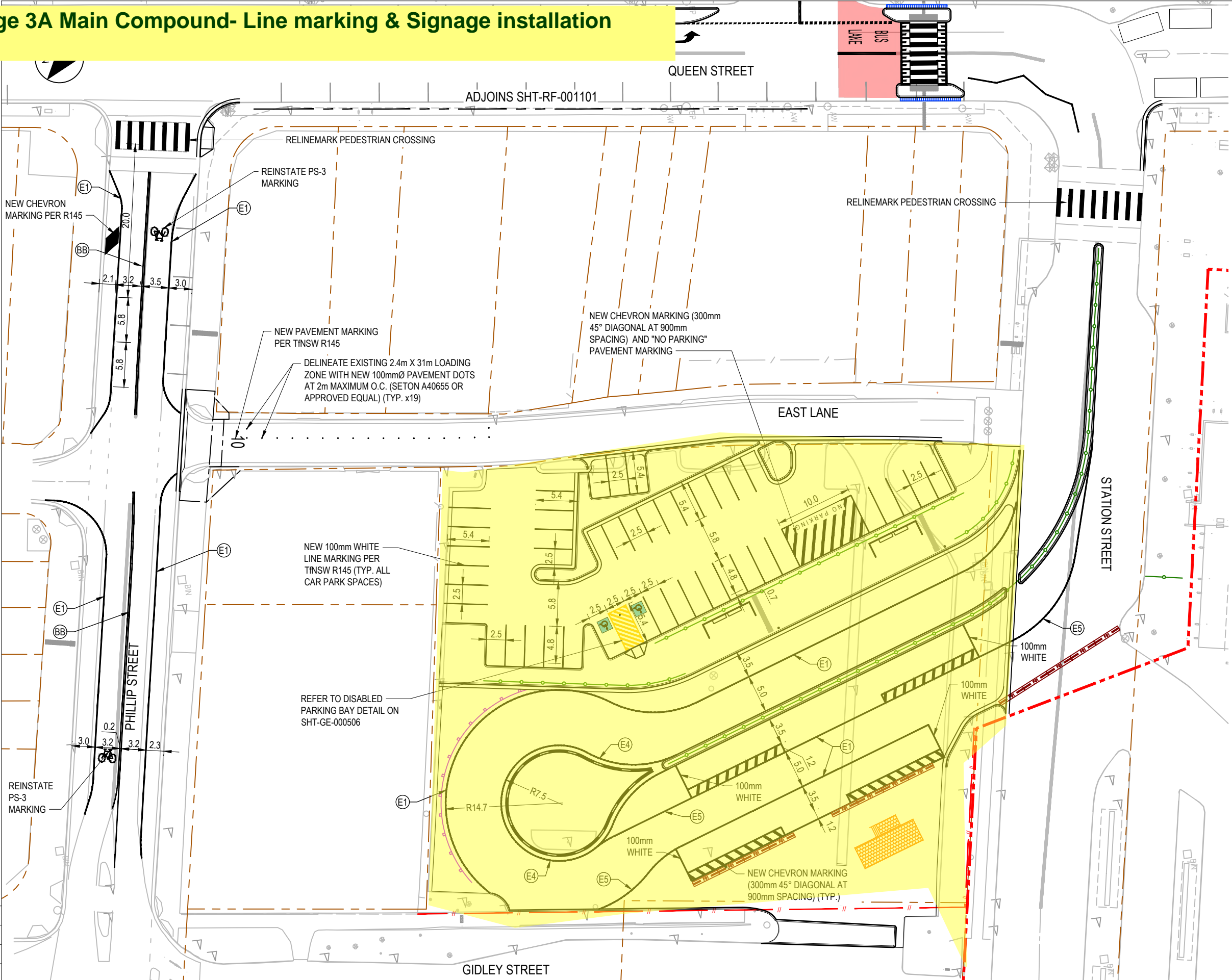
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Stage 3A Main Compound- Line marking & Signage installation

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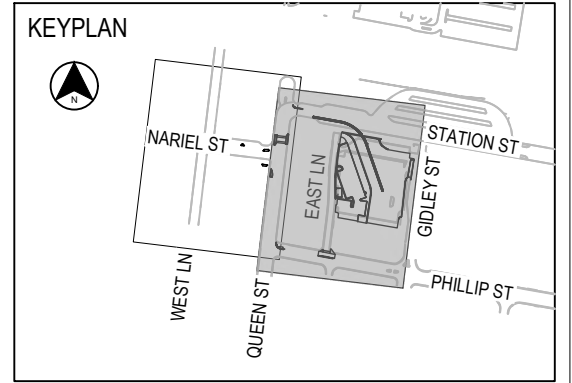
LEGEND

- BOUNDARY / LOT PROPERTY
- EXISTING SURVEY
- INDICATIVE LIMITS OF METRO BOX CONSTRUCTION ZONE
- NEW PROPERTY FENCE
- NEW PEDESTRIAN FENCE
- NEW GUARDRAIL
- NEW PRECAST CONCRETE TYPE F BARRIER
- LINEMARKING TAG
- PAVEMENT ARROW TAG
- NEW BUS SHELTER
- NEW DRIVERS FACILITY
- EXISTING TCS POSTS & MAST ARMS (TO BE MAINTAINED)

NOTES

- ALL REGULATORY SIGNPOSTING AND LINEMARKING SHOWN ON THESE DRAWINGS WILL NEED TO BE APPROVED BY WRITTEN AUTHORISATION FROM AN OFFICER AUTHORISED UNDER SECTION 5.9 OF THE TNSW DELEGATIONS MANUAL.

Line marking on D/S



CHECK PRINT

DRAWING FILE LOCATION / NAME PW/P0054029-SHT-RF-001102.DWG		DESIGN LOT CODE	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING		PLOT DATE / TIME 26-May-21 / 9:36:51 PM	PLOT BY MICHAEL.PANCITO	CLIENT	PENRITH CITY COUNCIL STATION STREET ST MARYS CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION LINEMARKING PLAN	A3																					
EXTERNAL REFERENCE FILES	REV 0	DATE 03.03.21 22.04.21	AMENDMENT / REVISION DESCRIPTION ISSUED FOR 80% DETAILED DESIGN IFT	WVR No.	APPROVAL S. CHAVA S. CHAVA	SCALES ON A3 SIZE DRAWING 2.5 0 2.5 5 7.5m 1:500 FULL SIZE A3	DRAWINGS / DESIGN PREPARED BY	TNSW REGISTRATION No. DS2021/000076	SHEET No. 1																					
<div style="font-size: 2em; opacity: 0.5; transform: rotate(-15deg);">REVISION IN PROGRESS</div>			CO-ORDINATE SYSTEM GDA 94 MGA ZONE 56		HEIGHT DATUM AHD		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>DISCIPLINE</th> <th>PRELIM</th> <th>FINAL</th> </tr> <tr> <td>M. PANCITO</td> <td>INITIAL</td> <td>DATE</td> </tr> <tr> <td>V. ECCLES</td> <td></td> <td>22.04.21</td> </tr> <tr> <td>S. ANDREWS</td> <td></td> <td>22.04.21</td> </tr> <tr> <td>V. ECCLES</td> <td></td> <td>22.04.21</td> </tr> <tr> <td>C. VAVOULAS</td> <td></td> <td>22.04.21</td> </tr> <tr> <td>S. CHAVA</td> <td></td> <td>22.04.21</td> </tr> </table>			DISCIPLINE	PRELIM	FINAL	M. PANCITO	INITIAL	DATE	V. ECCLES		22.04.21	S. ANDREWS		22.04.21	V. ECCLES		22.04.21	C. VAVOULAS		22.04.21	S. CHAVA		22.04.21
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		0	03.03.21 22.04.21	ISSUED FOR 80% DETAILED DESIGN IFT		S. CHAVA S. CHAVA	2.5 0 2.5 5 7.5m 1:500 FULL SIZE A3																							

SHEET 2 OF 2

PART 1

ISSUE 1













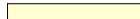





© Transport for NSW

External Work- Stage 1A Nariel St & Queen St

Last saved by: MICHAEL.PANCITO(2021-05-26) Last Plotted: 2021-05-26





CARINYA AVENUE

LEGEND

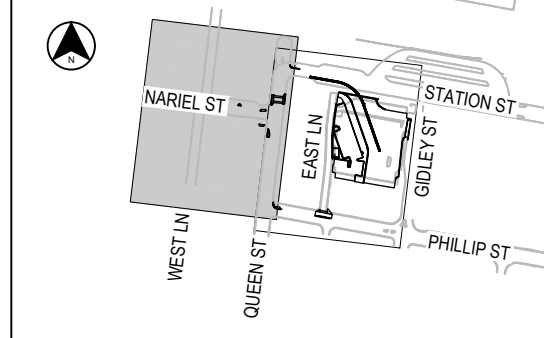
-  BOUNDARY / LOT PROPERTY
-  EXISTING SURVEY
-  INDICATIVE LIMITS OF METRO BOX CONSTRUCTION ZONE
-  NEW PROPERTY FENCE
-  NEW PEDESTRIAN FENCE
-  NEW GUARDRAIL
-  NEW PRECAST CONCRETE TYPE F BARRIER
-  NEW BUS LANE
-  NEW KISS AND RIDE PARKING
-  NEW LANDSCAPE
-  TEMPORARY BUS DROP OFF
-  TEMPORARY BUS PICK UP
-  TEMPORARY BUS LAYOVER
-  TEMPORARY PEDESTRIAN AREA
-  PARKING SPACE TO BE REMOVED
-  EXISTING PAVEMENT
-  NEW DRIVERS FACILITY
-  NEW BUS SHELTER

NOTES

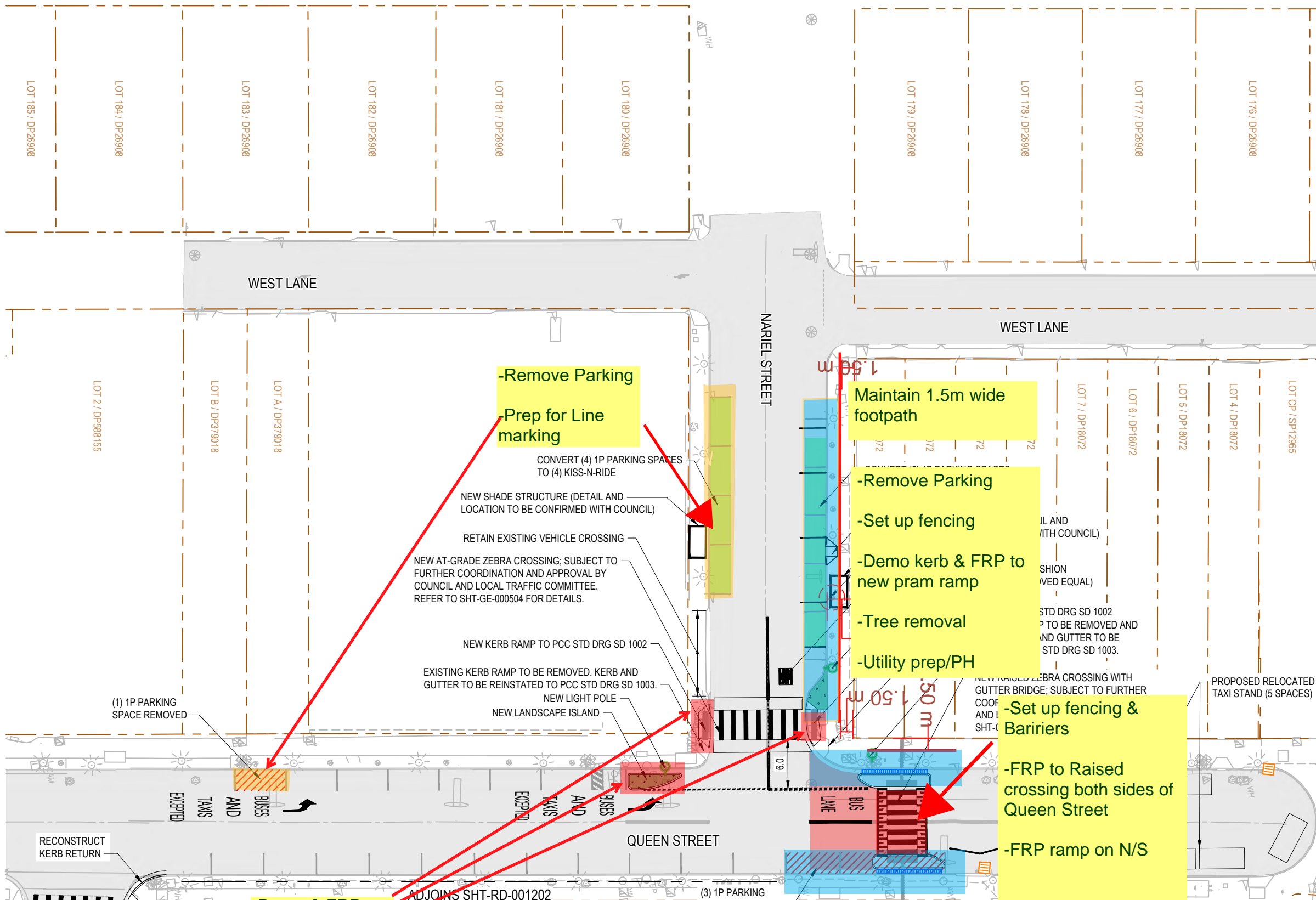
1. PENRITH CITY COUNCIL MAY MANAGE AND USE THE RETAINED VENESS PLACE CAR PARK AREA TEMPORARILY FOR PUBLIC CAR PARKING. THIS AREA IS ONLY AVAILABLE WHILE THE TEMPORARY BUS INTERCHANGE IS IN OPERATION (BETWEEN APPROXIMATELY MAR 2022 AND MAR 2027)

-  Parking removal
-  Work compound set up 24hrs
-  Pedestrian walkway (1.5m)
-  N/S areas

KEYPLAN



CHECK PRINT



-Remove Parking
-Prep for Line marking

Maintain 1.5m wide footpath

-Remove Parking
-Set up fencing
-Demo kerb & FRP to new pram ramp
-Tree removal
-Utility prep/PH

-Set up fencing & Barriers
-FRP to Raised crossing both sides of Queen Street
-FRP ramp on N/S

-Demo & FRP kerb & pram ramps on N/S
-FRP raised ramp on N/S

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED 50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME PW:/P0054029-SHT-RD-001201.DWG	
EXTERNAL REFERENCE FILES	REV DATE
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	1 03.03.21
	2 22.04.21

DESIGN LOT CODE	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING
WVR No.	APPROVAL
	S. CHAVA
	S. CHAVA
	S. CHAVA
SCALES ON A3 SIZE DRAWING	DRAWINGS / DESIGN PREPARED BY
1:500	
CO-ORDINATE SYSTEM GDA 94 MGA ZONE 56	HEIGHT DATUM AHD

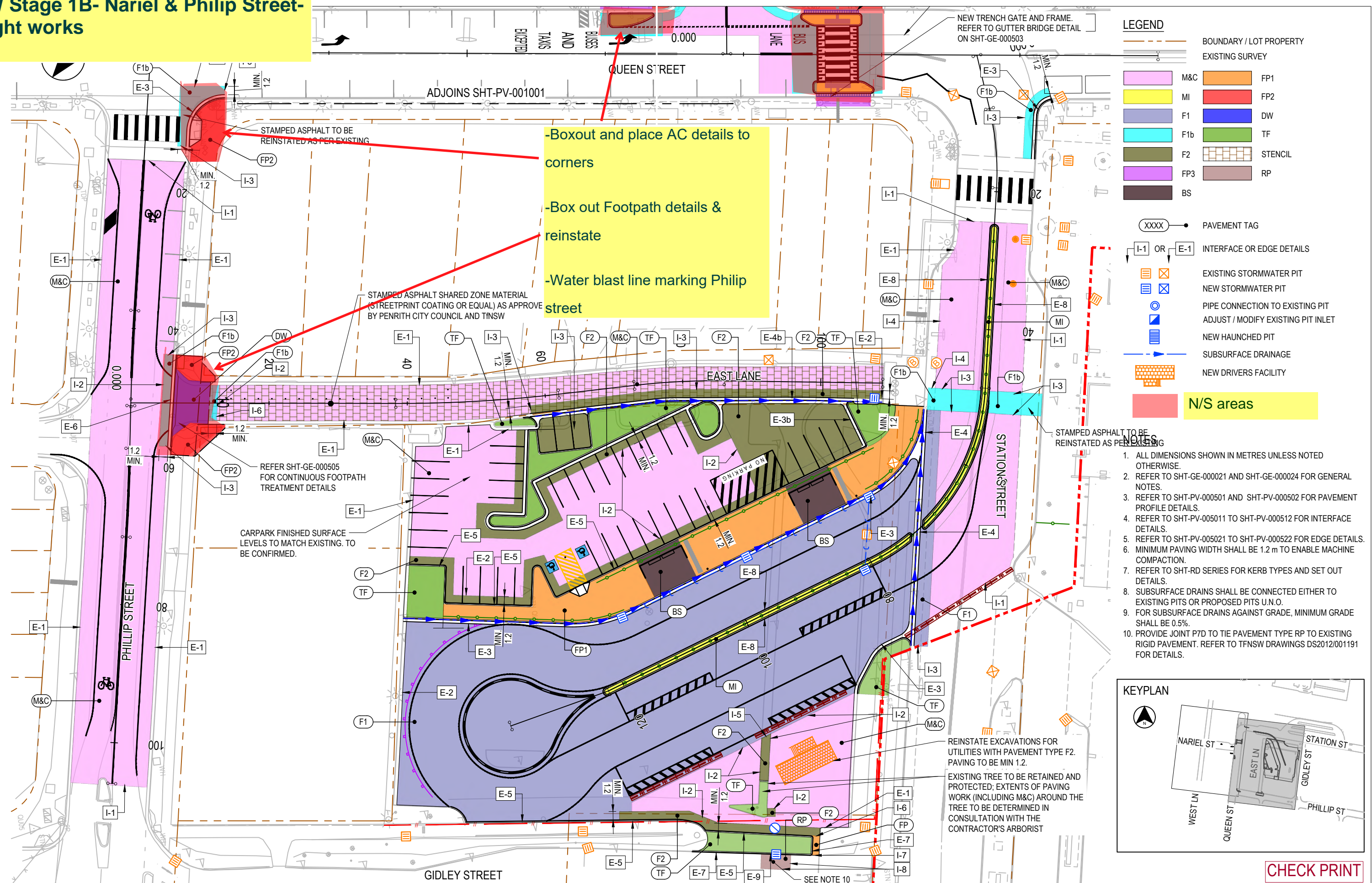
PLOT DATE / TIME 26-May-21 / 9:34:20 PM	PLOT BY MICHAEL.PANCITO
CLIENT PENRITH CITY COUNCIL	
PREPARED FOR GREATER SYDNEY DIVISION ON BEHALF OF SYDNEY METRO WEST. SYDNEY AIRPORT	

DISCIPLINE	M. PANCITO	PRELIM	INITIAL	FINAL	DATE
DISCIPLINE	V. ECCLES				22.04.21
DISCIPLINE	S. ANDREWS				22.04.21
DISCIPLINE	V. ECCLES				22.04.21
DISCIPLINE	C. VAVOULAS				22.04.21
DISCIPLINE	S. CHAVA				22.04.21

PENRITH CITY COUNCIL STATION STREET ST MARYS CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION GENERAL ARRANGEMENT PLAN		A3
TNSW REGISTRATION No. DS2021/000076		PART 1
ISSUE STATUS DETAILED DESIGN	EDMS No.	SHEET No. SHT-RD-001201
		ISSUE 2

EW Stage 1B- Nariel & Philip Street- Night works

Last saved by: MICHAEL.PANCITO(2021-05-26) Last Plotted: 2021-



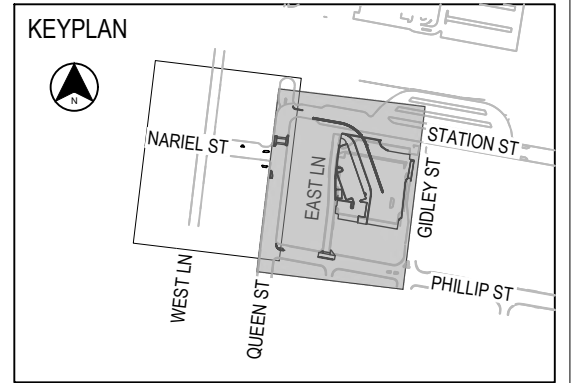
LEGEND

	BOUNDARY / LOT PROPERTY		M&C		FP1
	EXISTING SURVEY		MI		FP2
			F1		DW
			F1b		TF
			F2		STENCIL
			FP3		RP
			BS		

	PAVEMENT TAG
	INTERFACE OR EDGE DETAILS
	EXISTING STORMWATER PIT
	NEW STORMWATER PIT
	PIPE CONNECTION TO EXISTING PIT
	ADJUST / MODIFY EXISTING PIT INLET
	NEW HAUNCHED PIT
	SUBSURFACE DRAINAGE
	NEW DRIVERS FACILITY

N/S areas

- ALL DIMENSIONS SHOWN IN METRES UNLESS NOTED OTHERWISE.
- REFER TO SHT-GE-000021 AND SHT-GE-000024 FOR GENERAL NOTES.
- REFER TO SHT-PV-000501 AND SHT-PV-000502 FOR PAVEMENT PROFILE DETAILS.
- REFER TO SHT-PV-0005011 TO SHT-PV-0005012 FOR INTERFACE DETAILS.
- REFER TO SHT-PV-0005021 TO SHT-PV-0005022 FOR EDGE DETAILS.
- MINIMUM PAVING WIDTH SHALL BE 1.2 m TO ENABLE MACHINE COMPACTION.
- REFER TO SHT-RD SERIES FOR KERB TYPES AND SET OUT DETAILS.
- SUBSURFACE DRAINS SHALL BE CONNECTED EITHER TO EXISTING PITS OR PROPOSED PITS U.N.O.
- FOR SUBSURFACE DRAINS AGAINST GRADE, MINIMUM GRADE SHALL BE 0.5%.
- PROVIDE JOINT P7D TO TIE PAVEMENT TYPE RP TO EXISTING RIGID PAVEMENT. REFER TO TFNSW DRAWINGS DS2012/001191 FOR DETAILS.



CHECK PRINT

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

DRAWING FILE LOCATION / NAME PW/P0054029-SHT-PV-001002.DWG		DESIGN LOT CODE -	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING -	PLOT DATE / TIME 26-May-21 9:31:59 PM	PLOT BY MICHAEL.PANCITO	CUSTOMER PENRITH CITY COUNCIL STATION STREET ST MARYS CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION PAVEMENT PLAN	A3																						
EXTERNAL REFERENCE FILES	REV 0 1	DATE 03.03.21 22.04.21	AMENDMENT / REVISION DESCRIPTION ISSUED FOR 80% DETAILED DESIGN IFT	WVR No. S. CHAVA S. CHAVA	APPROVAL	SCALES ON A3 SIZE DRAWING 1:500 FULL SIZE A3	DRAWINGS / DESIGN PREPARED BY M. PANCITO V. ECCLES F. RASHID C. NAVARRO C. MAVOULAS S. CHAVA																						
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DISCIPLINE	PRELIM	FINAL																											
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C. MAVOULAS		22/04/21																											
S. CHAVA		22/04/21																											

EW Stage 2A Nariel & Philip Street - Night works

Last saved by: MICHAEL.PANCITO(2021-05-26) Last Plotted: 2021-05-26 10:30:00 AM

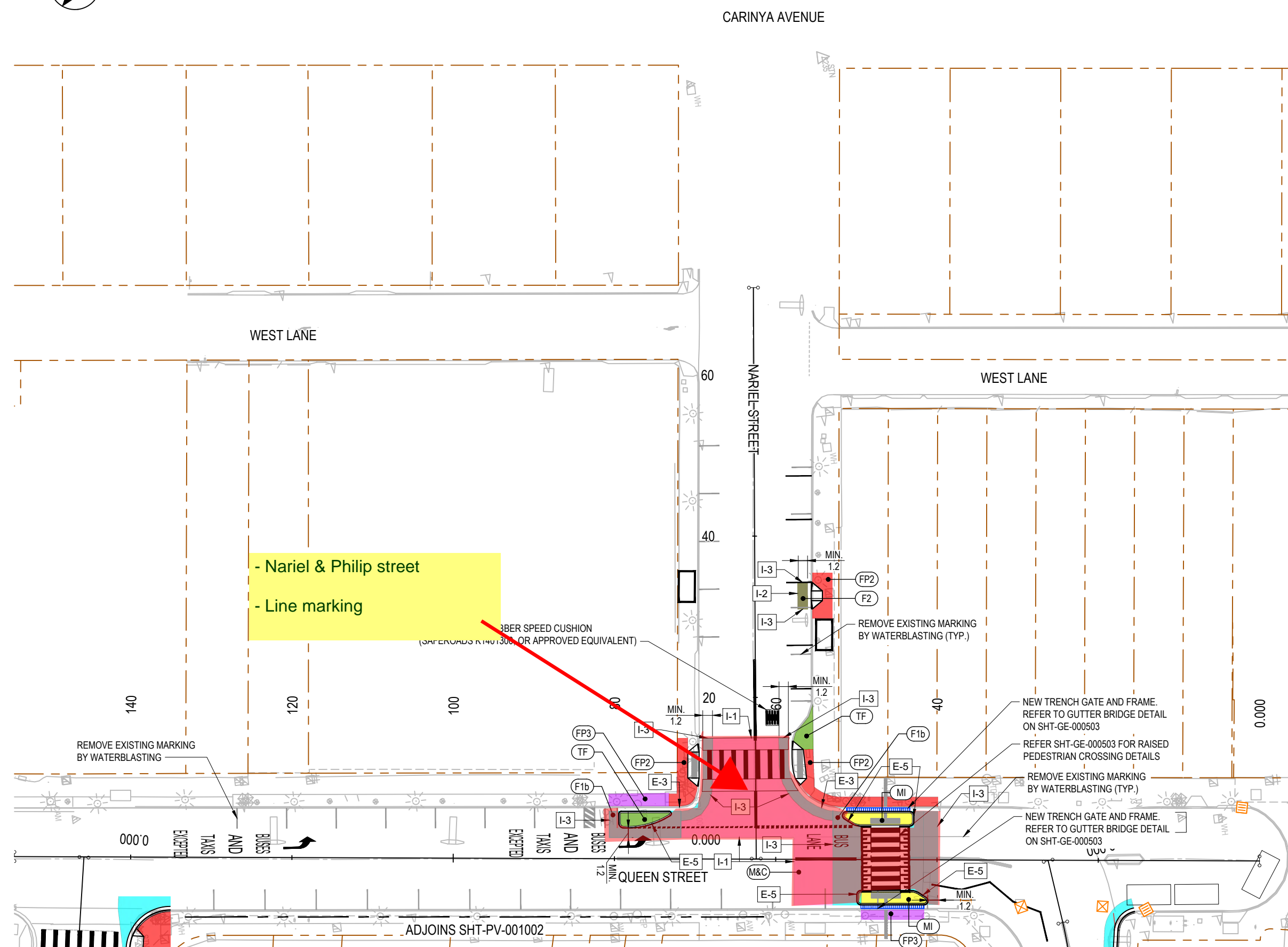
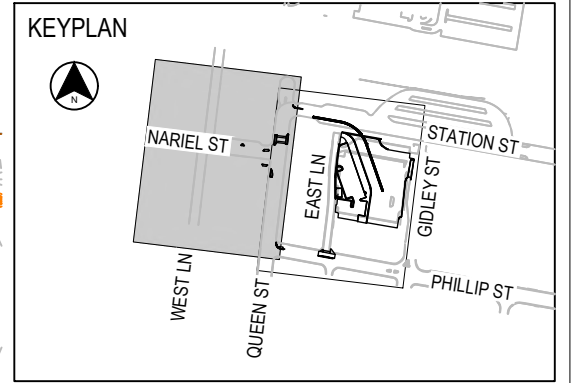
LEGEND

	BOUNDARY / LOT PROPERTY		M&C		FP1
	EXISTING SURVEY		MI		FP2
	F1		DW		TF
	F1b		STENCIL		RP
	F2				
	FP3				
	BS				

	PAVEMENT TAG
	INTERFACE OR EDGE DETAILS
	EXISTING STORMWATER PIT
	NEW STORMWATER PIT
	PIPE CONNECTION TO EXISTING PIT
	ADJUST / MODIFY EXISTING PIT INLET
	NEW HAUNCHED PIT
	SUBSURFACE DRAINAGE
	NEW DRIVERS FACILITY

N/S areas

- ### NOTES
- ALL DIMENSIONS SHOWN IN METRES UNLESS NOTED OTHERWISE.
 - REFER TO SHT-GE-000021 AND SHT-GE-000024 FOR GENERAL NOTES.
 - REFER TO SHT-PV-000501 AND SHT-PV-000502 FOR PAVEMENT PROFILE DETAILS.
 - REFER TO SHT-PV-005011 TO SHT-PV-000512 FOR INTERFACE DETAILS.
 - REFER TO SHT-PV-005021 TO SHT-PV-000522 FOR EDGE DETAILS.
 - MINIMUM PAVING WIDTH SHALL BE 1.2 m TO ENABLE MACHINE COMPACTION.
 - REFER TO SHT-RD SERIES FOR KERB TYPES AND SET OUT DETAILS.
 - SUBSURFACE DRAINS SHALL BE CONNECTED EITHER TO EXISTING PITS OR PROPOSED PITS U.N.O.
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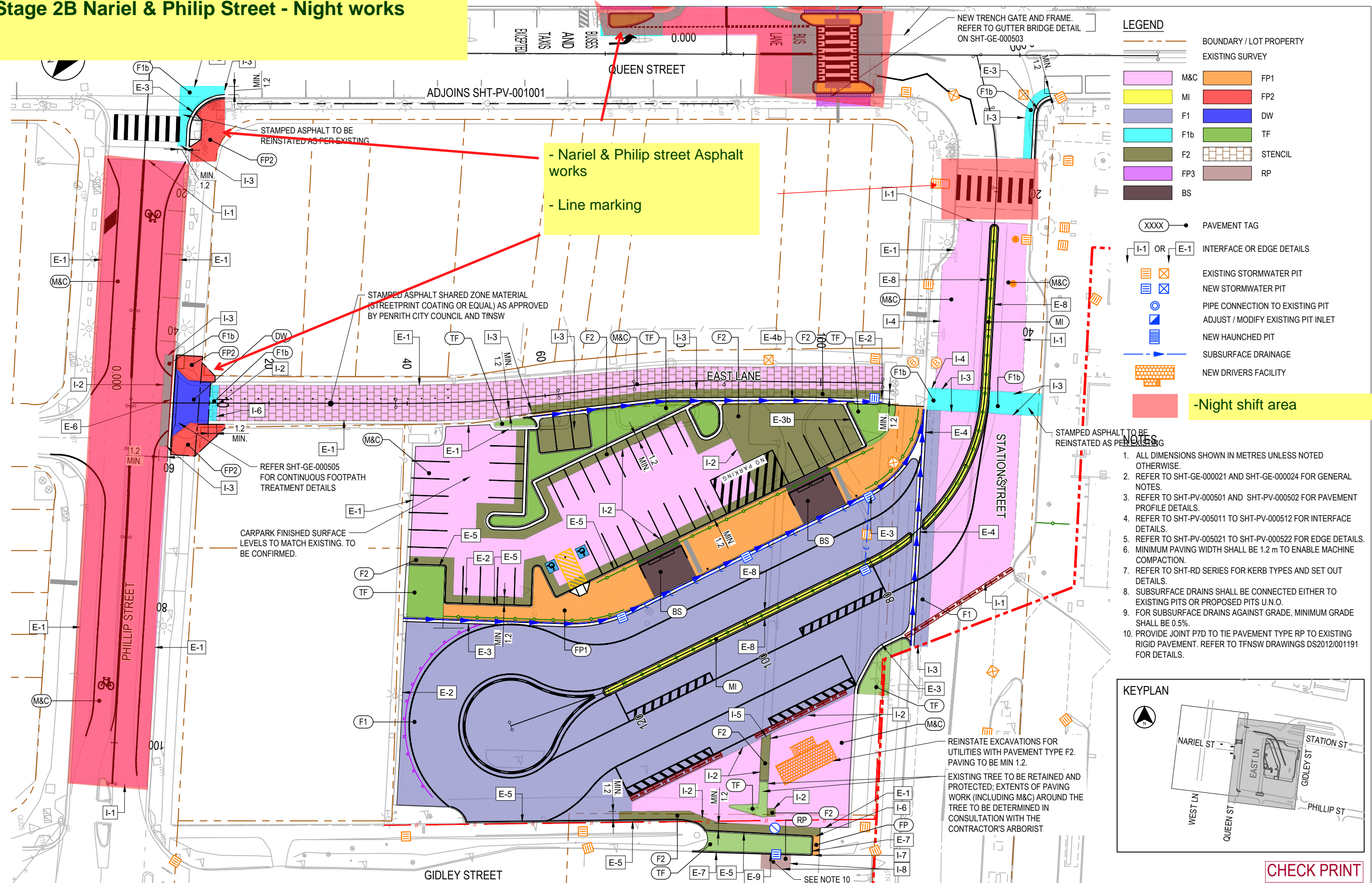
THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED FROM A 50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME PW/P0054029-SHT-PV-001001.DWG		DESIGN LOT CODE	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING		PLOT DATE / TIME 26-May-21 / 9:31:46 PM	PLOT BY MICHAEL.PANCITO	CLIENT	PENRITH CITY COUNCIL STATION STREET ST MARYS CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION PAVEMENT PLAN	A3																														
EXTERNAL REFERENCE FILES	REV 0 1	DATE 03.03.21 22.04.21	AMENDMENT / REVISION DESCRIPTION ISSUED FOR 80% DETAILED DESIGN IFT	WVR No.	APPROVAL S. CHAVA	SCALES ON A3 SIZE DRAWING 2.5 0 2.5 5 7.5m 1:500 FULL SIZE A3	DRAWINGS / DESIGN PREPARED BY	Transport for NSW PREPARED FOR GREATER SYDNEY DIVISION ON BEHALF OF SYDNEY METRO WEST, SYDNEY AIRPORT	TNSW REGISTRATION No. DS2021/000076																														
<div style="border: 1px solid black; padding: 5px; display: inline-block; transform: rotate(-15deg); opacity: 0.5;">REVISION IN PROGRESS</div>		CO-ORDINATE SYSTEM GDA 94 MGA ZONE 56		HEIGHT DATUM AHD		<div style="border: 2px solid red; padding: 5px;"> CHECK PRINT <table border="1"> <tr> <th>DISCIPLINE</th> <th>PRELIM</th> <th>FINAL</th> <th>DATE</th> </tr> <tr> <td>M. PANCITO</td> <td></td> <td></td> <td>22.04.21</td> </tr> <tr> <td>V. ECCLES</td> <td></td> <td></td> <td>22.04.21</td> </tr> <tr> <td>F. RASHID</td> <td></td> <td></td> <td>22.04.21</td> </tr> <tr> <td>C. NAVARRO</td> <td></td> <td></td> <td>22.04.21</td> </tr> <tr> <td>C. MAVOULAS</td> <td></td> <td></td> <td>22.04.21</td> </tr> <tr> <td>S. CHAVA</td> <td></td> <td></td> <td>22.04.21</td> </tr> </table> </div>			DISCIPLINE	PRELIM	FINAL	DATE	M. PANCITO			22.04.21	V. ECCLES			22.04.21	F. RASHID			22.04.21	C. NAVARRO			22.04.21	C. MAVOULAS			22.04.21	S. CHAVA			22.04.21	ISSUE STATUS DETAILED DESIGN	EDMS No.	SHEET No. SHT-PV-001001
DISCIPLINE	PRELIM	FINAL	DATE																																				
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C. MAVOULAS			22.04.21																																				
S. CHAVA			22.04.21																																				

CHECK PRINT

EW Stage 2B Nariel & Philip Street - Night works

Last saved by: MICHAEL.PANCITO(2021-05-26) Last Plotted: 2021-05-26 15:00:00 50mm ON A3 SIZE ORIGINAL



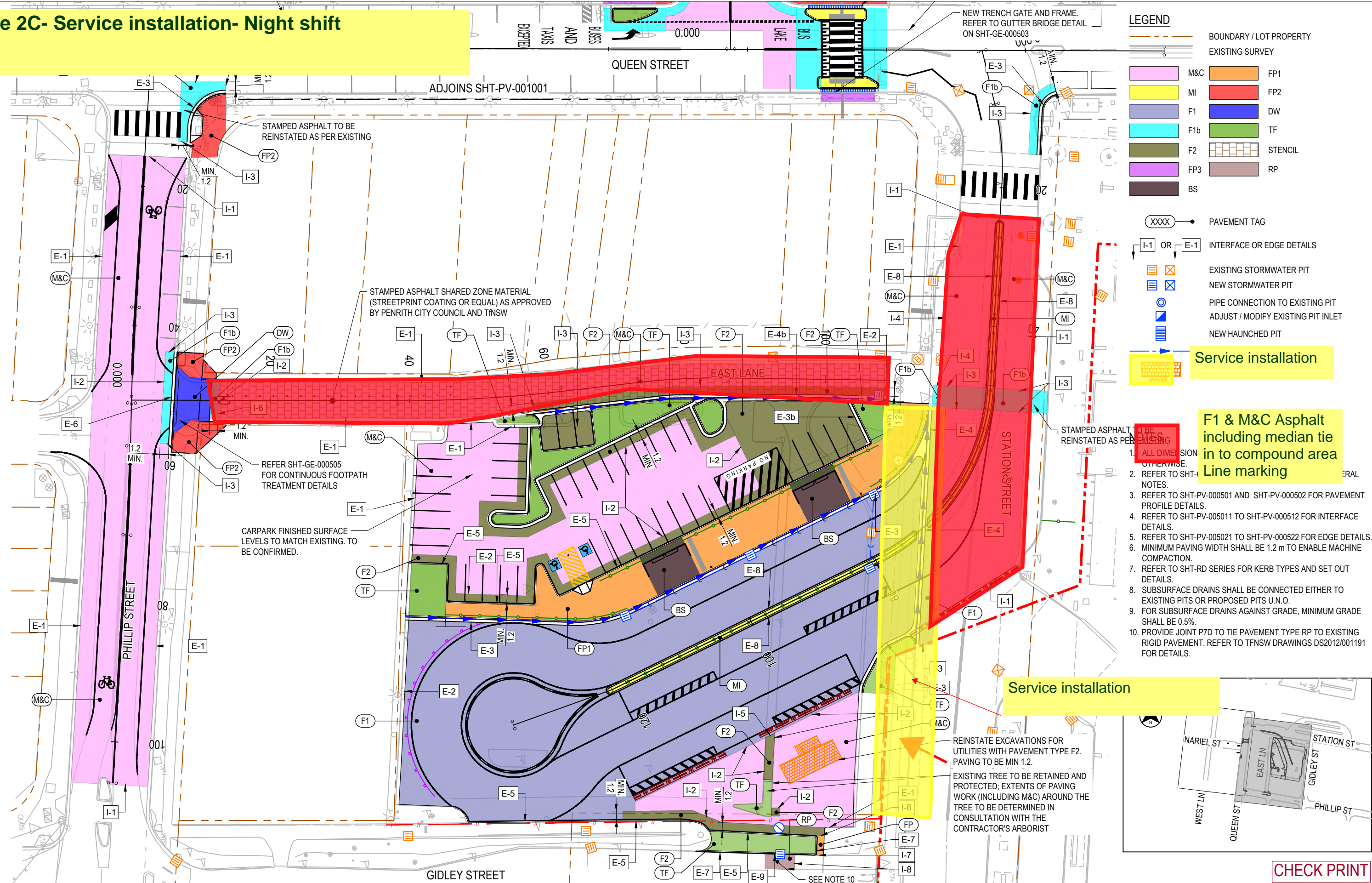
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THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

DRAWING FILE LOCATION / NAME PW/P0054029-SHT-PV-001002.DWG		DESIGN LOT CODE -	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING -	PLOT DATE / TIME 26-May-21 9:31:59 PM	PLOT BY MICHAEL PANCITO	CUSTOMER PENRITH CITY COUNCIL STATION STREET ST MARYS CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION PAVEMENT PLAN	A3
EXTERNAL REFERENCE FILES	REV 0 1	DATE 03.03.21 22.04.21	AMENDMENT / REVISION DESCRIPTION ISSUED FOR 80% DETAILED DESIGN IFT	WVR No. S. CHAVA S. CHAVA	APPROVAL	SCALES ON A3 SIZE DRAWING 1:500 FULL SIZE A3	DRAWINGS / DESIGN PREPARED BY M. PANCITO V. ECCLES F. RASHID C. NAVARRO C. MAVOULAS S. CHAVA
<p style="font-size: 2em; opacity: 0.5; transform: rotate(-45deg);">REVISION IN PROGRESS</p>		<p style="font-size: 1.5em; font-weight: bold; border: 2px solid red; padding: 5px;">CHECK PRINT</p>				<p>PREPARED FOR GREATER SYDNEY DIVISION ON BEHALF OF SYDNEY METRO WEST, SYDNEY AIRPORT</p>	<p>TNSW REGISTRATION No. DS2021/000076</p> <p>ISSUE STATUS: DETAILED DESIGN</p> <p>EDMS No. -</p> <p>SHEET No. 1</p> <p>ISSUE No. 1</p>

Stage 2C- Service installation- Night shift

Last saved by: MICHAEL.PANCITO(2021-05-26) Last Plotted:



LEGEND	
	BOUNDARY / LOT PROPERTY
	EXISTING SURVEY
	M&C
	MI
	F1
	F1b
	F2
	FP3
	BS
	FP1
	FP2
	DW
	TF
	STENCIL
	RP

- PAVEMENT TAG
- INTERFACE OR EDGE DETAILS
- EXISTING STORMWATER PIT
- NEW STORMWATER PIT
- PIPE CONNECTION TO EXISTING PIT
- ADJUST / MODIFY EXISTING PIT INLET
- NEW HAUNCHED PIT

Service installation

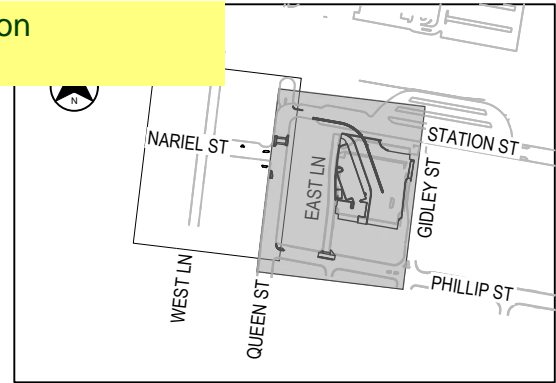
F1 & M&C Asphalt including median tie in to compound area Line marking

1. ALL DIMENSION OTHERWISE.
2. REFER TO SHT-NOTES.
3. REFER TO SHT-PV-000501 AND SHT-PV-000502 FOR PAVEMENT PROFILE DETAILS.
4. REFER TO SHT-PV-0005011 TO SHT-PV-0005012 FOR INTERFACE DETAILS.
5. REFER TO SHT-PV-0005021 TO SHT-PV-0005022 FOR EDGE DETAILS.
6. MINIMUM PAVING WIDTH SHALL BE 1.2 m TO ENABLE MACHINE COMPACTION.
7. REFER TO SHT-RD SERIES FOR KERB TYPES AND SET OUT DETAILS.
8. SUBSURFACE DRAINS SHALL BE CONNECTED EITHER TO EXISTING PITS OR PROPOSED PITS U.N.O.
9. FOR SUBSURFACE DRAINS AGAINST GRADE, MINIMUM GRADE SHALL BE 0.5%.
10. PROVIDE JOINT P7D TO TIE PAVEMENT TYPE RP TO EXISTING RIGID PAVEMENT. REFER TO FNWS DRAWINGS DS2012/001191 FOR DETAILS.

Service installation

REINSTATE EXCAVATIONS FOR UTILITIES WITH PAVEMENT TYPE F2. PAVING TO BE MIN 1.2.

EXISTING TREE TO BE RETAINED AND PROTECTED; EXTENTS OF PAVING WORK (INCLUDING M&C) AROUND THE TREE TO BE DETERMINED IN CONSULTATION WITH THE CONTRACTOR'S ARBORIST



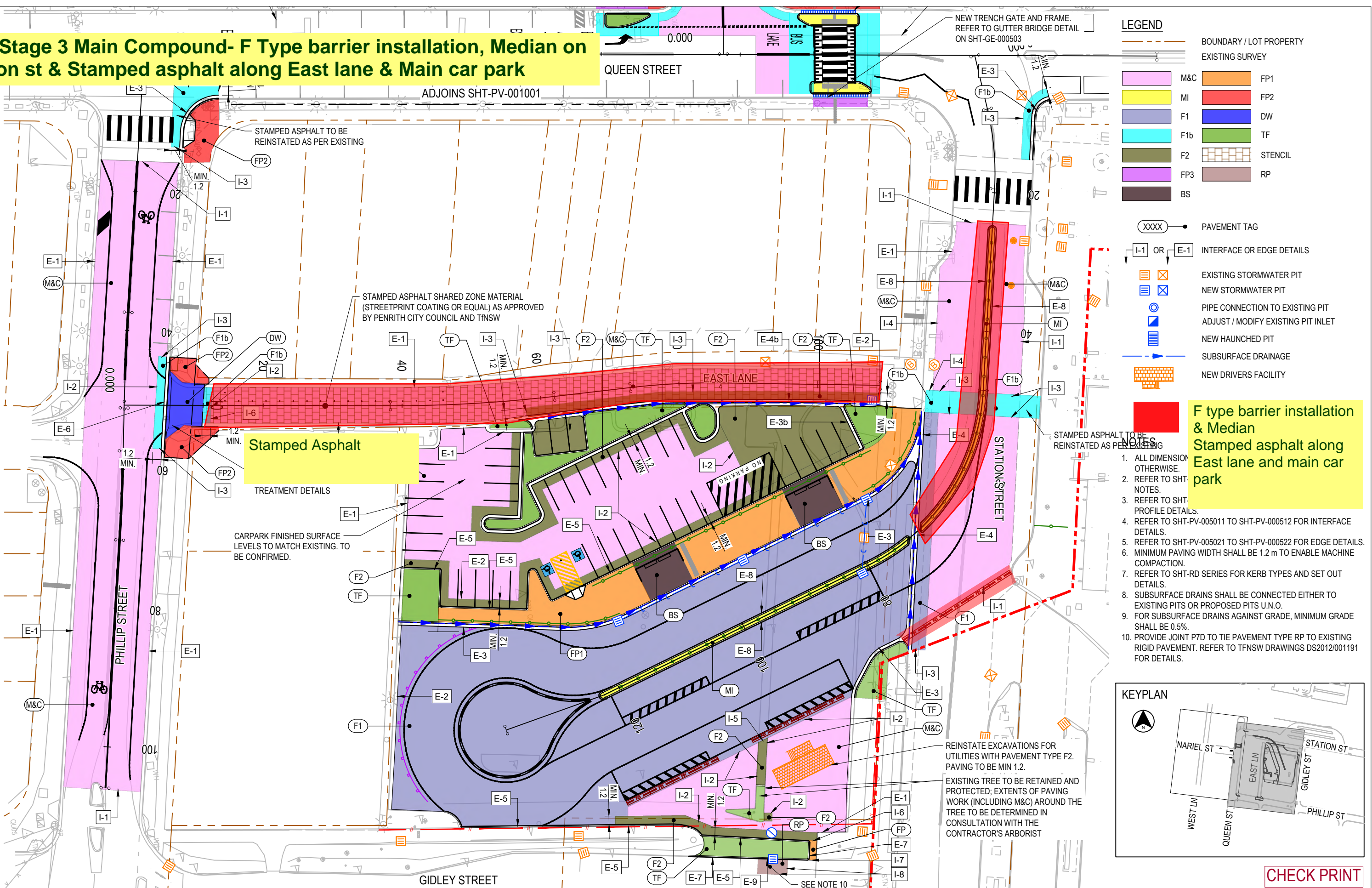
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THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

DRAWING FILE LOCATION / NAME PW/P0054029-SHT-PV-001002.DWG		DESIGN LOT CODE -		DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING -		PLOT DATE / TIME 26-May-21 / 9:31:59 PM		PLOT BY MICHAEL PANCITO		CLIENT PENRITH CITY COUNCIL STATION STREET ST MARYS CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION PAVEMENT PLAN		A3	
EXTERNAL REFERENCE FILES		REV	DATE	AMENDMENT / REVISION DESCRIPTION		SCALES ON A3 SIZE DRAWING		DRAWINGS / DESIGN PREPARED BY		NSW Transport for NSW		TNSW REGISTRATION No. DS2021/000076	
		0	03.03.21	ISSUED FOR 80% DETAILED DESIGN		1:500 FULL SIZE A3		M. PANCITO		PREPARED FOR GREATER SYDNEY DIVISION ON BEHALF OF SYDNEY METRO WEST. SYDNEY AIRPORT		SHEET No. SHT-PV-001002	
		1	22.04.21	IFT		CO-ORDINATE SYSTEM: GDA 94 MGA ZONE 56		S. CHAVA		ISSUE STATUS: DETAILED DESIGN		PART 1	
				REVISION IN PROGRESS		HEIGHT DATUM: AHD		S. CHAVA		EDMS No. -		ISSUE 1	

EW- Stage 3 Main Compound- F Type barrier installation, Median on station st & Stamped asphalt along East lane & Main car park

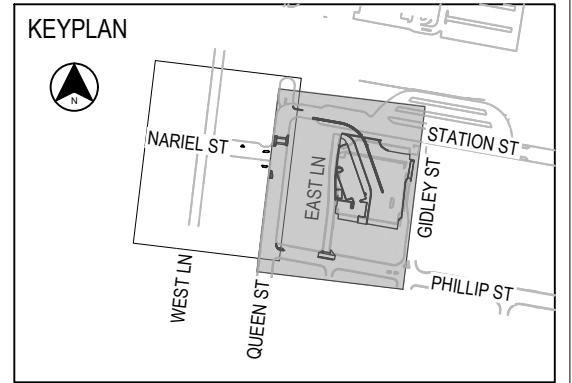
Last saved by: MICHAEL.PANCITO(2021-05-26) Last Plotted



LEGEND

- BOUNDARY / LOT PROPERTY
- EXISTING SURVEY
- M&C
- MI
- F1
- F1b
- F2
- F3
- BS
- FP1
- FP2
- DW
- TF
- STENCIL
- RP
- XXXX
- I-1 OR E-1
- EXISTING STORMWATER PIT
- NEW STORMWATER PIT
- PIPE CONNECTION TO EXISTING PIT
- ADJUST / MODIFY EXISTING PIT INLET
- NEW HAUNCHED PIT
- SUBSURFACE DRAINAGE
- NEW DRIVERS FACILITY

- F type barrier installation & Median
Stamped asphalt along East lane and main car park**
- ALL DIMENSION OTHERWISE.
 - REFER TO SHT-NOTES.
 - REFER TO SHT-PROFILE DETAILS.
 - REFER TO SHT-PV-005011 TO SHT-PV-000512 FOR INTERFACE DETAILS.
 - REFER TO SHT-PV-005021 TO SHT-PV-000522 FOR EDGE DETAILS.
 - MINIMUM PAVING WIDTH SHALL BE 1.2 m TO ENABLE MACHINE COMPACTION.
 - REFER TO SHT-RD SERIES FOR KERB TYPES AND SET OUT DETAILS.
 - SUBSURFACE DRAINS SHALL BE CONNECTED EITHER TO EXISTING PITS OR PROPOSED PITS U.N.O.
 - FOR SUBSURFACE DRAINS AGAINST GRADE, MINIMUM GRADE SHALL BE 0.5%.
 - PROVIDE JOINT P7D TO TIE PAVEMENT TYPE RP TO EXISTING RIGID PAVEMENT. REFER TO TFNSW DRAWINGS DS2012/001191 FOR DETAILS.



CHECK PRINT

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

DRAWING FILE LOCATION / NAME PW/P0054029-SHT-PV-001002.DWG		DESIGN LOT CODE -		DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING -		PLOT DATE / TIME 26-May-21 9:31:59 PM		PLOT BY MICHAEL PANCITO		CLIENT PENRITH CITY COUNCIL STATION STREET ST MARYS CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION PAVEMENT PLAN		A3	
EXTERNAL REFERENCE FILES		REV	DATE	AMENDMENT / REVISION DESCRIPTION		SCALES ON A3 SIZE DRAWING		DRAWINGS / DESIGN PREPARED BY		Transport for NSW		TNSW REGISTRATION No. DS2021/000076	
		0	03.03.21	ISSUED FOR 80% DETAILED DESIGN		1:500 FULL SIZE A3		CHECK PRINT DISCIPLINE M. PANCITO DISCIPLINE V. ECCLES DISCIPLINE F. RASHID DISCIPLINE C. NAVARRO BACKDRAFTED/CORRECTED CONFIRMED S. CHAVA		PREPARED FOR GREATER SYDNEY DIVISION ON BEHALF OF SYDNEY METRO WEST. SYDNEY AIRPORT		SHEET No. SHT-PV-001002 ISSUE 1	
		1	22.04.21	REVISION IN PROGRESS IFT		CO-ORDINATE SYSTEM GDA 94 MGA ZONE 56				SHEET No. 1 ISSUE 1		SHEET 2 OF 2 © Transport for NSW	



APPENDIX C

Construction Equipment Schedules and Sound Power Levels

Table B-1 Construction Equipment Schedules and Sound Power Levels

Stage	Activity	Construction Equipment	Sound Power Level - SWL (L_{Aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL ($L_{Aeq,15min}$ dBA)	Activity SWL ($L_{A1,1min}$ dBA)
SE – Site Establishment	Setup Environmental Controls/Tree Protection Install ATF Fencing (Standard Hours)	Semi/Bogie	105	5	100	107	112
		All Terrain Forklift	96	5	91		
		Delivery / Hiab Truck	105	5	100		
		14t Excavator with Bucket	105	5	105		
		Hand Tools	90	5	85		
1A – Main Car Park	Potholing (Standard Hours and Out-of-Hours)	Wet Vac	103	10	101	115	120
		Dry Vac	103	10	101		
		2t Tipper Truck	105	5	100		
		Plate Compactor	109	5	104		
		Jumping Jack	106	5	101		
		Delivery / Hiab Truck	105	5	100		
		Concrete Saw	118	5	113		
		Jackhammer	113	5	108		
		Hand Tools	90	5	85		
1A – Main Car Park	Demo Car Park AC (Standard Hours)	14t Excavator with Bucket / Ripper	105	5	105	114	120
		14t Excavator with Hammer	118	5	113		
		Rigid Truck / Bogie	105	5	100		
		2t Tipper Truck	105	5	100		
		Concrete Saw	118	5	113		

Stage	Activity	Construction Equipment	Sound Power Level - SWL (L _{Aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL (L _{Aeq,15min} dBA)	Activity SWL (L _{A1,1min} dBA)
1B - Main Car Park	Pavement Box Out (Standard Hours)	20t Excavator with Bucket	105	5	100	106	115
		Rigid Truck / Bogie	105	5	100		
		Watercart	107	5	102		
1B - Main Car Park	Pavement Box Out Service Installation - Stormwater (Standard Hours)	14t Excavator with Bucket	105	5	100	114	120
		14t Excavator with Hammer	118	5	113		
		Plate Compactor	109	5	104		
		Jumping Jack	106	5	101		
		Rigid Truck / Bogie	105	5	100		
		2t Tipper Truck	105	5	100		
1B - Main Car Park	Pavement Box Out Service Installation - Electrical Services (Standard Hours)	5t Excavator with Bucket	95	5	105	112	117
		5t Excavator with Hammer	115	5	110		
		Plate Compactor	109	5	104		
		Jumping Jack	106	5	101		
		Rigid Truck / Bogie	105	5	100		
		2t Tipper Truck	105	5	100		
2A - Main Car Park	Sub base installation (Pavement works) (Standard Hours)	14t Excavator with Bucket	105	5	100	110	114
		Positrack	90	5	85		
		Watercart	107	5	102		
		8t Smooth Drum Roller	107	10	105		

Stage	Activity	Construction Equipment	Sound Power Level - SWL (L _{Aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL (L _{Aeq,15min} dBA)	Activity SWL (L _{A1,1min} dBA)
		Rigid Trucks - Bogies/10 Wheelers	105	5	100		
		Concrete Agitator	109	5	104		
		Kerb placing machine	109	5	104		
2A - Main Car Park	Kerb Construction (Standard Hours)	Concrete Agitator	109	5	104	107	114
		Kerb Placing Machine	109	5	104		
		Hand tools	90	5	85		
2B - Main Car Park	Pavement Final Trim Works (Standard Hours)	14t Excavator with Bucket	105	5	100	107	115
		Positrack	90	5	85		
		Watercart	107	5	102		
		CC10 Vibratory Roller*	109	5	104		
2B - Main Car Park	Landscape Prep Works (Standard Hours)	8t Excavator with Bucket	100	5	105	105	115
		Positrack	90	5	85		
2B - Main Car Park	AC Prep Works (Standard Hours)	Milling Machine / Profiler	117	5	112	113	119
		Positrack	90	5	85		
		14t Excavator with Bucket	105	5	100		
		Rigid Trucks - Bogies/10 Wheelers	105	5	100		
2B - Main Car Park	Driver Facility Installation (Standard Hours)	20t Franna	98	15	98	102	110
		Hiab Truck	105	5	100		
2B - Main Car Park	Bus Shelter Installation	20t Franna	98	15	98	102	110
		Hiab Truck	105	5	100		

Stage	Activity	Construction Equipment	Sound Power Level - SWL (L _{Aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL (L _{Aeq,15min} dBA)	Activity SWL (L _{A1,1min} dBA)
	(Standard Hours)						
2B - Main Car Park	Asphalt Works - Mill and Correct in Car Park	Milling Machine / Profiler	117	5	112	113	119
		Positrack	90	5	85		
		Paver	114	10	112		
	(Standard Hours)	Rigid Trucks - Bogies/10 Wheelers	105	5	100		
3 - Main Car Park	Stamped Asphalt	Plate Compactor	109	5	104	104	114
	(Standard Hours)	Positrack	90	5	85		
3A - Main Car Park	Line Marking	Line Marking Truck	108	10	106	106	110
	(Standard Hours)	Line Marking Gernie	90	5	85		
3A - Main Car Park	Signage Installation	Hand Tools	90	5	85	113	120
	(Standard Hours)	Core Drill	118	5	113		
External Works							
Stage	Activity	Construction Equipment	Sound Power Level - SWL (L _{Aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL (L _{Aeq,15min} dBA)	Activity SWL (L _{A1,1min} dBA)
1A - External Works - Nariel and Queen Street	Set up ATF Fencing/Satellite Site Compounds (Night Works)	Hand Tools	90	5	85	100	105
		2t Tipper	105	5	100		
	Potholing	Wet Vac	103	10	101	113	120

Stage	Activity	Construction Equipment	Sound Power Level - SWL (L _{Aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL (L _{Aeq,15min} dBA)	Activity SWL (L _{A1,1min} dBA)
1A - External Works - Nariel and Queen Street	(Night Works)	Dry Vac	103	10	101		
		2t Tipper Truck	105	5	100		
		Plate Compactor	109	5	104		
		Jumping Jack	106	5	101		
		Delivery / Hiab Truck	105	5	100		
		Quick Cut Concrete Saw*	118	3	111		
		Jackhammer	113	5	108		
1A - External Works - Nariel and Queen Street	Remove Parking Lanes (Night Works)	Hand Tools	90	5	85	112	120
		Jackhammer	113	5	108		
		5t Excavator with Bucket	95	5	105		
		2t Tipper Truck	105	5	100		
		Rigid Truck / Bogie	105	5	100		
		Quick Cut Concrete Saw*	118	3	111		
1A - External Works - Nariel and Queen Street	Kerb Demolition (Night Works)	Hand Tools	90	5	85	113	120
		Jackhammer	113	5	108		
		5t Excavator with Bucket	95	5	105		
		2t Tipper Truck	105	5	100		
		Rigid Truck / Bogie	105	5	100		
		Quick Cut Concrete Saw*	118	3	111		
1A - External Works - Nariel and Queen Street	Kerb/Pram Ramp Construction	Concrete Agitator	109	5	104	105	110
		Form Work Tools	90	5	85		
	(Night Works)	Circular Saw/Grinder*	105	5	100		

Stage	Activity	Construction Equipment	Sound Power Level - SWL (L _{Aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL (L _{Aeq,15min} dBA)	Activity SWL (L _{A1,1min} dBA)
1A - External Works - Nariel and Queen Street	Raised Crossing Construction	Concrete Agitator	109	5	104	112	120
		Circular Saw/Grinder*	105	5	100		
	(Night Works)	Quick Cut Concrete Saw*	118	3	111		
1A - External Works - Nariel and Queen Street	Tree Removal (Night Works)	Chainsaw*	114	5	109	109	119
		2t Tipper Truck	105	5	100		
1B - External Works - Nariel and Phillip Street	Excavate/Box out and Re-instate Footpath Corners	Hand Tools	90	5	85	110	118
		Jackhammer	113	5	108		
	(Night Works)	5t Excavator with Bucket	95	5	105		
		2t Tipper Truck	105	5	100		
		Rigid Truck / Bogie	105	5	100		
1B - External Works - Nariel and Phillip Street	Asphalt Works to Corners	CC10 Vibratory Roller*	109	5	104	113	116
		Positrack	90	5	85		
	(Night Works)	Paver	114	10	112		
		Rigid Trucks - Bogies/10 Wheelers	105	5	100		
		5t Excavator with Bucket	95	5	105		
2A - External Works - Nariel and Phillip Street	Line Marking (Night Works)	Line Marking Truck	108	10	106	106	115
		Line Marking Gernie	90	5	85		
		Water Blaster*	110	5	105		
		2t Tipper Truck	105	5	100		
		Traffic Control Utes	90	5	85		

Stage	Activity	Construction Equipment	Sound Power Level - SWL (L _{Aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL (L _{Aeq,15min} dBA)	Activity SWL (L _{A1,1min} dBA)
2C - External Works - Nariel and Phillip Street	Service Installation - Electrical Services (Standard Hours)	5t Excavator with Bucket	95	5	105	110	120
		5t Excavator with Hammer	115	5	110		
		Plate Compactor	109	5	104		
		Jumping Jack	106	5	101		
		Rigid Truck / Bogie	105	5	100		
		2t Tipper Truck	105	5	100		
2C - External Works - Nariel and Phillip Street	Asphalt Works (Standard Hours)	Milling Machine / Profiler	117	5	112	112	119
		Positrack	90	5	85		
		Paver	114	10	112		
		Rigid Trucks - Bogies/10 Wheelers	105	5	100		
		CC10 Non-Vibratory Steam Roller	109	5	104		

Note: Sources marked with an asterisk (e.g. concrete saws, grinders, hydraulic hammers, profilers, vibratory rollers) can emit noise with special audible (annoying) characteristics. In accordance with the ICNG and the CNVS, predicted noise levels for these stages incur a +5 dB penalty to account for the additional annoyance that could arise. This penalty has been applied to the predicted levels. The activity sound power levels for each stage take account of the potential for the coinciding use of plant items – where certain plant items would operate at the same time adjustments have been calculated. Additionally, semi/bogie trucks would not idle whilst on site. For the car park demolition provision has been made for a medium sized hydraulic hammer (max capacity 900 kg) attachment to be used in conjunction with the 14t excavator. Depending on site conditions, lower capacity plant may potentially be used where practicable. For the Stage 1A tree removal works, the trees to be removed are small and will be transported to compound for chipping during standard hours in 2t tipper/bogie. The predicted levels from the identified works are considered to be conservative. In practice, due to the inherent mobilization and planning/safety protocols involved with these type of works, there would be expected to be lengthy periods during which plant would not operate at the capacities assumed by this assessment, Therefore generally lower levels than predicted would be expected for significant durations during the works.



APPENDIX D

Construction Noise Prediction Tables and CNVS Additional Mitigation Measures

Table D-1 L_{Aeq,15min} Construction Noise Predictions for Sub-Stages 1-19 – Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	51	57	56	48	53	52	55	43	73	72	71	63	65	67	78	61	55	66	58
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	51	57	56	48	55	52	55	42	74	73	73	65	69	70	76	63	50	68	54
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	48	54	53	45	54	49	52	41	70	69	64	56	60	66	71	54	48	60	53
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	42	50	49	40	49	44	48	38	57	56	52	44	50	53	61	44	45	55	48
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	43	50	49	41	48	45	48	37	56	55	51	43	50	51	60	44	45	53	48
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	32	39	38	29	36	33	37	23	40	39	40	32	39	35	49	32	32	38	35
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	33	40	39	30	36	34	38	26	42	41	40	32	38	38	49	32	35	41	37
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	39	45	44	36	46	40	43	33	56	55	49	41	48	52	57	42	43	48	45
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	46	51	50	43	49	47	49	36	57	54	57	49	56	51	57	48	44	54	47
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	48	53	52	45	46	49	51	36	62	61	62	54	52	57	69	52	44	57	47
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	63	70	69	62	70	66	68	46	56	56	46	38	42	44	72	37	64	78	67
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	51	58	57	49	57	53	56	47	52	52	43	35	42	42	63	35	54	68	57
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	40	47	46	37	46	41	45	37	48	48	39	31	36	40	60	31	47	64	50
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	34	41	40	31	40	35	39	29	41	41	35	27	33	36	56	27	44	60	47
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	33	40	39	29	36	33	38	29	41	41	34	26	30	35	54	25	42	57	45
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	32	39	38	29	37	33	37	29	41	40	37	29	33	37	52	27	39	54	42
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	30	36	35	26	32	30	34	26	38	37	37	29	34	34	50	28	36	52	39
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	25	32	31	22	31	26	30	20	38	38	36	28	32	27	48	27	36	53	39
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	30	36	35	25	31	29	34	26	40	40	31	23	29	26	50	23	38	54	41
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	33	40	39	30	37	34	38	29	42	42	34	26	31	34	53	25	42	57	45
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	34	41	40	32	38	36	39	30	39	39	37	29	36	33	58	30	46	62	49
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	56	64	62	55	64	59	61	42	54	54	49	41	46	44	57	40	58	70	63
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	51	58	57	49	60	53	56	37	53	53	49	41	44	45	57	38	53	60	59
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	44	50	49	41	54	45	48	30	49	47	49	41	48	44	52	40	46	52	51
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	37	43	41	33	41	37	40	30	46	46	41	33	38	37	49	33	41	47	44
R26	3 Station St	Residential	37	37	36	47	42	42	41	54	61	59	52	65	56	58	42	47	41	47	39	46	38	45	37	61	59	62
R27	1 Station St	Residential	37	37	36	47	42	42	41	52	58	57	49	61	53	56	45	47	46	47	39	46	34	45	38	57	54	60
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	43	49	48	40	51	44	47	38	44	44	41	33	40	28	41	31	46	37	50
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	39	45	41	34	47	38	40	29	40	40	38	30	33	34	39	28	45	45	47
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	39	46	41	35	48	39	40	25	38	38	36	28	35	32	43	29	46	48	49
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41	54	62	61	52	60	56	60	51	86	86	85	77	79	72	94	74	57	80	61

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver.

- 01 - SE - Site Establishment
- 02 - 1A - Main Car Park - Potholing
- 03 - 1A - Main Car Park - Demo Carpark AC
- 04 - 1B - Main Carpark - Pavement Box Out
- 05 - 1B - Main Carpark - Service Installation
- 06 - 2A - Main Carpark - Sub-Base Installation & Kerbs
- 07 - 2B - Main Car Park - Mill & Correct
- 08 - 3 - Stamped Asphalt
- 09 - EW - 1A Nariel St & Queen St - Potholing
- 10 - EW - 1A Nariel St & Queen St - Remove Parking Lanes
- 11 - EW - 1A Nariel St & Queen St - Kerb Demolition
- 12 - EW - 1A Nariel St & Queen St - Kerb-Pram Ramp Construction
- 13 - EW - 1A Nariel St & Queen St - Raised Crossing Construction
- 14 - EW - 1A Nariel St & Queen St - Tree Removal
- 15 - EW - 1B Nariel & Philip St- Night Works
- 16 - EW - 2A Nariel & Philip St - Night Works
- 17 - EW - 2C- Nariel and Phillip St - Service Installation
- 18 - EW - 2C Nariel & Phillip St - Ashhault Works
- 19 - EW- 3 Main Compound- F Type Barrier Installation, Median on Station St & Stamped Asphalt along East Lane & Main Car Park

Table D-2 L_{Aeq,15min} Construction Noise Predictions for Sub-Stages 1-19 – Non-Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
C01	TBC	Commercial	-	-	-	70	70	70	70	80	88	87	74	78	78	86	82	60	59	59	51	56	56	67	51	78	62	81
C02	TBC	Commercial	-	-	-	70	70	70	70	75	83	82	71	77	75	81	75	60	59	56	48	52	56	77	47	87	76	90
C03	TBC	Commercial	-	-	-	70	70	70	70	73	81	80	71	81	75	79	72	57	55	56	48	55	50	68	49	81	67	84
C04	TBC	Commercial	-	-	-	70	70	70	70	75	83	82	75	87	79	81	71	56	52	56	48	55	49	62	48	88	63	91
C05	TBC	Commercial	-	-	-	70	70	70	70	76	84	83	74	84	78	82	68	60	57	60	52	59	54	66	52	77	71	80
C06	TBC	Commercial	-	-	-	70	70	70	70	72	79	78	70	74	74	77	67	61	59	60	52	58	56	66	52	71	73	74
C07	TBC	Commercial	-	-	-	70	70	70	70	60	68	67	61	72	65	66	52	84	76	83	75	82	60	85	75	75	82	78
C08	TBC	Commercial	-	-	-	70	70	70	70	53	60	59	51	63	55	58	49	94	85	94	86	90	82	92	83	64	89	66
C09	TBC	Commercial	-	-	-	70	70	70	70	53	61	60	51	58	55	59	51	91	90	91	83	81	82	98	78	55	84	58
C10#	TBC	Commercial	-	-	-	70	70	70	70	54	62	61	52	60	56	60	51	86	86	85	77	79	72	94	74	57	80	61
C11	TBC	Commercial	-	-	-	70	70	70	70	49	57	56	48	57	52	55	46	89	89	77	69	72	68	85	67	58	80	61
C12	TBC	Commercial	-	-	-	70	70	70	70	47	54	53	45	54	49	52	44	76	76	68	60	67	50	77	61	52	72	56
C13	TBC	Commercial	-	-	-	70	70	70	70	42	49	48	41	50	45	47	38	71	71	66	58	64	46	75	58	48	64	51
C14	TBC	Commercial	-	-	-	70	70	70	70	43	50	49	41	50	45	48	40	67	67	64	56	62	46	72	56	48	62	51
C15	TBC	Commercial	-	-	-	70	70	70	70	36	44	43	35	45	39	42	33	63	63	60	52	59	43	69	53	42	59	45
C16	TBC	Commercial	-	-	-	70	70	70	70	34	42	41	32	39	36	40	31	64	64	62	54	58	47	69	53	37	59	40
C17	TBC	Commercial	-	-	-	70	70	70	70	38	46	45	37	43	41	44	34	69	69	65	57	62	54	73	56	42	62	45
C18	TBC	Commercial	-	-	-	70	70	70	70	42	50	49	40	49	44	48	40	72	72	68	60	63	56	76	58	49	66	52
C19	TBC	Commercial	-	-	-	70	70	70	70	46	54	53	44	52	48	52	43	77	77	70	62	66	60	78	61	54	70	57
C20	TBC	Commercial	-	-	-	70	70	70	70	50	57	56	48	55	52	55	47	82	82	76	68	69	66	86	65	66	87	69
C21	TBC	Commercial	-	-	-	70	70	70	70	61	68	67	58	70	62	66	60	78	78	56	48	53	49	85	47	75	91	78
C22	TBC	Commercial	-	-	-	70	70	70	70	58	65	64	56	63	60	63	56	70	70	50	42	49	47	80	42	68	90	71
C23	TBC	Commercial	-	-	-	70	70	70	70	45	51	50	40	49	44	49	42	45	45	41	33	37	40	63	32	52	68	55
C24	TBC	Commercial	-	-	-	70	70	70	70	51	57	56	48	58	52	55	44	51	51	42	34	41	41	64	35	54	73	57
C25	TBC	Commercial	-	-	-	70	70	70	70	61	68	67	59	61	63	66	56	60	60	51	43	48	47	69	41	62	78	65
C26	TBC	Childcare Centre	-	-	-	60	60	-	-	49	56	54	47	60	51	53	37	42	36	42	34	41	33	40	32	56	54	57

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver.

- 01 - SE - Site Establishment
- 02 - 1A - Main Car Park - Potholing
- 03 - 1A - Main Car Park - Demo Carpark AC
- 04 - 1B - Main Carpark - Pavement Box Out
- 05 - 1B - Main Carpark - Service Installation
- 06 - 2A - Main Carpark - Sub-Base Installation & Kerbs
- 07 - 2B - Main Car Park - Mill & Correct
- 08 - 3 - Stamped Asphalt
- 09 - EW - 1A Nariel St & Queen St - Potholing
- 10 - EW - 1A Nariel St & Queen St - Remove Parking Lanes
- 11 - EW - 1A Nariel St & Queen St - Kerb Demolition
- 12 - EW - 1A Nariel St & Queen St - Kerb-Pram Ramp Construction
- 13 - EW - 1A Nariel St & Queen St - Raised Crossing Construction
- 14 - EW - 1A Nariel St & Queen St - Tree Removal
- 15 - EW - 1B Nariel & Philip St- Night Works
- 16 - EW - 2A Nariel & Philip St - Night Works
- 17 - EW - 2C- Nariel and Phillip St - Service Installation
- 18 - EW - 2C Nariel & Philip St - Ashphalt Works
- 19 - EW- 3 Main Compound- F Type Barrier Installation, Median on Station St & Stamped Asphalt along East Lane & Main Car Park

Table D-3 L_{Aeq,15min} Construction Noise Predictions – Standard Hours NML Exceedances for Sub-Stages 1-19 and Additional Mitigation – Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	4	10	9	1	6	5	8	-	-	-	-	-	-	-	-	-	8	19	11
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	4	10	9	1	8	5	8	-	-	-	-	-	-	-	-	-	3	21	7
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	1	7	6	-	7	2	5	-	-	-	-	-	-	-	-	-	1	13	6
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	3	2	-	2	-	1	-	-	-	-	-	-	-	-	-	-	8	1
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	3	2	-	1	-	1	-	-	-	-	-	-	-	-	-	-	6	1
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	4	3	-	2	-	2	-	-	-	-	-	-	-	-	-	-	7	0
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	1	6	5	-	-	2	4	-	-	-	-	-	-	-	-	-	-	10	0
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	16	23	22	15	23	19	21	-	-	-	-	-	-	-	-	-	17	31	20
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	4	11	10	2	10	6	9	-	-	-	-	-	-	-	-	-	7	21	10
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	17	3	
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	-
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	2
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	9	17	15	8	17	12	14	-	-	-	-	-	-	-	-	-	11	23	16
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	4	11	10	2	13	6	9	-	-	-	-	-	-	-	-	-	6	13	12
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	3	2	-	7	-	1	-	-	-	-	-	-	-	-	-	-	5	4
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R26	3 Station St	Residential	37	37	36	47	42	42	41	7	14	12	5	18	9	11	-	-	-	-	-	-	-	-	-	14	12	15
R27	1 Station St	Residential	37	37	36	47	42	42	41	5	11	10	2	14	6	9	-	-	-	-	-	-	-	-	-	10	7	13
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	-	2	1	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	3
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	2
C10 ⁺	St Mary's Hotel	Residential	37	37	36	47	42	42	41	7	15	14	5	13	9	13	4	-	-	-	-	-	-	-	-	10	33	14

Yellow = LB
 Amber = LB, M
 Red = LB, M, SN
 Purple = LB, M, SN

Table D-4 L_{Aeq,15min} Construction Noise Predictions – Out-of-Hours Daytime NML Exceedances for Sub-Stages 1-19 and Additional Mitigation – Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	-	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	-	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	-	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R26	3 Station St	Residential	37	37	36	47	42	42	41	-	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R27	1 Station St	Residential	37	37	36	47	42	42	41	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Yellow = LB, M
 Amber = LN, M, SN
 Red = LB, M, SN, RO
 Purple = LB, M, SN, IB, PC, RO, SN

Note, the highlighted Additional Mitigation triggers are based on the exceedance of the L_{Aeq,15min} NMLs. To determine whether it is justified to provide Respite Offer measures, consideration must also be given to the duration of the works.

Given the scheduling of the works, it would be expected that the identified impacts would occur for only one or two shifts at any one location before they are completed, and therefore the actual duration of impact would not be prolonged at any particular receiver location. On this basis, it is considered that offers of RO would not be justified.

Table D-5 L_{Aeq,15min} Construction Noise Predictions – Out-of-Hours Evening NML Exceedances for Sub-Stages 1-19 and Additional Mitigation – Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	-	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	-	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	-	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R26	3 Station St	Residential	37	37	36	47	42	42	41	-	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R27	1 Station St	Residential	37	37	36	47	42	42	41	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Yellow = LB, M
 Amber = LN, M, SN
 Red = LB, M, SN, RO
 Purple = LB, M, SN, IB, PC, RO, SN

Note, the highlighted Additional Mitigation triggers are based on the exceedance of the L_{Aeq,15min} NMLs. To determine whether it is justified to provide Respite Offer measures, consideration must also be given to the duration of the works.

Given the scheduling of the works, it would be expected that the identified impacts would occur for only one or two evenings at any one location before they are completed, and therefore the actual duration of impact would not be prolonged at any particular receiver location. On this basis, it is considered that offers of RO would not be justified.

Table D-6 L_{Aeq,15min} Construction Noise Predictions – Out-of-Hours Night NML Exceedances for Sub-Stages 1-19 and Additional Mitigation – Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	-	16	-	-	-	-	-	-	32	31	30	22	24	26	37	20	-	-	17
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	-	16	-	-	-	-	-	-	33	32	32	24	28	29	35	22	-	-	13
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	-	13	-	-	-	-	-	-	29	28	23	15	19	25	30	13	-	-	12
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	9	-	-	-	-	-	-	16	15	11	3	9	12	20	3	-	-	7
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	9	-	-	-	-	-	-	15	14	10	2	9	10	19	3	-	-	7
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	1	-	-	-	-	-	8	-	-	-	-
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	4	-	-	-	-	-	-	15	14	8	0	7	11	16	1	-	-	4
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	10	-	-	-	-	-	-	16	13	16	8	15	10	16	7	-	-	6
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	-	12	-	-	-	-	-	-	21	20	21	13	11	16	28	11	-	-	6
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	-	29	-	-	-	-	-	-	15	15	5	-	1	3	31	-	-	-	26
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	-	17	-	-	-	-	-	-	11	11	2	-	1	1	22	-	-	-	16
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	-	6	-	-	-	-	-	-	7	7	-	-	-	-	19	-	-	-	9
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	0	0	-	-	-	-	15	-	-	-	6
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	-	-	-	4
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	-	1
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-	-
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-	0
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	1	1	-	-	-	-	12	-	-	-	4
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	-	-	-	8
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	-	23	-	-	-	-	-	-	13	13	8	0	5	3	16	-	-	-	22
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	-	17	-	-	-	-	-	-	12	12	8	-	3	4	16	-	-	-	18
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	9	-	-	-	-	-	-	8	6	8	0	7	3	11	-	-	-	10
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	2	-	-	-	-	-	-	5	5	-	-	-	-	8	-	-	-	3
R26	3 Station St	Residential	37	37	36	47	42	42	41	-	20	-	-	-	-	-	-	6	-	6	-	5	-	4	-	-	-	21
R27	1 Station St	Residential	37	37	36	47	42	42	41	-	17	-	-	-	-	-	-	6	5	6	-	5	-	4	-	-	-	19
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	-	8	-	-	-	-	-	-	3	3	-	-	-	-	-	-	-	-	9
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	5	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	8
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41	-	21	-	-	-	-	-	-	45	45	44	36	38	31	53	33	-	-	20

- Yellow = LB, M
- Amber = LN, M, SN, RO
- Red = LB, M, SN, IB, PC, RO, AA
- Purple = LB, M, SN, IB, PC, RO, SN, AA

Note, the highlighted Additional Mitigation triggers are based on the exceedance of the L_{Aeq,15min} NMLs. To determine whether it is justified to provide Respite Offers and Alternative Accommodation measures, consideration must also be given to the duration of the works.

Given the scheduling of the works, it would be expected that the identified impacts would occur for only one or two nights at any one location before they are completed, and therefore the actual duration of impact would not be prolonged at any particular receiver location. On this basis, it is considered that offers of RO and AA would not be justified.

Table D-7 L_{Aeq,15min} Construction Noise Predictions – Standard Hours NML Exceedances for Sub-Stages 1-19 and Additional Mitigation – Non-Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
C01	-	Commercial	-	-	-	70	70	70	70	10	18	17	4	8	8	16	12	-	-	-	-	-	-	-	-	8	-	11
C02	-	Commercial	-	-	-	70	70	70	70	5	13	12	1	7	5	11	5	-	-	-	-	-	-	-	-	17	6	20
C03	-	Commercial	-	-	-	70	70	70	70	3	11	10	1	11	5	9	2	-	-	-	-	-	-	-	-	11	-	14
C04	-	Commercial	-	-	-	70	70	70	70	5	13	12	5	17	9	11	1	-	-	-	-	-	-	-	-	18	-	21
C05	-	Commercial	-	-	-	70	70	70	70	6	14	13	4	14	8	12	-	-	-	-	-	-	-	-	-	7	1	10
C06	-	Commercial	-	-	-	70	70	70	70	2	9	8	0	4	4	7	-	-	-	-	-	-	-	-	-	1	3	4
C07	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	5	12	8
C08	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19	-
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-
C10#	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	-
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	21	8
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	1
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-
C26	-	Childcare Centre	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results. Additional Mitigation Measures are only applicable when the receiver building is in use.

- Yellow = LB
- Amber = LB, M
- Red = LB, M, SN
- Purple = LB, M, SN

Table D-8 L_{Aeq,15min} Construction Noise Predictions – Out-of-Hours Daytime NML Exceedances for Sub-Stages 1-19 and Additional Mitigation – Non- Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
C01	-	Commercial	-	-	-	70	70	70	70	-	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C02	-	Commercial	-	-	-	70	70	70	70	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C03	-	Commercial	-	-	-	70	70	70	70	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C04	-	Commercial	-	-	-	70	70	70	70	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C05	-	Commercial	-	-	-	70	70	70	70	-	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C06	-	Commercial	-	-	-	70	70	70	70	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C07	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C08	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C10	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C26	-	Childcare Centre	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results. Additional Mitigation Measures are only applicable when the receiver building is in use.

- Yellow = LB, M
- Amber = LN, M, SN
- Red = LB, M, SN, RO
- Purple = LB, M, SN, IB, PC, RO, SN

Table D-9 L_{Aeq,15min} Construction Noise Predictions – Out-of-Hours Evening NML Exceedances for Sub-Stages 1-19 and Additional Mitigation – Non-Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
C01	-	Commercial	-	-	-	70	70	70	70	-	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C02	-	Commercial	-	-	-	70	70	70	70	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C03	-	Commercial	-	-	-	70	70	70	70	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C04	-	Commercial	-	-	-	70	70	70	70	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C05	-	Commercial	-	-	-	70	70	70	70	-	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C06	-	Commercial	-	-	-	70	70	70	70	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C07	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C08	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C10	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C26	-	Childcare Centre	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results. Additional Mitigation Measures are only applicable when the receiver building is in use.

Yellow = LB, M
Amber = LN, M, SN
Red = LB, M, SN, RO
Purple = LB, M, SN, IB, PC, RO, SN

Table D-10 L_{Aeq,15min} Construction Noise Predictions – Out-of-Hours Night NML Exceedances for Sub-Stages 1-19 and Additional Mitigation – Non-Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
x	-	Commercial	-	-	-	70	70	70	70	-	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
C02	-	Commercial	-	-	-	70	70	70	70	-	13	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	20
C03	-	Commercial	-	-	-	70	70	70	70	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14
C04	-	Commercial	-	-	-	70	70	70	70	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21
C05	-	Commercial	-	-	-	70	70	70	70	-	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
C06	-	Commercial	-	-	-	70	70	70	70	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
C07	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	14	6	13	5	12	-	15	5	-	-	8
C08	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	24	15	24	16	20	12	22	13	-	-	-
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	21	20	21	13	11	12	28	8	-	-	-
C10	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	16	16	15	7	9	2	24	4	-	-	-
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	19	19	7	-	2	-	15	-	-	-	-
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	6	6	-	-	-	-	7	-	-	-	-
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	1	1	-	-	-	-	5	-	-	-	-
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	2	2	-	-	-	-	6	-	-	-	-
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	7	7	-	-	-	-	8	-	-	-	-
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	12	12	6	-	-	-	16	-	-	-	-
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	8	8	-	-	-	-	15	-	-	-	8
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	1
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C26	-	Childcare Centre	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results. Additional Mitigation Measures are only applicable when the receiver building is in use.

Yellow = LB, M
Amber = LN, M, SN, RO
Red = LB, M, SN, IB, PC, RO, AA
Purple = LB, M, SN, IB, PC, RO, SN, AA

Table D-11 LA1,1min Maximum Construction Noise Predictions – Out-of-Hours Night - for Sub-Stages 1-19 – Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	RBL+15 NML	NPfl	RNP	-	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
R01	69 Carinya Ave	Residential	-	-	36	51	52	65	-	-	62	-	-	-	-	-	-	80	80	78	68	73	77	86	70	-	-	66
R02	65-67 Carinya Ave	Residential	-	-	36	51	52	65	-	-	62	-	-	-	-	-	-	81	81	80	70	77	80	84	72	-	-	62
R03	59 Carinya Ave	Residential	-	-	36	51	52	65	-	-	59	-	-	-	-	-	-	77	77	71	61	68	76	79	63	-	-	61
R04	43 Carinya Ave	Residential	-	-	36	51	52	65	-	-	55	-	-	-	-	-	-	64	64	59	49	58	63	69	53	-	-	56
R05	41 Carinya Ave	Residential	-	-	36	51	52	65	-	-	55	-	-	-	-	-	-	63	63	58	48	58	61	68	53	-	-	56
R06	9 Kungala St	Residential	-	-	36	51	52	65	-	-	44	-	-	-	-	-	-	47	47	47	37	47	45	57	41	-	-	43
R07	13 Benalong St	Residential	-	-	36	51	52	65	-	-	45	-	-	-	-	-	-	49	49	47	37	46	48	57	41	-	-	45
R08	7 Waratah St	Residential	-	-	36	51	52	65	-	-	50	-	-	-	-	-	-	63	63	56	46	56	62	65	51	-	-	53
R09	17 Araluen St	Residential	-	-	36	51	52	65	-	-	56	-	-	-	-	-	-	64	62	64	54	64	61	65	57	-	-	55
R10	14 Nariel St	Residential	-	-	36	51	52	65	-	-	58	-	-	-	-	-	-	69	69	69	59	60	67	77	61	-	-	55
R11	34-36 Phillip St	Residential	-	-	36	51	52	65	-	-	75	-	-	-	-	-	-	63	64	53	43	50	54	80	46	-	-	75
R12	36A Phillip St	Residential	-	-	36	51	52	65	-	-	63	-	-	-	-	-	-	59	60	50	40	50	52	71	44	-	-	65
R13	30 Phillip St	Residential	-	-	36	51	52	65	-	-	52	-	-	-	-	-	-	55	56	46	36	44	50	68	40	-	-	58
R14	7 Lethbridge St	Residential	-	-	36	51	52	65	-	-	46	-	-	-	-	-	-	48	49	42	32	41	46	64	36	-	-	55
R15	16 Phillip St	Residential	-	-	36	51	52	65	-	-	45	-	-	-	-	-	-	48	49	41	31	38	45	62	34	-	-	53
R16	8 Phillip St	Residential	-	-	36	51	52	65	-	-	44	-	-	-	-	-	-	48	48	44	34	41	47	60	36	-	-	50
R17	109 Glossop St	Residential	-	-	36	51	52	65	-	-	41	-	-	-	-	-	-	45	45	44	34	42	44	58	37	-	-	47
R18	1 Phillip St	Residential	-	-	36	51	52	65	-	-	37	-	-	-	-	-	-	45	46	43	33	40	37	56	36	-	-	47
R19	9 Phillip St	Residential	-	-	36	51	52	65	-	-	41	-	-	-	-	-	-	47	48	38	28	37	36	58	32	-	-	49
R20	19A Phillip St	Residential	-	-	36	51	52	65	-	-	45	-	-	-	-	-	-	49	50	41	31	39	44	61	34	-	-	53
R21	29 Phillip St	Residential	-	-	36	51	52	65	-	-	46	-	-	-	-	-	-	46	47	44	34	44	43	66	39	-	-	57
R22	2 Gidley St	Residential	-	-	36	51	52	65	-	-	69	-	-	-	-	-	-	61	62	56	46	54	54	65	49	-	-	71
R23	1 Ross Pl	Residential	-	-	36	51	52	65	-	-	63	-	-	-	-	-	-	60	61	56	46	52	55	65	47	-	-	67
R24	43 Little Chapel St	Residential	-	-	36	51	52	65	-	-	55	-	-	-	-	-	-	56	55	56	46	56	54	60	49	-	-	59
R25	20 Blair Ave	Residential	-	-	36	51	52	65	-	-	48	-	-	-	-	-	-	53	54	48	38	46	47	57	42	-	-	52
R26	3 Station St	Residential	-	-	36	51	52	65	-	-	66	-	-	-	-	-	-	54	49	54	44	54	48	53	46	-	-	70
R27	1 Station St	Residential	-	-	36	51	52	65	-	-	63	-	-	-	-	-	-	54	54	54	44	54	44	53	47	-	-	68
R28	1A Chesham St	Residential	-	-	36	51	52	65	-	-	54	-	-	-	-	-	-	51	52	48	38	48	38	49	40	-	-	58
R29	6 Chesham St	Residential	-	-	36	51	52	65	-	-	50	-	-	-	-	-	-	47	48	45	35	41	44	47	37	-	-	55
R30	10A Chesham St	Residential	-	-	36	51	52	65	-	-	51	-	-	-	-	-	-	45	46	43	33	43	42	51	38	-	-	57
C10 ^f	St Mary's Hotel	Residential	-	-	36	51	52	65	-	-	67	-	-	-	-	-	-	91	91	90	82	84	77	99	79	-	-	66

The predicted LA1,1min levels shown are considered to be approximately equivalent to LAmax levels.

The amber shaded cells indicate exceedances of LAmax 52 dBA recognised by the NPfl

The red shaded cells indicate levels in excess of the LAmax 65 dBA level recognised by the NSW Road Noise Policy, based on a synopsis of research on sleep disturbance and awakenings.



APPENDIX E

Predicted Construction Noise Contours

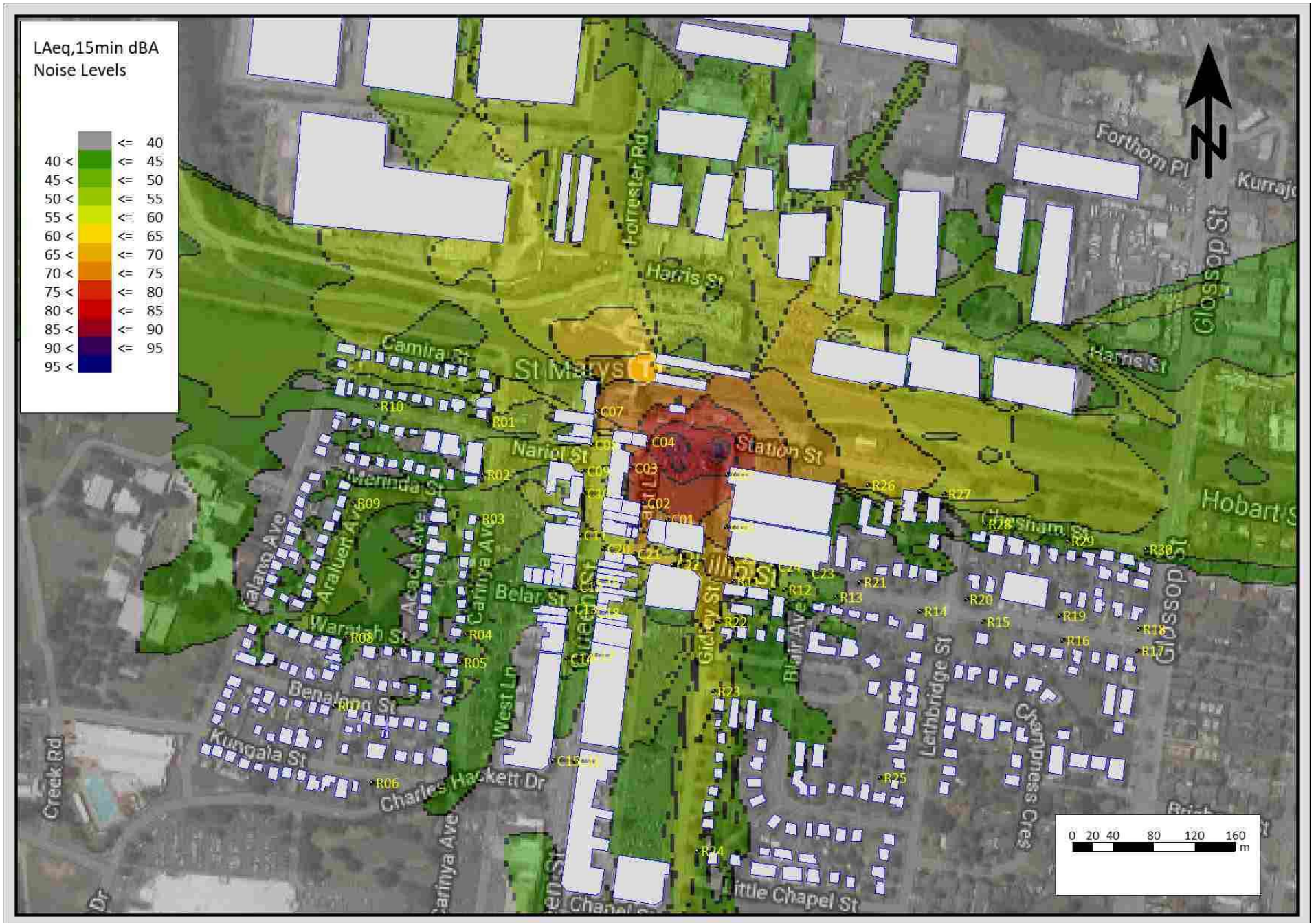
Noise Model Scenario 02 - 1A - Main Car Park – Potholing



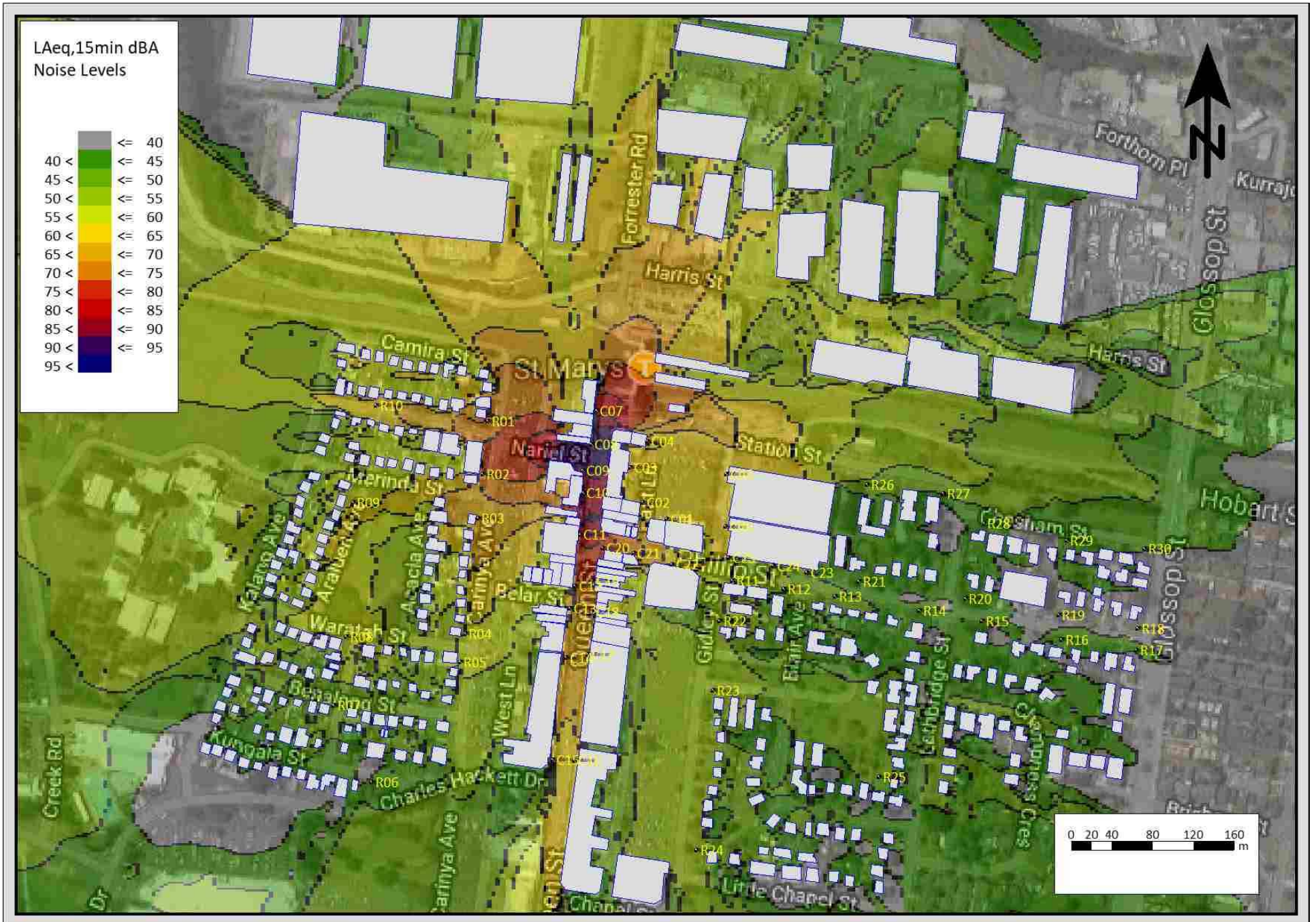
Noise Model Scenario 03 - 1A - Main Car Park - Demo Carpark AC



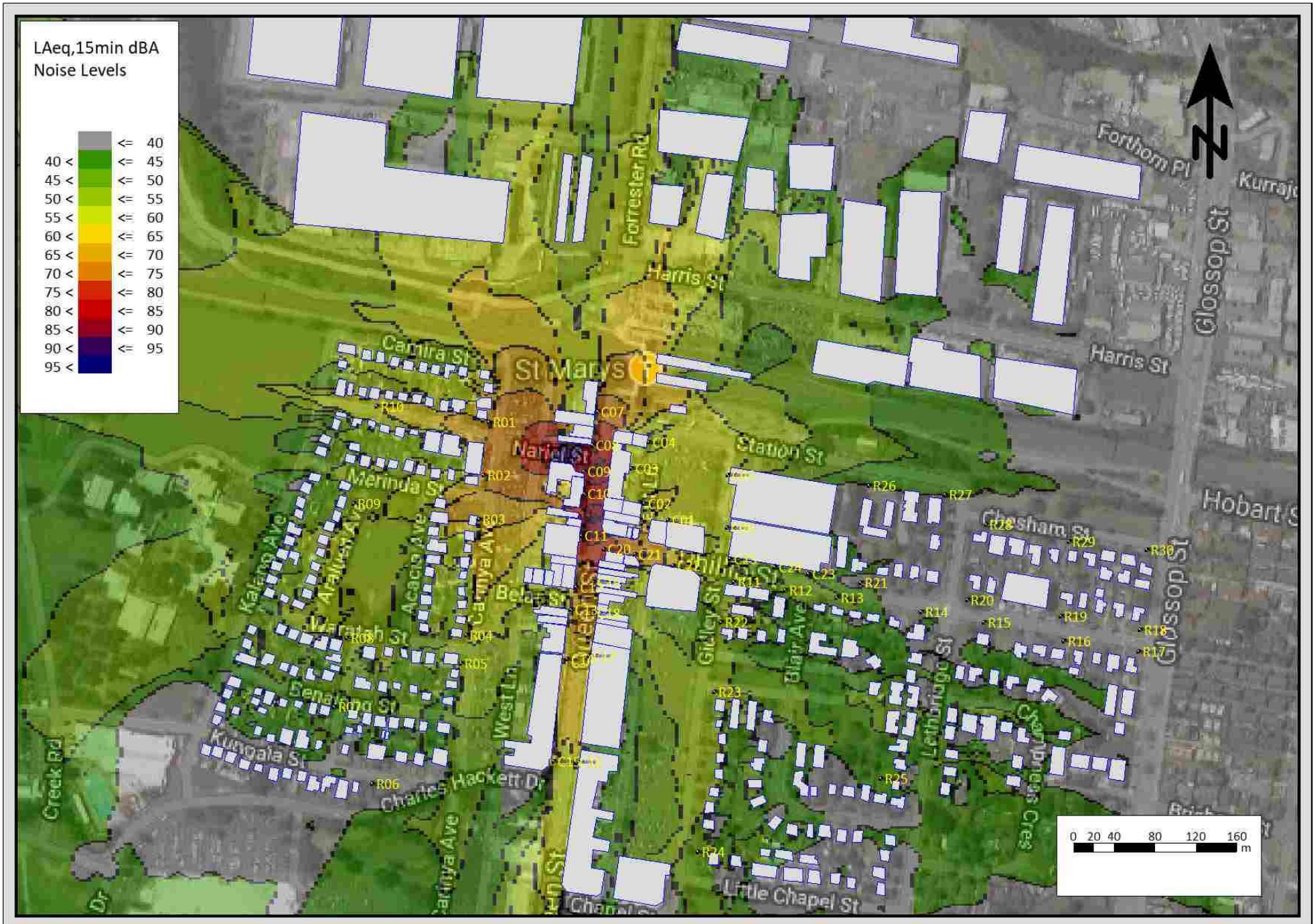
Noise Model Scenario 05 - 1B - Main Carpark - Service Installation



Noise Model Scenario 09 - EW - 1A Nariel St & Queen St – Potholing



Noise Model Scenario 10 - EW - 1A Nariel St & Queen St - Remove Parking Lanes



Noise Model Scenario 11 - EW - 1A Nariel St & Queen St - Kerb Demolition



Noise Model Scenario 14 - EW - 1A Nariel St & Queen St - Tree Removal



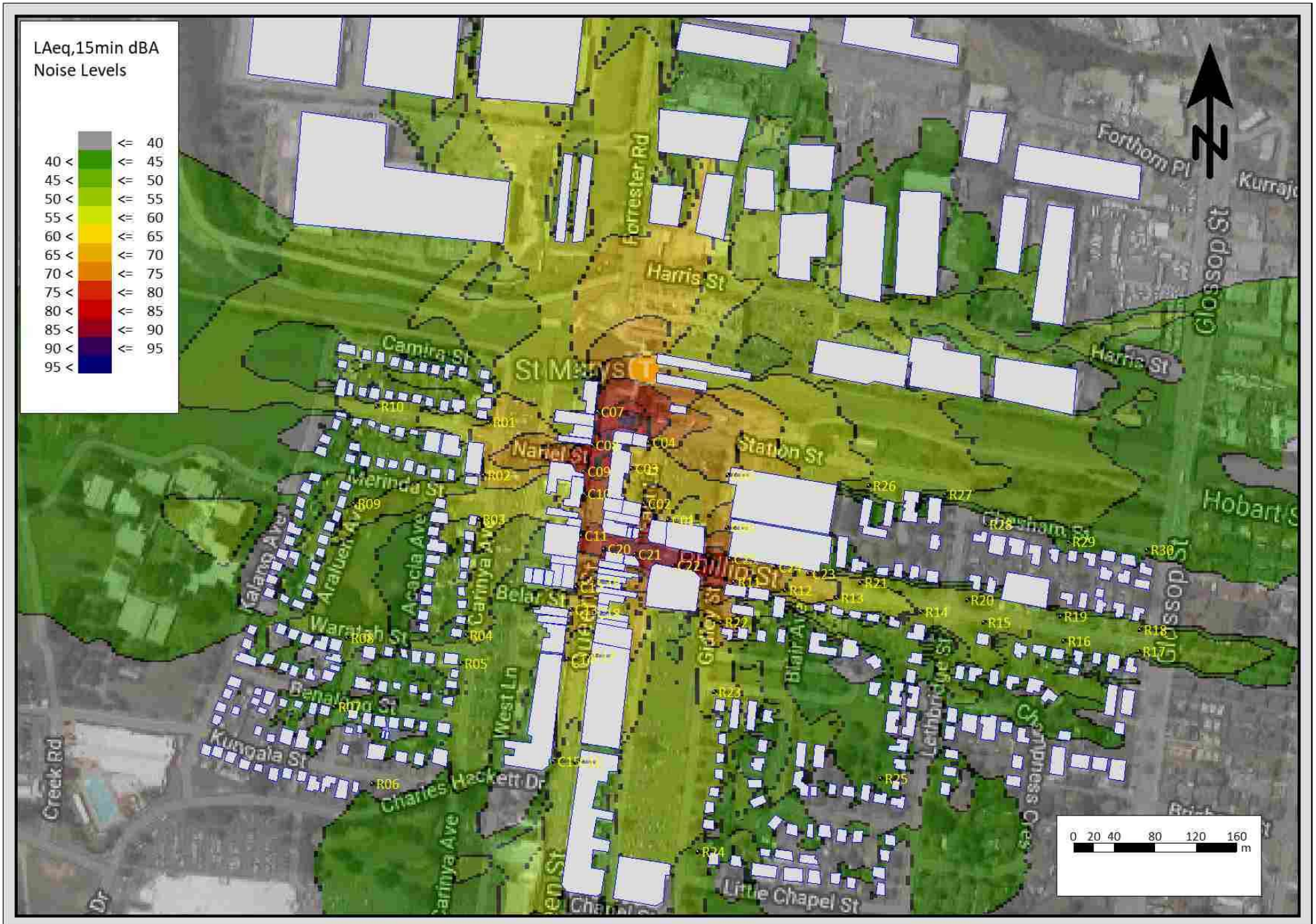
Noise Model Scenario 15 - EW - 1B Nariel & Philip Street- Night Works



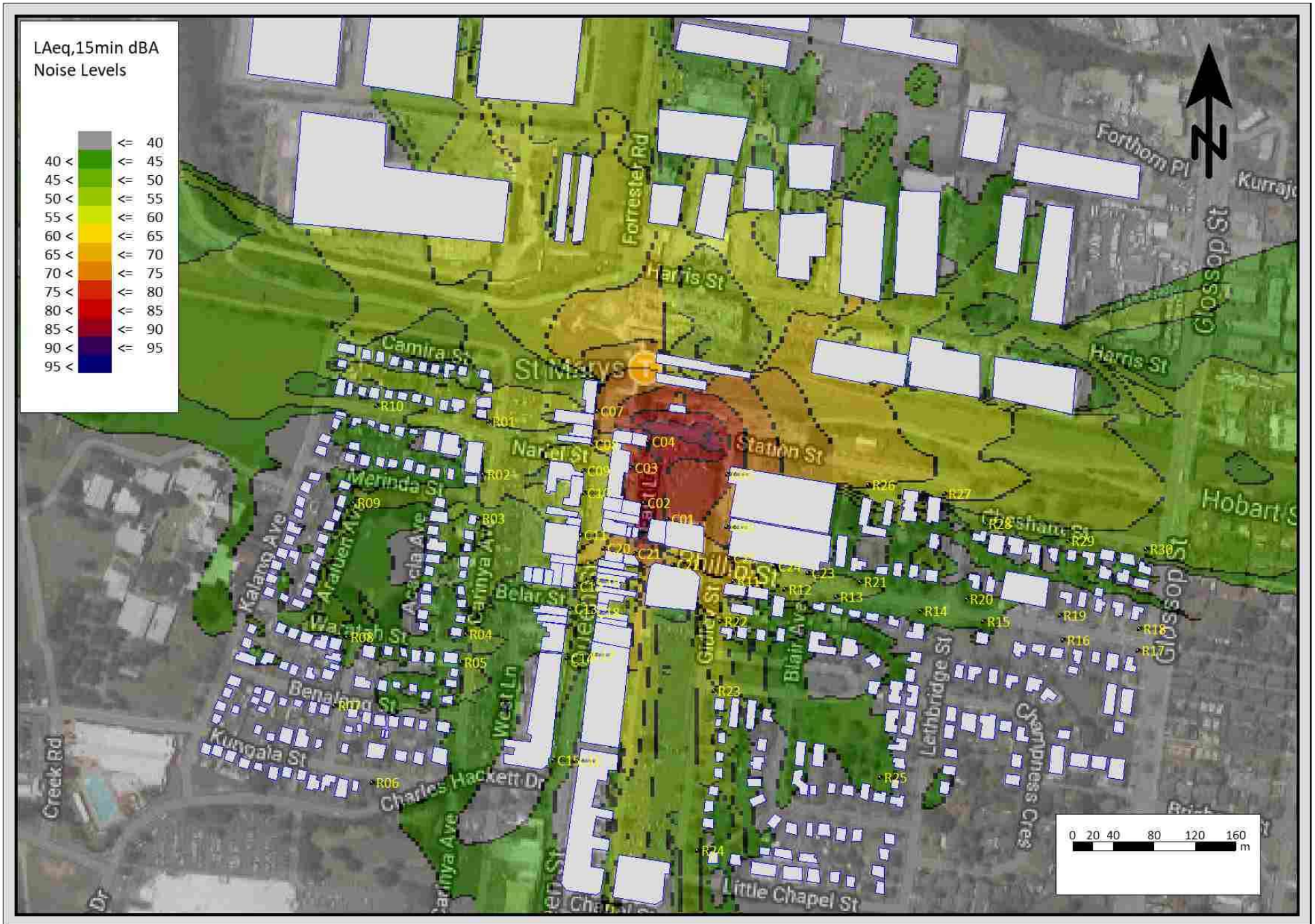
Noise Model Scenario 17 - EW - 2C- Nariel and Phillip Street - Service Installation



Noise Model Scenario 18 - EW - 2C Nariel & Philip Street - Asphalt Work



Noise Model Scenario 19 - EW- 3 Main Compound- F Type Barrier Installation, Median on Station St & Stamped Asphalt along East Lane & Main Car Park



APPENDIX F

Construction Noise & Vibration Monitoring Program





Construction Noise & Vibration Monitoring Program

Conditions C13 - C15 specify in detail requirements for monitoring. These matters are addressed in the following sections. **Section 8.2.5** and **Appendix D** of the DNVIS will inform the most impacted receivers that trigger monitoring requirements.

The construction noise and vibration monitoring program will apply for the duration of works that pose a risk of exceeding set criteria. Monitoring is not required where activities to be undertaken do not pose risk of exceeding set criteria from the project planning approval.

Condition C13 requires consultation with relevant government agencies during preparation of the program. A risk assessment (see Section 7.1 of the CEMP) has assessed the works as low to moderate impact. In consultation with SM-WSA and the ER, based on the limited extent and duration of the works and their assessed low to moderate impact (as assessed in the DNVIS) further consultation was determined not to be required.

The Construction Noise and Vibration Monitoring Program results will be submitted to the EPA and relevant Councils, as required.

Noise and vibration monitoring will be undertaken to verify compliance with the noise and vibration objectives and/or the predicted levels in the DNVIS.

Baseline Noise Monitoring Data

Baseline noise monitoring data was reported in the CSSI EIS. A summary of the relevant noise monitoring results is provided in **Table 7-1** of the DNVIS and reproduced below. No further baseline data is required to be obtained.

DNVIS Table 7-1 NCA3 Unattended Noise Monitoring Results – Determined by EIS

Location	Rating Background Level - RBL (L_{A90} dBA)			Ambient Noise Level (L_{Aeq} dBA)		
	Day	Evening	Night	Day	Evening	Night
NM02	37	37	36	55	59	51

Time periods defined as follows – Day: 7.00am to 6.00pm Monday to Saturday, 8.00am to 6.00pm Sunday; Evening: 6.00pm to 10.00pm; and Night: 10.00pm to 7.00am Monday to Saturday, 10.00pm to 8.00am Sunday.

Consistent with the EIS study, the Rating Background Noise Levels (RBLs) shown have been considered in determining the construction noise criteria, as discussed in **Section 8** of the DNVIS.

Attended Airborne Noise Monitoring in the Community

Attended monitoring of construction noise levels will be undertaken as follows:

- As described in this DNVIS to ensure that noise and vibration levels in the adjacent community remain consistent with the requirements of the project planning approval conditions. Attended

monitoring will be completed during each work stage, to ensure appropriate management measures are implemented for the corresponding works.

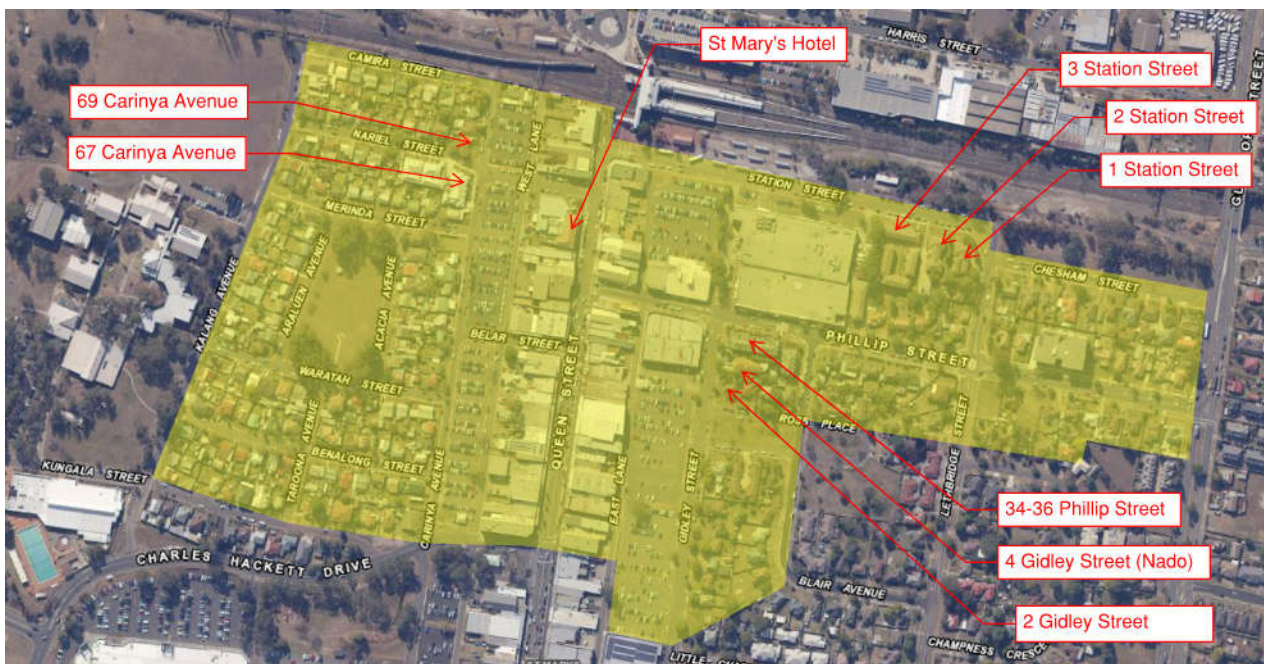
- Where appropriate in response to a noise related complaint(s) (determined on a case-by-case basis).

Attended monitoring will be undertaken at a location representative of the most affected noise sensitive receiver(s) in proximity to construction activities. Noise monitoring locations will consider factors including:

- The location of previous monitoring sites;
- The proximity of the receiver to the Project works area;
- The sensitivity of the receiver to noise;
- Background noise levels;
- The expected duration of the impact.

Subject to site conditions, attended noise monitoring will be undertaken at the representative locations identified in **Figure 8-1** (reproduced below) to verify predictions and ensure suitable management measures are in place. Depending on the locations of works, the monitoring locations identified may be varied in consultation with the ER.

DNVIS Figure 8-1 Nominated Noise Monitoring Locations



Monitoring may also be undertaken in response to a complaint. Where any investigation identifies works or activities being undertaken on the subject worksite as the likely source of the complaint, the proponent must offer to undertake attended noise or vibration monitoring at the complainant's premises. The attended measurements will need to be carried out by an appropriately trained person

in the measurement and assessment of construction noise, who is familiar with the requirements of the relevant standards and procedures.

Where noise monitoring indicates that the activity, work or combination of simultaneous activities or works has caused or is causing noise or vibration levels higher than the predicted levels at any noise sensitive receiver, Ward must review and where possible, modify the work or activity to prevent any recurrence.

Records of community enquiries and complaints, and Wards response will be managed via the project Community Communications Strategy.

Real time noise and vibration monitoring is not currently proposed, but shall be considered on a case-by-case basis, in response to any community concerns or complaints.

Parameters to be Monitored

A Type-1 integrating sound level meter should be used for attended noise monitoring. Measurements should be undertaken generally at the worst affected location on the residential boundary of an affected receiver, with the microphone at approximately 1.5m above ground and away (>3 m, where practicable) from any other reflecting surfaces. The sound level meter should be set to A-weighting frequency response and generally fast time response. Any deviations from this should be noted and reported.

As a minimum, when assessing construction noise levels, the $L_{Aeq,15min}$ and L_{Amax} (fast response) shall be measured and reported.

As a minimum, when assessing construction vibration levels, the Peak Particle Velocity - PPV (mm/s) in three orthogonal directions will be simultaneously measured.

Plant & Equipment Noise

Regular inspection of each item of plant will include listening for excessive noise from sources such as poorly performing mufflers, loose engine cowling and moving parts needing lubrication. Plant maintenance records are to be checked where excessive noise production is identified.

If subjective evaluation indicates excessive noise from any plant item(s), subject to safety, plant noise measurements shall be undertaken to confirm plant noise levels do not exceed the maximum permissible levels allowable, as set out in Table 13 of the Sydney Metro CNVS. If attended noise monitoring demonstrates exceedance of the maximum allowable plant noise level(s), corrective actions are to be identified to eliminate excessive noise and these are to be implemented as soon as practicable.

Attended Vibration Monitoring

Attended vibration monitoring is to be undertaken at the commencement of operation for each plant or activity on site, which has the potential to generate significant vibration levels, where the vibration screening criteria is likely to be exceeded. The results of the attended monitoring are to be used to confirm minimum safe working distances from the vibration generating plant.

Heritage-Listed Structures

Section 9.1.5 of the DNVIS identifies local heritage listed structures, none of which have been assessed as being structurally unsound and therefore are not considered particularly vibration

sensitive on account of their heritage classifications. Anticipated vibration levels are significantly lower than any threshold or criteria for commercial buildings, or for that matter heritage items. As such, no specific vibration monitoring of heritage structures is proposed.

In the event measurements become necessary (e.g. complaints), Ward would seek the advice of a Heritage consultant on methods and locations for installing equipment used for vibration monitoring of heritage-listed structures as required.

Where an exceedance of the vibration screening criterion is identified, the responsible works will cease, and the corresponding methodology will be reviewed and reassessed before recommencing works.

Reporting

The results of noise and vibration monitoring shall be documented in monthly construction noise and vibration monitoring reports and submitted to the Secretary for information, as required after ER endorsement.

In accordance with Condition C15, the results of the monitoring must be readily available to the construction team, the Proponent and ER. The Planning Secretary and EPA must be provided with access to the results on request.

The monthly reports shall contain:

- Details of the type of monitoring completed and a brief statement of the measurement method;
 - Relevant noise and vibration planning approval conditions and management objectives;
 - Monitoring equipment specifications and locations;
 - Description of works, construction equipment, meteorological conditions and nearest affected sensitive receivers;
 - Unattended monitoring results (if undertaken);
 - Attended monitoring results; and
 - Statements of compliances and non-compliances against noise and vibration planning approval conditions and management objectives, including reasons for any identified non-compliances and strategies for minimising further occurrence of identified non-compliances.
-

APPENDIX G

Relevant Conditions of Approval



The Sydney Metro Western Sydney Airport Approval includes several Conditions that relate to noise and vibration. These are set out below.

E37 - Land Use Survey

A detailed land use survey must be undertaken to confirm sensitive land use(s) (including critical working areas such as operating theatres and precision laboratories) potentially exposed to construction noise and vibration and construction ground-borne noise. The survey may be undertaken on a progressive basis but must be undertaken in any one area before the commencement of work which generates construction noise, vibration or ground-borne noise in that area. The results of the survey must be included in the Detailed Noise and Vibration Impact Statements required under Condition E47.

E38 - Construction Hours

Work must only be undertaken during the following hours:

- (a) 7:00am to 6:00pm Mondays to Fridays, inclusive;*
- (b) 8:00am to 1:00pm Saturdays; and*
- (c) at no time on Sundays or public holidays.*

E39 - Highly Noise Intensive Work

Except as permitted by an EPL or approved in accordance with the Out-of-Hours Works Protocol required by Condition E42, highly noise intensive work that result in an exceedance of the applicable NML at the same receiver must only be undertaken:

- (a) between the hours of 8:00 am to 6:00 pm Monday to Friday;*
- (b) between the hours of 8:00 am to 1:00 pm Saturday; and*
- (c) if continuously, then not exceeding three (3) hours, with a minimum cessation of work of not less than one (1) hour.*

For the purposes of this condition, 'continuously' includes any period during which there is less than one (1) hour between ceasing and recommencing any of the work.

E41- Variation to Work Hours

Notwithstanding Conditions E38 and E39 work may be undertaken outside the hours specified in the following circumstances:

(a) Safety and Emergencies, including:

- (i) for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or*



(ii) 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

(b) Low impact, including:

(i) 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 ICNG, and*
- no more than the 'Noise affected' NMLs specified in Table 3 of the ICNG at other sensitive land user(s); and*

(ii) construction that causes:

- continuous or impulsive vibration values, measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.2 of Assessing Vibration: a technical guideline (DEC, 2006), or*
- intermittent vibration values measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.4 of Assessing Vibration: a technical guideline (DEC, 2006); or*

(c) By Approval, including:

(i) where different construction hours are permitted or required under an EPL in force in respect of the CSSI; or

(ii) works which are not subject to an EPL that are approved under an Out-of-Hours Work Protocol as required by Condition E42; or

(iii) negotiated agreements with directly affected residents and sensitive land user(s); or

E42 - Out-of-Hours Work Protocol – Work not subject to an EPL

An Out-of-Hours Work Protocol must be prepared to identify a process for the consideration, management and approval of work (not subject to an EPL) that is outside the hours defined in Conditions E38 and E39. The Protocol must be approved by the Planning Secretary before commencement of the out-of-hours work. The Protocol must be prepared in consultation with the ER. The Protocol must provide:

(a) justification for why out-of-hours work need to occur;

(b) identification of low and high-risk activities and an approval process that considers the risk of activities, proposed mitigation, management, and coordination, including where:

(i) the ER reviews all proposed out-of-hours activities and confirms their risk levels;

(ii) low risk activities that can be approved by the ER; and

(iii) high risk activities that are approved by the Planning Secretary;

(c) a process for the consideration of out-of-hours work against the relevant NML and vibration criteria;

(d) a process for selecting and implementing mitigation measures for residual impacts in consultation with the community at each affected location, including respite periods consistent with the requirements of Condition E56. The measures must take into account the predicted noise levels and the likely frequency and duration of the out-of-hours works that sensitive land user(s) would be exposed to, including the number of noise awakening events;

(e) procedures to facilitate the coordination of out-of-hours work including those approved by an EPL or undertaken by a third party, to ensure appropriate respite is provided; and

(f) notification arrangements for affected receivers for all approved out-of-hours works and notification to the Planning Secretary of approved low risk out-of-hours works.

This condition does not apply if the requirements of Condition E41 are met.

Note: Out-of-hours work is any work that occurs outside the construction hours identified in Condition E38 and E39.

E43 - Construction Noise Management Levels and Vibration Criteria

Mitigation measures must be implemented with the aim of achieving the following construction noise management levels and vibration criteria:

(a) construction 'Noise affected' noise management levels established using the Interim Construction Noise Guideline (DECC, 2009);

(b) preferred vibration criteria established using the Assessing vibration: a technical guideline (DEC, 2006) (for human exposure);

(c) Australian Standard AS 2187.2 - 2006 "Explosives - Storage and Use - Use of Explosives" (for human exposure);

(d) BS 7385 Part 2-1993 "Evaluation and measurement for vibration in buildings Part 2" as they are "applicable to Australian conditions"; and

(e) the vibration limits set out in the German Standard DIN 4150-3: Structural Vibration- effects of vibration on structures (for structural damage).

Any work identified as exceeding the noise management levels and / or vibration criteria must be managed in accordance with the Noise and Vibration CEMP Sub-plan.

Note that in accordance with the Sydney Metro Staging Plan, a noise and vibration sub-plan is not required for this scope of works. Noise and vibration impacts will be managed under the Project CEMP and relevant management procedures.

Note: The ICNG identifies 'particularly annoying' activities that require the addition of 5 dB(A) to the predicted level before comparing to the construction Noise Management Level.

E44 - All reasonable and feasible mitigation measures must be applied when the following residential ground-borne noise levels are exceeded:

(a) evening (6:00 pm to 10:00 pm) — internal LAeq(15 minute): 40 dB(A); and

(b) night (10:00 pm to 7:00 am) — internal LAeq(15 minute): 35 dB(A).

The mitigation measures must be outlined in the Noise and Vibration CEMP Sub-plan, including in any Out-of-Hours Work Protocol, required by Condition E42.

E45 - Noise generating work in the vicinity of potentially-affected community, religious, educational institutions and noise and vibration-sensitive businesses and critical working areas (such as theatres, laboratories and operating theatres) resulting in noise levels above the NMLs must not be timetabled within sensitive periods, unless other reasonable arrangements with the affected institutions are made at no cost to the affected institution.

E46 - Construction Noise and Vibration Mitigation and Management

Industry best practice construction methods must be implemented where reasonably practicable to ensure that noise and vibration levels are minimised around sensitive land use(s). Practices may include, but are not limited to:

(a) use of regularly serviced low sound power equipment;

(b) at source control, temporary noise barriers (including the arrangement of plant and equipment) around noisy equipment and activities such as rock hammering and concrete cutting;

(c) use of non-tonal reversing alarms; and

(d) use of alternative construction and demolition techniques.

E47 - Detailed Noise and Vibration Impact Statements (DNVIS) must be prepared for any work that may exceed the NMLs, vibration criteria and / or ground-borne noise levels specified in Conditions E43 and E44 at any residence outside construction hours identified in Condition E38, or where receivers will be highly noise affected or subject to vibration levels above those otherwise determined as appropriate by a suitably qualified structural engineer under Condition E87. The DNVIS must include specific mitigation measures identified through consultation with affected sensitive land user(s) and the mitigation measures must be implemented for the duration of the works. A copy of the DNVIS must be provided to the ER before the commencement of the associated works. The Planning Secretary and the EPA may request a copy (ies) of the DNVIS.

E48 - Owners and occupiers of properties at risk of exceeding the screening criteria for cosmetic damage must be notified before works that generate vibration commences in the vicinity of those properties. If the potential exceedance is to occur more than once or extend over a period of 24 hours, owners and occupiers must be provided a schedule of potential exceedances on a monthly basis for the duration of the potential exceedances, unless otherwise agreed by the owner and occupier. These properties must be identified and considered in the Noise and Vibration CEMP Sub-plan.

E49 - Where sensitive land use(s) are identified in Appendix B as exceeding the highly noise affected criteria during typical case construction, mitigation measures must be implemented with the objective of reducing typical case construction noise below the highly noise affected criteria at each relevant sensitive land use(s). Activities that would exceed highly noise affected criteria during typical case construction must not commence until the measures identified in this condition have been implemented, unless otherwise agreed with the Planning Secretary.

Note: Mitigation measures may include path barrier controls such as acoustic sheds and/or noise walls, at-property treatment, or a combination of path and at-property treatment.

E50 - For all construction sites where acoustic sheds are installed, the sheds must be designed, constructed and operated to minimise noise emissions. This would include the following considerations:

(a) all significant noise producing equipment that would be used during the night-time would be inside the sheds, where feasible and reasonable;

(b) noise generating ventilation systems such as compressors, scrubbers, etc, would be located inside the sheds and external air intake/discharge ports would be appropriately acoustically treated; and

(c) the doors of acoustic sheds would be kept closed during the night-time period. Where night-time vehicle access is required at sites with nearby residences, the shed entrances would be designed and constructed to minimise noise breakout.

E51 - Where Condition E49 determines that at-property treatment (temporary or permanent) is the appropriate measure to reduce noise impacts, this at-property treatment must be offered to landowners of residential properties for habitable living spaces, unless other mitigation or management measures are agreed to by the landowner.

Landowners must be advised of the range of options that can be installed at or in their property and given a choice as to which of these they agree to have installed.

A copy of all guidelines and procedures that will be used to determine at-property treatment at their residence must be provided to the landowner.

E52 - Any offer for at-property treatment or the application of other noise mitigation measures in accordance with Condition E51, does not expire until the noise impacts specified in Condition E49, affecting that property are completed, even if the landowner initially refuses the offer.

Note: If an offer has been made but is not accepted, this does not preclude the commencement of construction under Condition E49.

E53 - The implementation of at-property treatment does not preclude the application of other noise and vibration mitigation and management measures including temporary and long-term accommodation.

E54 - Construction Vibration Mitigation – Heritage Items

Vibration testing must be conducted during vibration generating activities that have the potential to impact on Heritage items to verify minimum working distances to prevent cosmetic damage. In the event that the vibration testing and attended monitoring shows that the preferred values for vibration are likely to be exceeded, the Proponent must review the construction methodology and, if necessary, implement additional mitigation measures. Such measures must include, but not be limited to, review or modification of excavation techniques.

E55 - 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 items.

E56 - Utility Coordination and Respite

All 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 any work to provide respite to impacted noise sensitive land use(s) so that the respite is achieved in accordance with Condition E57; or

(b) consider the provision of alternative respite or mitigation to impacted noise sensitive land use(s); and

(c) provide documentary evidence to the ER in support of any decision made by the Proponent in relation to respite or mitigation.

The consideration of respite must also include all other approved Critical SSI, SSI and SSD projects which may cause cumulative and / or consecutive impacts at receivers affected by the delivery of the CSSI.

E57 – Out-of-Hours Works – Community Consultation on Respite

In order to undertake out-of-hours work outside the work hours specified under Condition E38, appropriate respite periods for the out-of-hours work must be identified in consultation with the community at each affected location on a regular basis. This consultation must include (but not be limited to) providing the community with:

(a) a progressive schedule for periods no less than three (3) months, of likely out-of-hours work;

(b) a description of the potential work, location and duration of the out-of-hours work;

(c) the noise characteristics and likely noise levels of the work; and

(d) likely mitigation and management measures which aim to achieve the relevant NMLs under Condition E43 (including the circumstances of when respite or relocation offers will be available and details about how the affected community can access these offers).

The outcomes of the community consultation, the identified respite periods and the scheduling of the likely out-of-hour work must be provided to the ER, EPA and the Planning Secretary prior to the out-of-hours work commencing.

Note: Respite periods can be any combination of days or hours where out-of-hours work would not be more than 5 dB(A) above the RBL at any residence.

APPENDIX H

Community Consultation Report





St Mary's nightwork - consultation report

Prepared by Kath Elliott, Director, 15 November 2021

Overview

KEC sent two staff to door knock residents regarding three different construction activities:

- Stormwater works on Station St from Queen to Philip streets
- Pedestrian works at the intersection of Queen and Nariel streets
- Works in Eastern Lane, St Mary's, off Philip St

Talking points were prepared and approved prior to door knocking and were used to discuss the details of the works with residents. (Appendix A)

Door knocking took place on the afternoon of Wednesday 10 November 2021 between 4pm and 7pm and Saturday 13 November 2021, between 10am and 2pm.

Three units at 23 Station St were in a isolated block which was locked and we were unable to gain entry.

65-67 Carinya Avenue was not accurate. The following Nariel Street addresses were actually on Carinya Avenue but part of a larger complex, with their address on the side street. We also knocked extra houses on Carinya Avenue that would be similarly affected to their neighbours who were on the list.

Residences knocked were:

- 3 Station Street – 18 units
- 2 Station Street – 8 units
- 1 Station Street / 3 Lethbridge Street – 7 units
- 1-6 Chesham Street – 6 houses
- 34-26 Phillip Street – 12 units
- 69 Carinya Avenue – 1 house
- 65-67 Carinya Avenue – 5 units
- 37 Queen Street (St Mary's Hotel)

Summary outcomes

There were few concerns regarding noise. Almost all were accepting that construction was taking place and did not object to nightworks. Understood it was necessary.

Some were concerned about the access and parking issues, particularly in the flats at 3 Station Street where there are quite a few people who park on Station Street.

We discovered a small number of particular personal circumstances and issues that are noted in the key issues section of this report.

Key Issues

Parking and access

- Several residents from Station Street, park on the street regularly. Timely advice about road closures may avoid delays to work.

- Several residents in Station Street work shift work and come or go at odd times late at night or very early in the morning. Timely advice about access limitations will be needed.

Health and welfare

- [REDACTED] has had repeated shoulder surgery this year and is still significantly limited in his ability to do things. As a result, his car has been parked on the street for some months and has a flat battery. Ray will need assistance to start his car and to have it moved to a different place.

[REDACTED]
[REDACTED] has hearing issues and finds sharp and loud noises distressing. [REDACTED]
[REDACTED] may benefit from noise-cancelling earphones.

- [REDACTED] is very concerned about dust as he has respiratory issues. This issue may require medical advice.
- [REDACTED] was anxious about noise interfering with baby's sleep but would not provide contact details.
- [REDACTED] is elderly and seems to live alone. She should not be troubled, but it may be suitable to be aware of her vulnerability and check that the work is not impacting her as it approaches the Chesham end of Station Street.

Local knowledge

- Several people expressed a general concern to know what will happen after Coles and the Child Care Centre closes. It might be helpful for local residents to have posters put up in the shopping centre to assuage their anxiety about future amenity. [REDACTED] asked to be contacted about this.
 - Some people expressed the hope that 3 Station Street (apartments appear to be privately owned) might be bought and demolished – presumably for future gain.
 - Some people wanted to know more about the general plans for the area and for future stations. Posters in the shopping centre might be a positive step.
-

Recommendations

- Prepare and distribute information regarding parking and access arrangements to residents on Station St.
- Contact [REDACTED] and assist him to move his car.

- Provide noise canceling headphones to [REDACTED] due to her hearing difficulties.
- Follow up with [REDACTED] with information on shopping Centre changes/timing.

Appendix A – talking points

Talking points- St Marys resident consultation, Station St stormwater - November 2021

Introduce ourselves by first name.

We are working with Ward Civil who are doing early construction works on the St Marys Temporary Bus Interchange for Transport for NSW.

Wanting to give you some information about some night construction work that is coming up nearby and get your thoughts on how that might impact you.

Do you have a few minutes?

Station Street Stormwater Drainage Works

We are intending to dig a stormwater drain along Station Street. We expect the work might impact you because it will be noisier than what you are normally used to.

We are planning on doing some of the work at night to avoid conflicts with road traffic.

This will involve nightshift work for 12 weeks, 5 nights a week with a break on Fridays and Saturdays. We will also be working every day from 7am and 6pm. We won't on public holidays.

The works will start on **Monday, 29 November**.

We expect the noise impact you will experience will be classified as moderate. It will be about 60 decibels which will feel like consistent traffic travelling at 40km per hour, about 7m away from your residence.

Every night we will do about 10 metres of work each night. We will be working from east to west (from the Queen St end first), using

- sawcutting equipment,
- a jackhammer
- a 5 tonne excavator (looks like a big bobcat) to dig out dirt
- a dry vac
- tipper trucks to remove soil
- followed by a cement pour and asphaltting the road (brought in by trucks) and
- tamped down with a plate compactor.
- Some vehicles may have "quacker" which you might hear

We will mitigate the noise by:

- Saw cutting prior to 10pm and other higher noise works by 11pm.
- Switching off jackhammers every 3 hours for 1 hour,
- Turning off machinery when not in use

Do you have any questions? Do you think the nightworks will affect you very much?

(wanting to get an idea of how we might provide some respite).

Talking points- St Marys resident consultation, Quenn/Nariel works - November 2021

Introduce ourselves by first name.

We are working with Ward Civil who are doing early construction works on the St Marys Temporary Bus Interchange for Transport for NSW.

Wanting to give you some information about some night construction work that is coming up nearby and get your thoughts on how that might impact you.

Do you have a few minutes?

We're building a new pedestrian crossing on Queen Street near the intersection of Queen and Nariel Streets, as well as removing some sections of kerb and footpath and replacing with new kerb and footpath

We expect the work might impact you because it will be noisier than what you are normally used to.

We are planning on doing some of the work at night to avoid conflicts with road traffic.

This will involve nightshift work for 3 weeks, 5 nights a week with a break on Fridays and Saturdays. We will also be working every day from 7am and 6pm. We won't work on public holidays.

The works will start on **29 November 2021**.

We expect the noise impact you will experience will be classified as moderate. It will be about 60 decibels which will feel like consistent traffic travelling at 40km per hour, about 7m away from your residence.

5 St Mary's door knocking report - 15 November 2021

We will use:

- sawcutting equipment,
- a jackhammer
- a 14 tonne excavator (looks like a big bobcat) to dig out dirt
- a dry vac truck
- tipper trucks to remove soil
- a cement pour from an agitator truck chute
- temporary asphaltting of the pavement (brought in by trucks) and
- asphalt roller
- tamping down with a plate compactor
- Line marking vehicles
- Some vehicles may have "quackers" which you might hear

We will mitigate the noise by:

- Saw cutting prior to 10pm and other higher noise works by 11pm
- Switching off jackhammers every 3 hours for 1 hour
- Turning off machinery when not in use

Do you have any questions? Do you think the nightworks will affect you very much?

(wanting to get an idea of how we might provide some respite).



**ST MARY'S BUS EXCHANGE
EARLY WORKS
ADDENDUM DETAILED NOISE &
VIBRATION IMPACT STATEMENT
(DNVIS) – STORMWATER
VARIATION**

Report 11.00323R_AD-01

prepared for Ward Civil Engineering Pty Ltd
on 05/11/2021



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BASIS OF REPORT

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

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from ACA. ACA disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

REFERENCE	DATE	PREPARED	REVIEWED	AUTHORISED
11.00323R_AD-01	05/11/2021	SF	MdIM	SF

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APPENDIX A: GLOSSARY OF NOISE & VIBRATION TERMS

APPENDIX B: NOISE PREDICTIONS & CNVS ADDITIONAL MITIGATION MEASURES

APPENDIX C: CONSTRUCTION NOISE CONTOURS

Report 11.00323R_AD-01

1. INTRODUCTION

Acoustics Consultants Australia (ACA) has previously prepared on behalf of Ward Civil & Engineering Pty Ltd (Ward) a Detailed Noise and Vibration Impact Statement (DNVIS) for the St Mary's Temporary Bus Interchange (TBI) Early Works, which form part of the Sydney Metro Western Sydney Airport (SMWSA) Project (SSI 10051).

Details the DNVIS assessment are set out in ACA report 11.00323R-02.

Subsequent to the issue of the DNVIS assessment (ACA report 11.00323R-02), this report provides an addendum assessment in relation to the following additional scope items:

- Operation of a materials laydown and amenities compound on Station Street.
- Civil works scope variation – Stormwater drainage and pavement works on Station Street.
- Civil works scope variation – CCTV trench works on Station Street.

This addendum report should be read in conjunction with the main DNVIS (Report 11.00323R-02).

The included assessments have been undertaken in accordance with the provisions of the NSW Interim Construction Noise Guideline – (ICNG), the Sydney Metro – Western Sydney Airport Construction Noise & Vibration Strategy (Ver 4.2, 8 September 2020) – (CNVS) and relevant Conditions of Approval as set out in the Department of Planning, Industry and Environment's Critical State Significant Infrastructure Approval for Sydney Metro – Western Sydney Airport (SSI 10051).

This document details Noise Management Level (NML) exceedances and mitigation requirements for the identified civil works scope variation.

The main objectives of this addendum DNVIS are to minimise unreasonable noise and vibration impacts on residents and businesses, and to avoid structural damage to buildings or heritage items as a result of construction vibration. This addendum DNVIS aims to support active community communication and maintain positive, cooperative relationships with local residents, businesses and building owners. It is noted that ongoing community engagement and management of such relationships is primarily managed via the Sydney Metro – Western Sydney Airport Community Communications Strategy.

A copy of this addendum NVIS must be provided to the ER before commencement of the works.

2. DESCRIPTION OF PROPOSED WORKS

Figure 2-1 shows the locations of the materials laydown and amenities compound, the stormwater drainage and pavement reconstruction works alignment and the CCTV trench location.

Figure 2-1 Station Street Additional Works



Materials Laydown and Amenities Compound

The materials laydown and amenities compound as shown in **Figure 2-1** would be used principally for stockpiling materials and would also accommodate amenities and a small crib room for workers to use during breaks.

A 5-14-tonne excavator and truck may operate occasionally within the compound for the purposes of loading materials.

It has been assumed that loading may occur within the compound at any time during standard hours or out-of-hours, however, the loading activities are anticipated to be relatively infrequent and for much of the time the compound would generate no notable noise emissions.

Sound curtains would be installed on the chain-link fencing facing onto Station Street to minimise any noise breakout from the compound.

Station Street Stormwater Drainage Works

The stormwater drainage works on Station Street will be required to be undertaken outside standard hours to avoid conflicts with road traffic.

The work would need to be undertaken progressively, working from east to west along Station Street. It is anticipated that approximately 10m of drainage will be completed each night, with the following methodology for each out-of-hours work shift:

- Establish temporary traffic control as per the approved Traffic Guidance System (TGS).
- The section of road surface to be removed will be saw cut – this activity would be undertaken for each shift prior to 10.00pm and would typically take less than 30 minutes to complete.
- A 5-14t excavator will then excavate the utility trench to the required depth and the spoil will be direct loaded onto a rigid truck for offsite disposal at appropriately licensed landfill facility. It is noted that the asphalt is ~150mm thick and will be able to be removed with an excavator ripper / bucket attachment. Stormwater pipes will then be placed within the trench.
- The trench will then be backfilled with select material and compacted using a jumping jack / plate compactor.
- Pits will be installed (if pre-cast off site) or constructed in-situ from reinforcing and concrete. Reinforcing will be delivered in rigid trucks and lifted into position using an excavator. Concrete will be poured direct from the back of the chute.
- The road surface will then be reinstated with hot mix. The hot mix would be delivered by a rigid truck, placed using the 14t excavator with bucket attachment and then be compacted using a plate compactor.

It is expected that approximately 40 out-of-hours shifts would be required to complete the stormwater drainage installation, assuming that each shift would commence at approximately 9.00pm and be completed by approximately 4.00am.

Station Street Pavement Reconstruction Works

Once the stormwater drainage is installed, the Station Street pavement would be reconstructed. The pavement works would be undertaken progressively from east to west along Station Street. It is anticipated that approximately 20 m² of pavement would be reconstructed each night (10 linear metres per shift), with the following methodology for each out-of-hours work shift:

- Establish temporary traffic control as per the approved Traffic Guidance System (TGS).
- The section of road surface to be removed will be saw cut – this activity would be undertaken prior to 10.00pm each shift and would typically take less than 30 minutes to complete.

- A 5-14t excavator will then excavate the pavement to the required depth (~500mm below existing surface). Spoil will be direct loaded onto a rigid truck for temporary stockpiling within the TBI for later offsite disposal at appropriately licensed landfill facilities.
- Select materials will be placed within the excavation and compacted using a jumping jack / plate compactor
- The road surface will then be reinstated with hot mix. The hot mix would be delivered by a rigid truck, placed using the 14t excavator with bucket attachment and then be compacted using a plate compactor.
- Kerbs, pram ramps which were removed as part of the drainage / pavement works would then be rectified, which would involve pouring concrete directly from a concrete agitator chute.

It is expected that approximately 30 out-of-hours shifts would be required to complete the pavement reconstruction, assuming that each shift would commence at approximately 9.00pm and be completed by approximately 4.00am.

Station Street Asphalt Works (Milling and Re-Sheeting)

Once the pavement reconstruction is complete, asphaltting would be undertaken along Station Street, as follows:

- Mill nominal 50mm of asphalt of project footprint using a 2m profiler
- Install spray seal on the exposed milled surface.
- Lay replacement nominal 50mm of asphalt. Compaction to be achieved using a 7t smooth drum static roller as well as a 7t multi tyre static roller.
- Line marking to be completed using line marking / spray truck.

It is expected that approximately 2 out-of-hours shifts would be required to complete the asphaltting (milling and resheeting).

CCTV Trench Works

The CCTV trench works on Station Street would not require occupation of the public road and therefore may be undertaken during standard hours only. The works will involve:

- Trenching along the alignment, as indicated in **Figure 2-1**. The works will involve pulling up existing pavers by hand, creating a trench with a 5-7 tonne excavator (max trench size: 500mm x 200mm), installing cabling and then back filling and compacting with a plate compactor.

Construction Hours

Standard construction hours defined by Condition E38, consistent with the CNVS, are:

- (a) 7:00am to 6:00pm Mondays to Fridays, inclusive;
- (b) 8:00am to 1:00pm Saturdays; and
- (c) at no time on Sundays or public holidays.

The proposed out-of-hours works will be managed under the Sydney Metro Out of Hours Works Protocol as required under CSSI Condition E42, which applies to out of hours work not subject to an EPL. Note that this Protocol was still in development during the development of this DNVIS.

Where works are proposed to be undertaken outside of the standard hours, specific respites and management measures would be considered and developed for those works as required.

In accordance with the Sydney Metro Out of Hours Work Protocol, an out of hours application will be submitted to Sydney Metro, and independent Environmental Representative for relevant endorsements and approval when out of hours works are planned.

The Community Communication Strategy will also support Ward's application for commencing out of hours work. It will detail how the community will be notified in advance of planned activities, kept informed of works progress and how potential noise impacts will be managed.

3. SENSITIVE RECEIVERS

Figure 3-1 shows the representative residential receivers surrounding the works areas previously considered by the DNVIS assessment and Figure 3-2 shows the representative non-residential (commercial) receivers surrounding the works areas.

For consistency with the DNVIS predictions have been undertaken for all representative receivers. However, for the identified works, the representative receivers potentially most impacted may be expected to be the Station Street receivers in the vicinity of R26.

Figure 3-1 Representative Residential Receivers Surrounding the Works



Figure 3-2 Representative Non-Residential Receivers Surrounding the Works



Note: Receiver C10 is the St Mary's Hotel which includes a residential component on the first floor. For the purposes of assessment, the first floor has been considered a residential use. Receiver C26 is a Childcare Centre located within the Station Plaza building – this has a semi-enclosed play area to the east of the building.

4. EXISTING NOISE ENVIRONMENT

The noise and vibration assessment undertaken as part of the Sydney Metro - Western Sydney Airport Environmental Impact Statement (EIS) is documented in the EIS Technical Paper 2 (*Sydney Metro - Western Sydney Airport Technical Paper 2: Noise and Vibration*).

The EIS study defined Noise Catchment Areas (NCAs) for the wider project. The sensitive receivers potentially affected by the St May's Bus Exchange Early Works are located with NCA3.

Table 4-1 sets out the existing ambient and background noise levels considered by this assessment. The levels for the Day, Evening and Night periods are consistent with the survey results identified by the EIS.

Table 4-1 Summary of NCA3 Unattended Noise Monitoring Results – Determined by EIS

Location	Rating Background Level - RBL (L_{A90} dBA)			Ambient Noise Level (L_{Aeq} dBA)		
	Day	Evening	Night	Day	Evening	Night
NM02	37	37	36	55	59	51

Time periods defined as follows – Day: 7.00am to 6.00pm Monday to Saturday, 8.00am to 6.00pm Sunday; Evening: 6.00pm to 10.00pm; and Night: 10.00pm to 7.00am Monday to Saturday, 10.00pm to 8.00am Sunday.

Consistent with the EIS study, the Rating Background Noise Levels (RBLs) shown have been considered in determining the construction noise criteria, as discussed in **Section 5**.

Whilst the EIS background noise levels have been applied for the purposes of assessment, it has been noted during daytime site inspections that the RBLs in the vicinity of the Station Street works are notably higher than L_{A90} 37 dBA.

In this regard, ACA report (ACA 11.00323L-01, dated 15 October 2021) sets out the results of daytime supplementary attended noise monitoring of pre-construction noise levels within St Marys, at locations potentially affected by the TBI Early Works. Of particular note, the supplementary noise monitoring determined that the closest residential receivers to the Station Street works (R26), are ordinarily subjected to daytime background noise levels of L_{A90} 53 dBA due to the influence of the Station Plaza shopping centre's mechanical services (car park exhaust fans). Additionally, residential receivers on Chesham Street (R29), are ordinarily subjected to daytime background noise levels of L_{A90} 51 dBA due to the influence of Glossop Street traffic and another construction compound.

5. AIRBORNE CONSTRUCTION NOISE

Airborne Construction Noise Criteria

The CNVS notes that Construction Noise Management Levels (NMLs) for all Sydney Metro projects should be determined in accordance with the procedures nominated in the DECCW's "*Interim Construction Noise Guideline*" dated July 2009 (ICNG).

The noise criteria set out in the ICNG have been considered in the assessment of potential impacts from the project works. **Table 5-1** summarises the construction noise criteria recommended by the ICNG for residential receivers and **Table 5-2** summarises the criteria for non-residential receivers. **Table 5-2** additionally includes the construction noise criteria for relevant special use receivers (other sensitive land uses) not identified by the ICNG.

With consideration to the out of hours periods identified by the Sydney Metro Construction Noise and Vibration Standard, the resultant project specific NMLs set out in **Table 5-3**.

Table 5-1 ICNG Airborne Construction Noise Criteria – Noise at Residences¹

Time of Day	Management Level $L_{Aeq,15min}$	How to Apply
Recommended Standard Hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or Public Holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq,15min}$ is greater than the noise affected level, the proponent would apply all feasible and reasonable work practices to minimise noise. The proponent would also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the proponent would consider very carefully if there is any other feasible and reasonable way to reduce noise to below this level. If no quieter work method is feasible and reasonable, and the works proceed, the proponent would communicate with the impacted residents by clearly explaining the duration and noise level of the works, and by describing any respite periods that will be provided.
Outside recommended standard hours	Noise affected RBL + 5 dB	A strong justification would typically be required for works outside the recommended standard hours. The proponent would apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dBA above the noise affected level, the proponent would negotiate with the community. For guidance on negotiating agreements see Section 7.2.2 of the ICNG
Note 1:	Adopted from the ICNG.	
Note 2:	Noise levels apply at the property boundary that is most exposed to construction noise (or receiver building façade that is most exposed to construction noise, noting that noise levels may be higher at upper floors of the noise affected receiver buildings). 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 5-2 ICNG Airborne Construction Noise Criteria – Other Sensitive Land Uses

Land Use	Management Level $L_{Aeq, 15min}$ (applies when properties are being used)	Reference
Classrooms at schools and other educational	Internal noise level: 45 dBA ¹	ICNG ⁵
Hospital wards and operating theatres	Internal noise level: 45 dBA ²	ICNG ⁵
Places of worship	Internal noise level: 45 dBA ³	ICNG ⁵
Active recreation areas	External noise level: 65 dBA	ICNG ⁵
Passive recreation areas	External noise level: 60 dBA	ICNG ⁵
Commercial premises (offices, etc)	External noise level: 70 dBA	ICNG ⁵
Industrial premises	External noise level: 75 dBA	ICNG ⁵
Childcare Centres (Sleeping areas)	Internal noise level: 40 dBA ⁴	AAAC ⁶
Childcare Centres (External areas)	Internal noise level: 60 dBA ⁴	AAAC ⁶

Notes: 1, 2, 3: External Noise Management Levels (NML) of $L_{Aeq, 15min}$ 55 dBA are considered by this assessment, assuming 10dB attenuation achieved by façades with open window(s);
4: External Noise Management Levels (NML) of $L_{Aeq, 15min}$ 60 dBA are considered by this assessment, assuming 20 dB attenuation achieved by façades with closed/fixed window(s);
5: Management Levels specified by Interim Construction Noise Guideline;
6: Management Level based on Australian Acoustical Consultants (AAAC) Technical Guideline on Child Care Centre Noise Assessments.

Table 5-3 Airborne Noise Management Levels (External Levels)

Location	Standard Hours (Day)		OOHW (Day)		OOHW (Evening)		OOHW (Night)	
	RBL	NML	RBL	NML	RBL	NML	RBL	NML
Residential	37	47	37	42	37	42	36	41
School (Classrooms)	n/a	55	n/a	55	n/a	55	n/a	55
Commercial (Offices)	n/a	70	n/a	70	n/a	70	n/a	70
Childcare Centre (External Play Areas & External to Sleeping Areas)	n/a	60	n/a	60	n/a	60	n/a	60

Notes: RBL - Rating Background Noise Level; NML - Noise Management Level; Non-residential criteria only apply when receiver building is in use. Noise levels apply at the property boundary that is most exposed to construction noise (or receiver building façade that is most exposed to construction noise, noting that noise levels may be higher at upper floors of the noise affected receiver buildings). 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.

Sydney Metro Construction Noise & Vibration Standard (CNVS)

In addition to the ICNG, the noise criteria set out in the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (CNVS) have been considered.

The CNVS recognises that works requiring the use of heavy machinery can generate high noise and vibration levels and in urban areas there is often limited setback distance between these noise sources and nearby buildings and receivers. Under such circumstances, typically there is limited opportunity to practicably mitigate the noise and vibration effects in a cost-effective manner. Therefore, potential disturbance impacts are usually minimised as much as practicable through management techniques. For residential receivers, depending on how far the predicted airborne construction noise level is above RBL, the CNVS recommends the adoption of the management measures set out in **Table 5-4**. Full definitions of the identified management measures are set out in the CNVS.

Table 5-4 Additional Airborne Noise Management Measures (Residential)

Time Period		Mitigation Measures			
		Predicted $L_{Aeq,15min}$ Noise Level Above NML			
		0 to 10 dB	10 to 20 dB	20 to 30 dB	> 30 dB
Standard Hours	Mon-Fri (7.00am - 6.00pm)				
	Sat (8.00am - 1.00pm)	LB	LB, M	LB, M, SN	LB, M, SN
	Sun/Pub Hol (Nil)				
OOH (Evening)	Mon-Fri (6.00pm - 10.00pm)				
	Sat (1.00pm - 10.00pm)	LB, M	LB, M, SN	LB, M, SN, RO	LB, M, SN, IB, PC, RO, SN
	Sun/Pub Hol (8.00am - 6.00pm)				
OOH (Night)	Mon-Fri (10.00pm - 7.00am)				
	Sat (10.00pm - 8.00am)	LB, M	LB, M, SN, RO	LB, M, SN, IB, PC, RO, AA	LB, M, SN, IB, PC, RO, SN, AA
	Sun/Pub Hol (6.00pm - 7.00am)				

Notes: AA – Alternative Accommodation; M – Monitoring; IB – Individual Briefings; LB – Letterbox drops; RO – Project Specific Respite Offer; PC – Phone Calls and emails; SN – Specific Notifications. Full definitions of these Additional Mitigation Measures are set out in Table 15 of the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (Ver 4.2, 08/09/2020).

Construction Activities

Assessment of airborne noise impacts from the construction activities have been determined by modelling the noise sources, receiver locations, topographical features and buildings.

Key details regarding the construction site layouts, the likely plant and equipment and hours of operation were informed by the construction team.

Table 5-5 provides a summary of the works to be undertaken and the timeframes at which the works would occur.

Table 5-5 Construction Scenarios

Model ID	Stage	Activity	Standard Hours	Out-of-Hours Day	Out-of-Hours Evening	Out-of-Hours Night
External Works						
20	Materials Laydown and Amenities Compound	Laydown Operations	Yes	Yes	Yes	Yes
21a	Service Installation Stormwater Drainage and Pavement Reconstruction and Resurfacing Works	Saw Cut Asphalt	No	No	Yes	No
21b		Excavate & Backfill	No	No	No	Yes
21c		Pavement Reconstruction	No	No	No	Yes
21d		Asphalting Works – Milling and Resheeting	No	No	No	Yes
22a	Service Installation CCTV Services	Lift Pavers	Yes	No	No	No
22b		Excavate	Yes	No	No	No
22c		Backfill & Compact	Yes	No	No	No

Construction Equipment

For the purposes of this assessment, the construction equipment and sound power levels set out in **Table 5-6** have been considered across the identified works areas as shown in **Figure 2-1**. The sound power levels have been determined by measurements undertaken by ACA on other similar projects, or have been adopted from other similar CSSI projects.

Table 5-6 Construction Plant Sound Power Levels

Stage	Activity	Construction Equipment	Sound Power Level - SWL (L _{Aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL (L _{Aeq,15min} dBA)	Activity SWL (L _{A1,1min} dBA)
20	Materials Laydown and Amenities Compound	Hand Tools	90	5	85	100	115
		2t Tipper	105	5	100		
		14t Excavator	105	5	100		
21a	Service Installation - Stormwater Drainage Services 21a Saw Cut Asphalt	2t Tipper Truck	105	5	100	111	120
		Concrete Saw*	118	3	111		
21b & 21c	Service Installation - Stormwater Drainage Services	Hand Tools	90	5	85	110	115
		Jackhammer	113	5	108		
		14t Excavator with Bucket	110	5	105		
	21b Excavate & Backfill	2t Tipper Truck	100	5	95		
		Rigid Truck / Bogie	105	5	100		
	21c Pavement Reconstruction Works	Plate Compactor	109	5	104		
		Jumping Jack	109	5	104		
21d	Service Installation - Stormwater	Milling Machine / Profiler	117	5	112	112	119
		Paver	114	5	109		

ST MARY'S BUS EXCHANGE EARLY WORKS
ADDENDUM DETAILED NOISE & VIBRATION IMPACT STATEMENT (DNVIS) – STORMWATER VARIATION

	Drainage Services	7t Smooth Drum Static Roller	107	5	102		
	21d Asphalting (Milling and Resheeting)	7t Multi Tyre Static roller.	107	5	102		
		Line Marking Truck	108	5	103		
22a	CCTV Services Lift Pavers	2t Tipper Truck	105	5	100	105	110
		5t Excavator with Bucket	110	5	105		
22b	CCTV Services Excavate	Hand Tools	90	5	85	110	115
		Jackhammer	113	5	108		
		5t Excavator with Bucket	110	5	105		
		5t Excavator with Small Hammer*	115	5	110		
		2t Tipper Truck	100	5	95		
		Rigid Truck / Bogie	105	5	100		
22c	CCTV Services Backfill & Compact	Hand Tools	90	5	85	108	115
		5t Excavator with Bucket	110	5	105		
		2t Tipper Truck	100	5	95		
		Plate Compactor	109	5	104		
		Jumping Jack	109	5	104		

Note: Sources marked with an asterisk (e.g. concrete saws, grinders, hydraulic hammers, profilers, vibratory rollers) can emit noise with special audible (annoying) characteristics. In accordance with the ICNG and the CNVS, predicted noise levels for these stages incur a +5 dB penalty to account for the additional annoyance that could arise. This penalty has been applied to the predicted levels. The activity sound power levels for each stage take account of the potential for the coinciding use of plant items – where certain plant items would operate at the same time adjustments have been calculated.

Activity 20 – Compound – The compound would support the out-of-hours works on Station Street and is assumed to operate at any time during standard hours and during the out-of-hours periods.

Activity 21a – Saw cutting – This activity would be restricted to the evening period (prior to 10.00pm). The saw cutting would be undertaken at the start of each shift and the activity would be completed within approximately 30 mins or less.

Activities 21b and 21c – Excavate, Backfill and Pavement Reconstruction – These activities would be undertaken during the night period.

Activities 21d – Asphalting (milling and re-sheeting) activities would be undertaken during the night period.

Activities 22a, 22b, 22c – CCTV Services would be undertaken during standard hours only.

Construction Noise Modelling

Construction noise emissions from the works have been modelled using the SoundPLAN (Version 8-2) environmental noise prediction software. This program is used and recognised internationally and is also recognised by NSW regulatory authorities as a preferred computer noise model. Factors that are addressed in the noise modelling are:

- Construction equipment sound power levels;
- Location of construction equipment;
- Screening from existing structures;
- Receiver locations, including multiple storey receivers;
- Ground topography;
- Noise attenuation due to geometric spreading;
- Ground absorption; and
- Atmospheric absorption.

Construction Noise Predictions

The predicted worst-case construction noise levels at the identified representative receivers for the modelled construction activities are set out in a series of tables in **Appendix B**. Additionally, the Additional Mitigation Measures that are required to be considered by the CNVS are identified in **Appendix B**.

A series of predicted noise contours is provided in **Appendix C**.

The predictions represent the typical-worst case noise levels that may be expected to arise at the external facades of the receiver buildings. It should be noted that construction noise levels would frequently be lower than the worst-case levels considered for significant periods of time. This would be apparent as works move around the work areas and are therefore more distant/more shielded from receivers and when less noisy activities are being undertaken.

The results show the airborne noise NLMs have potential to be exceeded at various localities and times depending on the works schedule. Given the likelihood of exceedances, the Sydney Metro standard mitigation measures will be applied throughout all of the identified work stages and the Additional Mitigation Measures (AMMs) will be considered at the locations indicated.

Highly Noise Affected Receivers

The modelling indicates the potential for some relatively high noise levels during the works. The highest levels and greatest impacts are anticipated at the closest receivers to the night works, principally on Station Street and Chesham Street. These receivers may be expected to be highly

noise affected at times during the works, that is, noise levels may be expected to exceed the NML by > 20 dB externally to these receivers.

Ward proposes to consult with the potentially affected receivers on Station Street and Chesham Street prior to the works to determine if any particular concerns regarding noise impacts may be addressed during the scheduling.

CNVS Additional Mitigation Measures – Airborne Construction Noise

The highlighted Additional Mitigation Measure (AMM) triggers shown in tables set out in **Appendix B** are based on the exceedance of the $L_{Aeq,15min}$ NMLs. The tables identify some AMM triggers of Respite Offer (RO) and Alternative Accommodation (AA).

Whilst the noise levels identified in **Appendix B** are representative of the typical worst case noise levels that may be expected to arise during the works, it is noted that given the scheduling of the works there is potential for the most exposed receivers to be impacted over several consecutive evenings and nights.

Modelling indicates the potential for AA triggers when the night works are undertaken within the easternmost 120 m of the Station Street works areas. **Figure 5-1** indicates the residential receiver buildings affected, these are located at 1 Station Street / 3 Lethbridge Street, 2 Station Street and 3 Station Street.

Figure 5-1 Residential Buildings where Alternative Accommodation (AA) Trigger Levels Predicted during Night Works



Ward will consult with these receivers to determine any AA requirements and will consider their feedback regarding the works scheduling.

Receiver Consultation in Accordance with E57

In accordance with Conditions E57, Ward proposes to consult with highly impacted residential receivers on Station Street and will also consult with the receivers that may be impacted by levels predicted to trigger RO, as indicated in **Appendix B**.

Consultation to negotiate suitable respite requirements to minimise any potential noise impacts to residents will be undertaken with:

- 1-3 Station Street / 3 Lethbridge Street
- 1-6 Chesham Street
- 3 Station Street
- 34-36 Phillip Street
- 69 Carinya Avenue
- 65-67 Carinya Avenue
- St Mary's Hotel residents

Ward will consult with these potentially affected receivers and consider any community feedback during the works scheduling.

The outcomes of this community consultation including any identified respite periods will be provided to the ER, EPA and the Planning Secretary prior to the out-of-hours work commencing.

All project community consultation will be completed in accordance with the Sydney Metro Overarching Community Communications Strategy (OCCS) and project specific Community Communications Strategy (CCS). Forecast noise and vibration levels and predicted potential impacts detailed in this DNVIS will be used to inform and guide the required project consultation.

All potentially affected receivers, as previously identified by the TBI DNVIS will be provided with regular letterbox drop notifications regarding the works, as required by the CNVS.

Noise Monitoring

Noise monitoring would be undertaken during the works at the most affected monitoring locations nominated by the DNVIS, based on on-site subjective evaluation.

The results of the noise monitoring at the identified locations would be reviewed as the works proceed and would be compared against the NML. Where necessary the results would be used to inform the

construction team of any notable exceedances, over the levels set out in **Appendix B** and would be used to identify any recommended modifications to work methods or to identify the requirements for additional specific amelioration measures.

Sleep Disturbance

Maximum noise level events from construction activities during the night-time period can trigger both awakenings and disturbance to sleep stages. The CNVS approach to managing events that cause sleep disturbance is consistent with the Noise Policy for Industry (EPA, 2017). A detailed maximum noise level event assessment is to be undertaken where night-time noise levels at a residential location exceed the:

- $L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, or the
- L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater.

The CNVS notes the maximum noise level event assessments should be based on the L_{AFmax} descriptor on an event basis under 'fast' time response. The detailed assessment will consider all feasible and reasonable noise mitigation measures with a goal of achieving the above trigger levels for night-time activities.

To assess the likelihood of sleep disturbance, **Table B-11 (Appendix B)** sets out the predicted maximum noise levels for each stage and identifies where exceedances may occur during works undertaken in the night period.

It is noted that the CNVS AMMs are based on the degree to which the $L_{Aeq,15min}$ level exceeds the RBL and not the L_{Amax} level. The AMMs based on the $L_{Aeq,15min}$ assessment would be expected to adequately address potential sleep disturbance impacts.

6. GROUNDBORNE CONSTRUCTION NOISE & VIBRATION

Construction Vibration Criteria

The effects of vibration in buildings can be divided into three main categories; those in which the occupants or users of the building are inconvenienced or possibly disturbed (human comfort), those where the building contents may be affected (effects on building contents) and those in which the integrity of the building or the structure itself may be prejudiced (structural damage).

Human Comfort

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

British Standard 6472-1992 "Guide to evaluation of human exposure to vibration in building" nominates guideline values for various categories of disturbance, the most stringent of which are the levels of building vibration associated with a "low probability of adverse comment" from occupants.

BS 6472-1992 provides guideline values for continuous, transient and intermittent events that are based on a Vibration Dose Value (VDV), rather than a continuous vibration level. The vibration dose value is dependent upon the level and duration of the short-term vibration event, as well as the number of events occurring during the daytime or night-time period.

The vibration dose values recommended in BS 6472-1992 for which various levels of adverse comment from occupants may be expected are presented in **Table 6 -1** (based on CNVS Table 4).

Table 6-1 Vibration Dose Values re Expected Adverse Comment in Residential Buildings

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	0.13	0.26	0.51

With respect to VDV, ACA notes that there can be practical difficulties in the prediction and measurement of this parameter, particularly given the limited available measured data. ACA considers the Peak Particle Velocity (PPV) levels as recognised by AVTG is an acceptable substitution (as per table C1.1 of the AVTG – i.e. Residential Daytime: 0.28 to 0.56 mm/s PPV; Residential Night: 0.2 to 0.4 mm/s PPV; Commercial: 0.56 to 1.1 mm/s PPV).

This is a common approach in the industry and allows alignment with structural damage vibration guide values and provides an opportunity for the same vibration equipment to measure for comfort and damage.

Effects on Building Contents

People can perceive floor vibration at levels well below those likely to cause damage to building contents or affect the operation of typical equipment found in most buildings that is not particularly vibration sensitive.

For most receivers, the controlling vibration criterion is the human comfort criterion, and it is therefore not normally required to set separate criteria in relation to the effect of construction vibration on typical building contents.

Where appropriate, objectives for the satisfactory operation of vibration sensitive critical instruments or manufacturing processes should be sourced from manufacturer's data and/or other published objectives.

Structural Damage

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.

BS 7385 Part 2-1993 sets guide values for building vibration based on the lowest vibration levels above which damage has been credibly demonstrated. These levels are judged to give a minimum risk of vibration induced damage, where minimal risk for a named effect is usually taken as a 95% probability of no effect.

Sources of vibration that are considered in the standard include demolition, blasting (carried out during mineral extraction or construction excavation), piling, ground treatments (e.g. compaction), construction equipment, tunnelling, road and rail traffic and industrial machinery.

The recommended limits (guide values) for transient vibration to ensure minimal risk of cosmetic damage to residential and industrial buildings are presented numerically in **Table 6-2** (based on CNVS Table 5).

Table 6-2 Transient Vibration Guide Values – Minimal Risk of Cosmetic Damage

Peak Component Particle Velocity, PCPV in the Frequency Range of Predominant Pulse (mm/s)		
Type of Building	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed building structures and heavy commercial buildings	50 mm/s at 4 Hz and above	
Unreinforced or light framed structures Residential or light commercial buildings	15 mm/s at 4 Hz, increasing to 20 mm/s at 15Hz	20 mm/s at 15 Hz, increasing to 50 mm/s at 40 Hz and above

In order to assess the likelihood of cosmetic damage due to vibration measurements would be as a minimum undertaken at the base of the building in three orthogonal vibration components (transverse, longitudinal and vertical directions).

It is noteworthy that extra to the guide values nominated, 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” and

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

Additionally, Condition E84 requires that before commencement of construction, all buildings identified as being at risk of damage must be inspected and a building condition survey undertaken by a suitably qualified and experienced person.

Due to the current difficulties in conducting internal building inspections due to Covid-19 restrictions, Ward generally proposes to minimise any building inspection requirements by minimising the potential for cosmetic damage effects.

General Vibration Screening Criterion

The guide values 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 may need to be reduced by up to 50%.

Note: rockbreaking/hammering and vibratory rolling activities are considered (by TfNSW) to have the potential to cause dynamic loading in some structures and it may therefore be appropriate to reduce the transient values by 50%.

Therefore, for most construction activities involving intermittent vibration sources such as rockbreakers, piling rigs, vibratory rollers, excavators with hydraulic hammers and the like, the predominant vibration energy occurs at frequencies greater than 4 Hz (and usually in the 10 Hz to 100 Hz range). On this basis, a conservative vibration damage screening level per receiver type is given below:

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

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

Guidelines for Heritage Structures

Heritage buildings and structures would be assessed as per the screening criteria as they should not be assumed to be more sensitive to vibration unless they are found to be structurally unsound. If a heritage building or structure is found to be structurally unsound (following inspection) a more conservative cosmetic damage criteria of 2.5 mm/s peak component particle velocity (from DIN 4150) would be considered.

Table 9-3 outlines the heritage listed items within the vicinity of the project, none of which have been assessed as being structurally unsound.

Table 6-3 Heritage Items

Heritage Item / Location	Register Listings	Significance	Location
St Marys Railway Station	State Heritage Register and State Rail S170 register under the Heritage Act	State	North of Site
St Marys Railway Station Parcel Office	Penrith City Council LEP (01249)	Local	North of Site

Guidelines for Sensitive Scientific & Medical Equipment

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

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 Table 6 and Figure 3 of the CNVS.

The land use survey undertaken by ward has not identified any uses that may be expected to include sensitive scientific or medical equipment.

Other Vibration Sensitive Structures & Utilities

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 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 with the structure or utility's owner in order to determine acceptable vibration levels.

CNVS Additional Mitigation Measures – Groundborne Construction Vibration

In addition to the vibration criteria discussed above, the CNVS requires the consideration of Additional Mitigation Measures, in the case of appreciable levels of vibration occurring at sensitive receivers.

Table 6-4 (based on Table 17 of the CNVS) sets out the Additional Mitigation Measures (AMMs) to be applied in the case of exceedances of the groundborne vibration management levels.

Table 6-4 Additional Mitigation Measures - Ground-Borne Vibration

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

Notes: AA – Alternative Accommodation; M – Monitoring; IB – Individual Briefings; LB – Letterbox drops; RO – Project Specific Respite Offer; PC – Phone Calls and emails; SN – Specific Notifications. Full definitions of these Additional Mitigation Measures are set out in Table 15 of the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (Ver 4.2, 08/09/2020). The 'maximum' vibration value is taken as the 'Maximum Peak Velocity (mm/s)' value identified in Table C1.1 in the Assessing Vibration: A technical guideline (DEC 2006).

ICNG Groundborne Construction Noise Criteria

Groundborne (regenerated) noise is noise generated by vibration transmitted through the ground into a structure. Groundborne noise caused, for example by underground works such as tunnelling, can be more noticeable than airborne noise. The following groundborne noise levels for residences are nominated in the ICNG and indicate when management actions would be implemented. These levels recognise the temporary nature of construction and are only applicable when groundborne noise levels are higher than airborne noise levels.

The groundborne noise management levels considered by this assessment are shown in **Table 6-5**.

Table 6-5 Ground-Borne Noise Management Levels

Receiver Type	Standard Hours (Day)	OOHW (Day)	OOHW (Evening)	OOHW (Night)
	L _{Aeq,15min} dBA	L _{Aeq,15min} dBA	L _{Aeq,15min} dBA	L _{Aeq,15min} dBA
Residential	45	40	40	35
Commercial	50 when in use			
Childcare	40 when in use			
School	45 when in use			

Note: The Groundborne Noise Management Levels for non-residential uses only apply when the building is in use.

The daytime criteria are applicable to both residential and commercial receivers, whereas the evening and night-time criteria are only applicable to residential receivers. The Groundborne Noise Management Levels for non-residential uses only apply when the receiver building is in use.

The internal noise levels are to be assessed at the centre of the most-affected habitable room.

CNVS Additional Mitigation Measures – Groundborne Construction Noise

Table 6-6 (based on Table 15 of the CNVS) sets out the AAMs to be applied in the case of exceedances of the groundborne noise management levels.

Table 6-6 Additional Groundborne Noise Management Measures (Residential)

	Time Period	Mitigation Measures			
		Predicted L _{Aeq,15min} Noise Level Above NML			
		0 to 10 dB	10 to 20 dB	20 to 30 dB	> 30 dB
Standard Hours	Mon-Fri (7.00am - 6.00pm)				
	Sat (8.00am - 1.00pm)	LB	LB, M	LB, M, SN	LB, M, SN
	Sun/Pub Hol (Nil)				
OOH (Evening)	Mon-Fri (6.00pm - 10.00pm)				LB, M, SN
	Sat (1.00pm - 10.00pm)	LB, M	LB, M, SN	LB, M, SN, RO	IB, PC, RO, SN
	Sun/Pub Hol (8.00am - 6.00pm)				
OOH (Night)	Mon-Fri (10.00pm - 7.00am)				LB, M, SN
	Sat (10.00pm - 8.00am)	LB, M	LB, M, SN, RO	LB, M, SN, IB, PC, RO, AA	IB, PC, RO, SN, AA
	Sun/Pub Hol (6.00pm - 7.00am)				

Notes: AA – Alternative Accommodation; M – Monitoring; IB – Individual Briefings; LB – Letterbox drops; RO – Project Specific Respite Offer; PC – Phone Calls and emails; SN – Specific Notifications. Full definitions of these Additional Mitigation Measures are set out in Table 15 of the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (Ver 4.2, 08/09/2020).

Groundborne Construction Noise & Vibration Assessment

Certain construction activities require the use of vibration intensive equipment that have potential to adversely impact the closest sensitive receivers.

With respect to groundborne noise, ACA notes that for the proposed surface works airborne noise levels would dominate over groundborne noise. It is considered that management of airborne noise impacts in addition to management of vibration impacts would satisfactorily manage any groundborne noise effects. Accordingly, this assessment does not consider groundborne noise effects any further.

Minimum working distances to sensitive receivers for cosmetic building damage and human response have been identified for vibration generating plant that may be used during the works. If equipment operates closer to a sensitive receiver, vibration from construction works may potentially exceed the vibration guidelines. It should be noted, however, the minimum working distances are conservative and indicative. Actual distances may be expected to vary depending on the activity/operator, equipment particularities, local ground conditions and receiver conditions (e.g. building footings).

Notwithstanding this, Ward has selected plant and works methods to, as far as practicable, minimise any potential vibration (and noise) effects during the night. In particular, only static (non-vibratory) rollers would be used. Out of hours compaction works would be undertaken with less vibration intensive plate compactors and jumping jacks, in lieu of vibratory rollers.

Additionally, hydraulic hammering would not be undertaken during the out of hours works. Some provision has been made for some limited use (for contingency) of a small hydraulic hammer during the CCTV works, but this would only be used during standard hours and whilst observing all safe working distances from structures.

Table 6-7 shows the vibration generating plant that would be used and the associated minimum working distances. The hammer setback distances are noted to be generally consistent with the TfNSW Construction Noise and Vibration Strategy (V 4.1). The TfNSW Strategy does not include reference distances for plate compactors or jumping jacks. The distances identified for these items are based on measurements undertaken by the University of Western Australia which are consistent with ACA's experience.

Vibration monitoring trials would be undertaken on site at the commencement of the works to confirm vibration levels and safe working distances for all vibration generating equipment.

Table 6-7 Recommended Minimum Working Distances for Vibration Intensive Equipment

Plant Item	Minimum Distance – Cosmetic Damage (BS 7385)	Minimum Distance – Human Response (OE&H Vibration Guideline)
5t Excavator with Small (300kg) Hydraulic Hammer	2	7
60kg Plate Compactor	2	7
Jumping Jack	2	7
Jackhammer	1 m (nominal)	Avoid contact with structure

Note 1: Hydraulic hammer & vibratory roller distances are consistent with the TfNSW Construction Noise and Vibration Strategy (V 4.1).

Note 2: Plate compactor distances are based on measurements undertaken by University of Western Australia.

Hydraulic Hammers

During the service installation works on Station Street if the 5-tonne excavator with small hydraulic hammer is used, a setback distance of >20 m would be maintained from the St Marys Railway Station Parcel Office (Heritage Receiver). At this distance vibration levels from a small hydraulic hammer are predicted to not exceed 1 mm/s PPV. Therefore, no material risk of exceedance of the screening criteria for cosmetic building damage for commercial or heritage receivers is predicted for the identified hydraulic hammering works.

Additionally, it is considered there would be no material risk of human comfort vibration exceedances from the identified potential hammering works.

Compaction Works

For the compaction works requiring plate compactors or jumping jacks, safe working distances with respect to cosmetic building damage and human comfort will be maintained and there would be no material risk of exceedances of the identified vibration screening criteria.

CNVS Additional Mitigation Measures – Groundborne Noise & Vibration

Given Ward's proposed vibration controls, further specific additional mitigation measures relating to groundborne noise or vibration are not considered necessary, beyond the standard measures defined by the CNVS. Application of the standard measures (outlined in **Section 8**) in addition to the controls discussed above would be expected to be sufficient to ensure vibration effects on the occupants of nearby buildings are satisfactorily managed.

7. CONSTRUCTION ROAD TRAFFIC NOISE

Construction Road Traffic Noise Guidelines

Criteria for off-site road traffic noise applicable to existing residences affected by additional traffic on existing local roads generated by land use developments are specified in the NSW Road Noise Policy (RNP). Whilst these criteria do not specifically apply to construction traffic movements, they have been conservatively considered and are summarised in **Table 7-1**.

Table 7-1 RNP Criteria for Road Traffic Noise

Type of Development	Daytime (07:00-22:00)	Night (22:00-07:00)
Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	L _{Aeq,15 hour} 60 (external)	L _{Aeq,9 hour} 55 (external)
Existing residences affected by additional traffic on existing local roads generated by land use developments	L _{Aeq,1 hour} 55 (external)	L _{Aeq,1 hour} 50 (external)

Note: The identified criteria do not apply to vehicle movements within the Project Site. For the purpose of assessment, any noise generated by on-site vehicle movements is considered as construction noise and assessed holistically with on-site mobile plant in accordance with the ICNG.

As required by the RNP, an initial screening test should first be applied by evaluating whether noise levels would increase by more than 2 dB (an increase in the number vehicles of approximately 60%) due to construction traffic or a temporary reroute due to a road closure.

Where noise levels increase by more than 2 dB further assessment is required using the criteria presented in the RNP, as shown in **Table 10-1**. A 2 dB increase is typically considered not noticeable.

Construction Road Traffic Assessment

Ward estimates that a maximum of 10 heavy vehicle movements per hour would be required during the peak construction phase.

Considering the existing volume of traffic on the adjacent roads, the noise impact generated by construction delivery vehicles arriving and leaving the site would be expected to result in an increase in road traffic noise levels of significantly less than 2 dB which is in compliance with the established criteria.

On this basis, no material construction traffic noise impacts are expected.

8. CONSTRUCTION NOISE & VIBRATION MITIGATION MEASURES

CNVS Additional Mitigation Measures

The CNVS sets out standard construction noise and vibration mitigation measures to be implemented on all Sydney Metro projects by default in order to minimise the potential noise and vibration impacts at the surrounding Noise Sensitive Receivers. These will be implemented by Ward where feasible and reasonable and are summarised in **Table 8-1**. A summary of roles and responsibilities is provided in **Table 8-2**.

Table 8-1 Standard Mitigation Measures to Reduce Construction Noise and Vibration

Action Required	Applies To	Details
Management Measures		
Implementation of any project specific mitigation measures required	Airborne noise Ground-borne noise and vibration	In addition to the measures set out in this table, any project specific mitigation measures identified in the environmental assessment documentation (e.g. EA, REF, submissions or representations report) or approval or licence conditions must be implemented.
Implement community consultation measures	Airborne noise Ground-borne noise and vibration	A register of all noise and vibration sensitive receivers (NSRs) would be kept on site. The register would include the following details for each NSR: <ul style="list-style-type: none"> • Address of receiver • Category of receiver (e.g. Residential, Commercial etc.) • Contact name and phone number
Site Inductions	Airborne noise Ground-borne noise and vibration	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: <ul style="list-style-type: none"> • All relevant project specific and standard noise and vibration mitigation measures • Relevant licence and approval conditions • Permissible hours of work • Any limitations on high noise generating activities • Location of nearest sensitive receivers • Construction employee parking areas • Designated loading/unloading areas and procedures • Site opening/closing times (including deliveries) • Environmental incident procedures

ST MARY'S BUS EXCHANGE EARLY WORKS
ADDENDUM DETAILED NOISE & VIBRATION IMPACT STATEMENT (DNVIS) – STORMWATER VARIATION

Behavioural practices	Airborne noise	No swearing or unnecessary shouting or loud stereos/radios; on site. No dropping of materials from height; throwing of metal items; and slamming of doors. No excessive revving of plant and vehicle engines Controlled release of compressed air.
Monitoring	Airborne noise Ground-borne noise and vibration	A noise monitoring program is to be carried out for the duration of the works in accordance with the Construction Noise and Vibration Management Plan and any approval and licence conditions.
Attended vibration measurements	Ground-borne vibration	Attended vibration measurements are required at the commencement of vibration generating activities to confirm that vibration levels satisfy the criteria for that vibration generating activity. Where there is potential for exceedances of the criteria further vibration site law investigations would be undertaken to determine the site-specific safe working distances for that vibration generating activity. Continuous vibration monitoring with audible and visible alarms would be conducted at the nearest sensitive receivers whenever vibration generating activities need to take place inside the applicable safe-working distances.
Source Controls		
Construction hours and scheduling	Airborne noise Ground-borne noise and vibration	Where feasible and reasonable, construction would be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels would be scheduled during less sensitive time periods.
Construction respite period	Ground-borne noise and vibration Airborne noise	High noise and vibration generating activities ² may only be carried out in continuous blocks, not exceeding 3 hours each, with a minimum respite period of one hour between each block ³ .
Equipment selection	Airborne noise Ground-borne noise and vibration	Use quieter and less vibration emitting construction methods where feasible and reasonable. For example, when piling is required, bored piles rather than impact-driven piles will minimise noise and vibration impacts. Similarly, diaphragm wall construction techniques, in lieu of sheet piling, will have significant noise and vibration benefits.
Maximum noise levels	Airborne-noise	The noise levels of plant and equipment must have operating Sound Power Levels compliant with the criteria in Table 13 (of the CNVS).
Rental plant and equipment	Airborne-noise	The noise levels of plant and equipment items are to be considered in rental decisions and in any case cannot be used on site unless compliant with the criteria in Table 13 (of the CNVS).

ST MARY'S BUS EXCHANGE EARLY WORKS
ADDENDUM DETAILED NOISE & VIBRATION IMPACT STATEMENT (DNVIS) – STORMWATER VARIATION

Plan worksites and activities to minimise noise and vibration	Airborne noise Ground-borne vibration	Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.
Non-tonal reversing alarms	Airborne noise	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.
Minimise disturbance arising from delivery of goods to construction sites	Airborne-noise	<p>Loading and unloading of materials/deliveries is to occur as far as possible from NSRs</p> <p>Select site access points and roads as far as possible away from NSRs</p> <p>Dedicated loading/unloading areas to be shielded if close to NSRs</p> <p>Delivery vehicles to be fitted with straps rather than chains for unloading, wherever feasible and reasonable</p>
Path Controls		
Shield stationary noise sources such as pumps, compressors, fans etc	Airborne-noise	<p>Stationary noise sources would be enclosed or shielded whilst ensuring that the occupational health and safety of workers is maintained.</p> <p>Appendix F of AS 2436: 1981 lists materials suitable for shielding.</p>
Shield sensitive receivers from noisy activities	Airborne-noise	<p>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.</p>

Table 8-2 Roles and Responsibilities

Role	Definition and Responsibilities
Project Environment Manager	<ul style="list-style-type: none"> Oversee the implementation of all noise and vibration management initiatives including coordinating responses to noise and vibration complaints. Manage review and continual improvement of the DNVIS/CNVMP. Ensure that sufficient resources are allocated for the implementation of the DNVIS/CNVMP. Consider and advise senior management on compliance obligations regarding noise and vibration. 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.
Site Supervisor	<ul style="list-style-type: none"> Ensure that all requirements of the DNVIS/CNVMP are effectively implemented. Ensure all appropriate noise and vibration mitigation measures are implemented.
EHS Coordinators	<ul style="list-style-type: none"> Assist the Project Environment Manager and Construction Managers in implementing the DNVIS/CNVMP. Oversee noise and vibration training including inductions, toolbox talks and specific technical training on monitoring equipment. Ensure all appropriate noise and vibration mitigation measures are implemented. Monitoring and reporting on compliance.
Site Engineers	<ul style="list-style-type: none"> Assist the Construction Manager in implementing the DNVIS/CNVMP.
Project Noise and Vibration Consultant	<ul style="list-style-type: none"> Provide Ward with specialist noise and vibration input and advice including development of the CNVMP, DNVIS and discussions regarding progressive construction works. Undertaking noise and vibration monitoring when required. Assisting in community consultation when required.
Construction Manager	<ul style="list-style-type: none"> Manage the delivery of the construction process, in relation to noise and vibration management across the site together with the Environment Manager. Ensure that all requirements of the DNVIS/CNVMP are effectively implemented, including all subcontractors
Stakeholder and Community Relations Manager	<ul style="list-style-type: none"> Manage notifications and consultation for noise and vibration and liaise with the Environment Manager about management of noise and vibration complaints. Assist in coordinating responses to noise and vibration complaints.

CNVS Additional Mitigation Measures

Based on the predictions, all reasonable and feasible mitigation measures to minimise noise and vibration from construction will be implemented. This includes the Standard Mitigation Measures (SMM) set out in **Table 8-1** and the Additional Mitigation Measures (AMM) required by the CNVS, as set out in **Section 5** and **Appendix B**.

Construction Noise & Vibration Monitoring Program

Conditions C13 - C15 specify in detail requirements for monitoring. These matters are addressed in the Construction Noise & Vibration Monitoring Program provided in the TBI Early Works DNVIS.

9. CONCLUSION

Acoustics Consultants Australia (ACA) has previously prepared on behalf of Ward Civil & Engineering Pty Ltd (Ward) a Detailed Noise and Vibration Impact Statement (DNVIS) for the St Mary's Temporary Bus Interchange (TBI) Early Works, which form part of the Sydney Metro Western Sydney Airport (SMWSA) Project (SSI 10051).

Details the DNVIS assessment are set out in ACA report 11.00323R-02.

Subsequent to the issue of the DNVIS assessment (ACA report 11.00323R-02), this addendum report has been prepared in relation to the following additional scope items:

- Operation of a materials laydown and amenities compound on Station Street.
- Civil works scope variation – for stormwater drainage and pavement works on Station Street.
- Civil works scope variation – for CCTV trench works on Station Street.

This addendum report should be read in conjunction with the main DNVIS (Report 11.00323R-02).

This addendum assessment has identified further Additional Mitigation Measures required to manage the proposed out of hours works.

APPENDIX A: Glossary of Noise & Vibration Terms

1 Sound Level (or Noise Level)

Sound may be defined as any pressure variation that the human ear can detect. The human ear responds to a wide range of changes in sound pressure. As the greatest sound pressures to which the human ear responds are 10,000,000 times greater than the lowest, the decibel (dB) scale, by the use of logarithms is used to express sound pressure levels more conveniently.

The standard reference sound pressure used to define a Sound Pressure Level is 2×10^{-5} Pascals (Pa).

The decibel is defined as ten times the logarithmic ratio of two pressures. The smallest perceptible change is approximately 1 dB.

Sound Pressure Level is typically abbreviated as SPL, L_p , or L.

2 "A" Weighted Sound Pressure Level

The most common frequency rating is 'A-Weighting'. The A-weighting frequency response curve is designed to approximate the sensitivity of the human ear. The symbol L_A represents A-weighted Sound Pressure Level - The overall broadband level of a sound/noise is typically expressed as a dB(A) level.

Human hearing is most sensitive mid frequencies sounds (500 Hz to 4000 Hz), and less sensitive at higher and lower frequencies. Therefore, the level expressed in dB(A) correlates strongly with the perceived loudness of the sound/noise.

A change in sound pressure level of 1-2 dB is barely noticeable to most people, whilst a 3-5 dB change is perceived as a small but noticeable change in loudness. A 10 dB change is perceived as an approximate doubling or halving in loudness. The table below present the sound pressure levels of some common sources.

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

In addition to A-weighting, other less commonly applied frequency weightings include B, C and D weightings. Unweighted or Linear levels are sound levels measured without any weighting. These are expressed as simply dB, or dB(lin) or dB(Z).

3 Sound Power Level

The rate at which a noise source emits acoustic energy is defined by its Sound Power Level. Sound Power Levels are also expressed in decibel units (dB or dB(A)). Sound Power is typically identified as SWL or LW. The standard reference sound power used to define a Sound Power Level is 1×10^{-12} Watts (W).

4 Statistical Noise Levels

Environmental noise levels from various sources in the environment will vary in level over time. Statistical exceedance levels are typically expressed as L_{AN} levels (i.e. the A-weighted sound pressure level exceeded for N% of a specific measurement period).

The most commonly used statistical noise levels are as follows:

L_{Amax}	Maximum noise level over a sample period (typically measured on fast time-weighting response).
L_{A1}	Noise level exceeded for 1% of a sample period (typically 15-minute interval).
L_{A10}	Noise level exceeded for 10% of a sample period (typically 15-minute interval).
L_{A90}	Noise level exceeded for 90% of a sample period. This noise level is commonly used to describe the background noise level (in the absence of the source under investigation).
L_{Aeq}	A-weighted equivalent noise level. This is equivalent to the steady sound level containing the same amount of acoustical energy as the time-varying sound. Often referred to as the average noise level.
ABL	Assessment Background Level. This is the single figure background level representing each assessment period (day, evening and night) for each day. It is determined by calculating the lowest 10th percentile background noise level (L_{A90}) for each period.
RBL	Rating Background Level. This is the median value of the ABL values for each period (day, evening, night), determined over several days of measurements.

Common Vibration Terms

Hertz (Hz) – Units in which frequency is expressed. Synonymous with cycles per second.

Decibel – Ratios of identical quantities are expressed in decibel or dB units. The number of dB is “ratio” against some standard or reference value in terms of the base 10 logarithm of that ratio. In measuring acoustic or vibration power (as in PSD or ASD of random vibration), the number of dB = $10 \text{ Log}_{10} (P/P_0)$. P_0 , the reference level, equals 0 dB. In measuring the more common voltage-like quantities such as acceleration, the number of dB = $20 \text{ Log}_{10} (E/E_0)$ E_0 , the reference level, equals 0 dB.-

Displacement – A vector quantity that specifies the change of position of a body or particle with respect to a reference frame.

Velocity – A vector quantity that specifies the time derivative of displacement.

Acceleration – Acceleration is rate of change of velocity with time usually along a specified axis, usually expressed in m/s^2

Peak – Extreme value of a varying quantity, measured from the zero or mean value. Also, a maximum spectral value.

Peak-to-peak value – The algebraic difference between extreme values (as $D = 2X$).

Duration of a shock pulse is how long it lasts. Time is usually measured between instants when the amplitude is greater than 10% of the peak value.

Amplitude – The magnitude of variation (in a changing quantity) from its zero value. Always modify it with an adjective such as **peak, RMS, average**, etc. May refer to displacement, velocity, acceleration.

Crest factor – Of an oscillating quantity. The ratio of the peak value to the r.m.s. value.

VDV – The Vibration Dose Value is the accumulation of energy measured over a given time period, proportional to the root mean quad of acceleration. This is usually measured in each of the three axes of motion. In most cases, vibration tends to be higher in the Z (vertical) axis. This is measured with units of $m/s^{1.75}$.

PPV – Peak Particle Velocity is the instantaneous peak of the resultant vector sum of all three axes of motion. Results are expressed in terms of velocity normally mm/s.

Peak Acceleration – This is the peak acceleration level measured in each of the three axes of motion. In some cases, this can also be combined in a vector sum. This is measured in m/s^2 .

Accelerometer – A sensor or transducer or pickup for converting acceleration to an electrical signal. Two common types are piezoresistive and piezoelectric.

Charge amplifier – An amplifier which converts a charge input signal (as from an accelerometer) into an output voltage; a charge-to-voltage converter.

Geophone – A sensor or transducer or pickup for converting velocity to an electrical signal.

APPENDIX B

Construction Noise Prediction Tables and CNVS Additional Mitigation Measures



Table B-1 L_{Aeq,15min} Construction Noise Predictions for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c – Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	38	56	50	50	52	42	52	45
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	35	57	51	51	53	42	52	45
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	31	55	49	49	51	40	50	43
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	22	47	41	41	43	33	43	36
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	22	46	40	40	42	31	41	34
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	10	35	29	29	31	20	30	23
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	12	39	33	33	35	25	35	28
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	19	47	41	41	43	33	43	36
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	36	51	45	45	47	34	44	37
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	31	49	43	43	45	28	38	31
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	23	60	54	54	56	46	56	49
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	24	50	44	44	46	37	47	40
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	39	53	47	47	49	24	34	27
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	32	51	45	45	47	23	33	26
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	34	51	45	45	47	25	35	28
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	26	42	36	36	38	24	34	27
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	23	39	33	33	35	19	29	22
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	20	39	33	33	35	20	30	23
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	31	43	37	37	39	18	28	21
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	35	55	49	49	51	25	35	28
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	38	51	45	45	47	23	33	26
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	19	55	49	49	51	38	48	41
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	17	50	44	44	46	32	42	35
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	11	45	39	39	41	29	39	32
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	37	46	40	40	42	28	38	31
R26	3 Station St	Residential	37	37	36	47	42	42	41	58	76	70	70	72	47	57	50
R27	1 Station St	Residential	37	37	36	47	42	42	41	51	76	70	70	72	41	51	44
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	44	63	57	57	59	24	34	27
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	41	58	52	52	54	37	47	40
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	37	55	49	49	51	36	46	39
C10 [#]	St Mary's Hotel	Residential	37	37	36	47	42	42	41	36	66	60	60	62	53	63	56

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver.

20 - Materials Laydown and Amenities Compound

- 21a - Service Installation - Stormwater Drainage Services - Saw Cut Asphalt (Approx 30 mins)
- 21b - Service Installation - Stormwater Drainage Services - Excavate & Backfill
- 21c - Service Installation - Stormwater Drainage Services - Pavement Works
- 21d - Service Installation - Stormwater Drainage Services - Asphalt Works (Mill & Resheet)

- 22a - CCTV Services - Lift Pavers
- 22b - CCTV Services - Excavate
- 22c - CCTV Services - Backfill & Compact

Table B-2 L_{Aeq,15min} Construction Noise Predictions for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c – Non-Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
C01	TBC	Commercial	-	-	-	70	70	70	70	30	72	66	66	68	58	68	61
C02	TBC	Commercial	-	-	-	70	70	70	70	38	71	65	65	67	57	67	60
C03	TBC	Commercial	-	-	-	70	70	70	70	45	69	63	63	65	51	61	54
C04	TBC	Commercial	-	-	-	70	70	70	70	46	78	72	72	74	64	74	67
C05	TBC	Commercial	-	-	-	70	70	70	70	29	74	68	68	70	59	69	62
C06	TBC	Commercial	-	-	-	70	70	70	70	35	69	63	63	65	55	65	58
C07	TBC	Commercial	-	-	-	70	70	70	70	45	80	74	74	76	66	76	69
C08	TBC	Commercial	-	-	-	70	70	70	70	32	75	69	69	71	62	72	65
C09	TBC	Commercial	-	-	-	70	70	70	70	29	69	63	63	65	56	66	59
C10#	TBC	Commercial	-	-	-	70	70	70	70	36	66	60	60	62	53	63	56
C11	TBC	Commercial	-	-	-	70	70	70	70	21	60	54	54	56	47	57	50
C12	TBC	Commercial	-	-	-	70	70	70	70	21	56	50	50	52	43	53	46
C13	TBC	Commercial	-	-	-	70	70	70	70	18	54	48	48	50	41	51	44
C14	TBC	Commercial	-	-	-	70	70	70	70	16	53	47	47	49	39	49	42
C15	TBC	Commercial	-	-	-	70	70	70	70	15	50	44	44	46	37	47	40
C16	TBC	Commercial	-	-	-	70	70	70	70	15	42	36	36	38	29	39	32
C17	TBC	Commercial	-	-	-	70	70	70	70	18	44	38	38	40	31	41	34
C18	TBC	Commercial	-	-	-	70	70	70	70	17	45	39	39	41	31	41	34
C19	TBC	Commercial	-	-	-	70	70	70	70	23	53	47	47	49	40	50	43
C20	TBC	Commercial	-	-	-	70	70	70	70	22	57	51	51	53	43	53	46
C21	TBC	Commercial	-	-	-	70	70	70	70	19	59	53	53	55	45	55	48
C22	TBC	Commercial	-	-	-	70	70	70	70	20	57	51	51	53	43	53	46
C23	TBC	Commercial	-	-	-	70	70	70	70	29	46	40	40	42	29	39	32
C24	TBC	Commercial	-	-	-	70	70	70	70	22	49	43	43	45	35	45	38
C25	TBC	Commercial	-	-	-	70	70	70	70	22	59	53	53	55	45	55	48
C26	TBC	Childcare Centre	-	-	-	60	60	-	-	55	73	67	67	69	44	54	47

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver.

20 - Materials Laydown and Amenities Compound

21a - Service Installation - Stormwater Drainage Services - Saw Cut Asphalt (Approx 30 mins)

21b - Service Installation - Stormwater Drainage Services - Excavate & Backfill

21c - Service Installation - Stormwater Drainage Services - Pavement Works

21d - Service Installation - Stormwater Drainage Services - Asphalt Works (Mill & Resheet)

22a - CCTV Services - Lift Pavers

22b - CCTV Services - Excavate

22c - CCTV Services - Backfill & Compact

Table B-3 L_{Aeq,15min} Construction Noise Predictions – Standard Hours NML Exceedances for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c & Additional Mitigation – Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	5	-
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	5	-
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	3	-
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	9	2
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	1	-
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R26	3 Station St	Residential	37	37	36	47	42	42	41	11	-	-	-	-	-	10	3
R27	1 Station St	Residential	37	37	36	47	42	42	41	4	-	-	-	-	-	4	-
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41	-	-	-	-	-	6	16	9

- Yellow = LB
- Amber = LB, M
- Red = LB, M, SN
- Purple = LB, M, SN

Table B-4 L_{Aeq,15min} Construction Noise Predictions – Out-of-Hours Daytime NML Exceedances for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c & Additional Mitigation – Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R26	3 Station St	Residential	37	37	36	47	42	42	41	16	-	-	-	-	-	-	-
R27	1 Station St	Residential	37	37	36	47	42	42	41	9	-	-	-	-	-	-	-
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	2	-	-	-	-	-	-	-
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-

Yellow = LB, M

Amber = LN, M, SN

Red = LB, M, SN, RO

Purple = LB, M, SN, IB, PC, RO, SN

Note, the highlighted Additional Mitigation triggers are based on the exceedance of the L_{Aeq,15min} NMLs. To determine whether it is justified to provide Respite Offer measures, consideration must also be given to the duration of the works.

Given the scheduling of the works, it would be expected that the identified impacts would occur for only one or two shifts at any one location before they are completed, and therefore the actual duration of impact would not be prolonged at any particular receiver location. On this basis, it is considered that offers of RO would not be justified.

Table B-5 L_{Aeq,15min} Construction Noise Predictions – Out-of-Hours Evening NML Exceedances for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c & Additional Mitigation – Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	-	14	-	-	-	-	-	-
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	-	15	-	-	-	-	-	-
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	-	13	-	-	-	-	-	-
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	5	-	-	-	-	-	-
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	4	-	-	-	-	-	-
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	5	-	-	-	-	-	-
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	9	-	-	-	-	-	-
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	-	7	-	-	-	-	-	-
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	-	18	-	-	-	-	-	-
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	-	8	-	-	-	-	-	-
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	-	11	-	-	-	-	-	-
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	-	9	-	-	-	-	-	-
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	-	9	-	-	-	-	-	-
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	-	1	-	-	-	-	-	-
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	-	13	-	-	-	-	-	-
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	-	9	-	-	-	-	-	-
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	-	13	-	-	-	-	-	-
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	-	8	-	-	-	-	-	-
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	3	-	-	-	-	-	-
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	4	-	-	-	-	-	-
R26	3 Station St	Residential	37	37	36	47	42	42	41	16	34	-	-	-	-	-	-
R27	1 Station St	Residential	37	37	36	47	42	42	41	9	34	-	-	-	-	-	-
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	2	21	-	-	-	-	-	-
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	-	16	-	-	-	-	-	-
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	13	-	-	-	-	-	-
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41	-	24	-	-	-	-	-	-

Yellow = LB, M
 Amber = LN, M, SN
 Red = LB, M, SN, RO
 Purple = LB, M, SN, IB, PC, RO, SN

Note, the highlighted Additional Mitigation triggers are based on the exceedance of the L_{Aeq,15min} NMLs. To determine whether it is justified to provide Respite Offer measures, consideration must also be given to the duration of the works.

Given the scheduling of the works, it would be expected that the identified impacts would occur for only one or two evenings at any one location before they are completed. Additionally, the required saw cutting would be brief (less than 30 minutes per shift) and therefore the actual duration of impact would not be prolonged at any particular receiver location. On this basis, it is considered that offers of RO would not be justified.

Table B-6 L_{Aeq,15min} Construction Noise Predictions – Out-of-Hours Night NML Exceedances for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c & Additional Mitigation – Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	9	9	11	-	-	-
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	10	10	12	-	-	-
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	8	8	10	-	-	-
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	2	-	-	-
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	1	-	-	-
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	-	-	-	2	-	-	-
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	-	4	4	6	-	-	-
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	-	-	2	2	4	-	-	-
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	-	-	13	13	15	-	-	-
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	-	-	3	3	5	-	-	-
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	-	-	6	6	8	-	-	-
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	-	-	4	4	6	-	-	-
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	-	-	4	4	6	-	-	-
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	-	-	8	8	10	-	-	-
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	-	-	4	4	6	-	-	-
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	-	-	8	8	10	-	-	-
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	-	-	3	3	5	-	-	-
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	1	-	-	-
R26	3 Station St	Residential	37	37	36	47	42	42	41	17	-	29	29	31	-	-	-
R27	1 Station St	Residential	37	37	36	47	42	42	41	10	-	29	29	31	-	-	-
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	3	-	16	16	18	-	-	-
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	0	-	11	11	13	-	-	-
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	-	8	8	10	-	-	-
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41	-	-	9	9	11	-	-	-

Yellow = LB, M

Amber = LN, M, SN, RO

Red = LB, M, SN, IB, PC, RO, AA

Purple = LB, M, SN, IB, PC, RO, SN, AA

Note, the highlighted Additional Mitigation triggers are based on the exceedance of the L_{Aeq,15min} NMLs. To determine whether it is justified to provide Respite Offers and Alternative Accommodation measures, consideration must also be given to the duration of the works.

Given the scheduling of the works, it would be expected that the identified impacts may occur for several consecutive nights at the impacted locations. On this basis, Ward will consult with the identified residents to determine appropriate mitigation measures, prior to the commencement of the works.

Table B-7 L_{Aeq,15min} Construction Noise Predictions – Standard Hours NML Exceedances for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c & Additional Mitigation – Non-Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
C01	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C02	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C03	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C04	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	4	-
C05	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C06	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C07	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	6	-
C08	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	2	-
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C10#	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C26	-	Childcare Centre	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results. Additional Mitigation Measures are only applicable when the receiver building is in use.

- Yellow = LB
- Amber = LB, M
- Red = LB, M, SN
- Purple = LB, M, SN

Table B-8 L_{Aeq,15min} Construction Noise Predictions – Out-of-Hours Daytime NML Exceedances for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c & Additional Mitigation – Non- Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
C01	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C02	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C03	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C04	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C05	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C06	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C07	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C08	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C10	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C26	-	Childcare Centre	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results. Additional Mitigation Measures are only applicable when the receiver building is in use.

Yellow = LB, M
Amber = LN, M, SN
Red = LB, M, SN, RO
Purple = LB, M, SN, IB, PC, RO, SN

Table B-9 $L_{Aeq,15min}$ **Construction Noise Predictions – Out-of-Hours Evening NML Exceedances for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c & Additional Mitigation – Non-Residential**

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
C01	-	Commercial	-	-	-	70	70	70	70	-	2	-	-	-	-	-	-
C02	-	Commercial	-	-	-	70	70	70	70	-	1	-	-	-	-	-	-
C03	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C04	-	Commercial	-	-	-	70	70	70	70	-	8	-	-	-	-	-	-
C05	-	Commercial	-	-	-	70	70	70	70	-	4	-	-	-	-	-	-
C06	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C07	-	Commercial	-	-	-	70	70	70	70	-	10	-	-	-	-	-	-
C08	-	Commercial	-	-	-	70	70	70	70	-	5	-	-	-	-	-	-
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C10	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C26	-	Childcare Centre	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results. Additional Mitigation Measures are only applicable when the receiver building is in use.

Yellow = LB, M
Amber = LN, M, SN
Red = LB, M, SN, RO
Purple = LB, M, SN, IB, PC, RO, SN

Table B-10 L_{Aeq,15min} Construction Noise Predictions – Out-of-Hours Night NML Exceedances for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c & Additional Mitigation – Non-Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
C01	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C02	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C03	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C04	-	Commercial	-	-	-	70	70	70	70	-	-	2	2	4	-	-	-
C05	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C06	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C07	-	Commercial	-	-	-	70	70	70	70	-	-	4	4	6	-	-	-
C08	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	1	-	-	-
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C10	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C26	-	Childcare Centre	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results. Additional Mitigation Measures are only applicable when the receiver building is in use.

- Yellow = LB, M
- Amber = LN, M, SN, RO
- Red = LB, M, SN, IB, PC, RO, AA
- Purple = LB, M, SN, IB, PC, RO, SN, AA

Table B-11 LA1,1min Maximum Construction Noise Predictions – Out-of-Hours Night - for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c – Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	RBL+15 NML	NPfl	RNP	-	20	21a	21b	21c	21d	22a	22b	22c
R01	69 Carinya Ave	Residential	-	-	36	51	52	65	-	43	-	55	55	59	-	-	-
R02	65-67 Carinya Ave	Residential	-	-	36	51	52	65	-	40	-	56	56	60	-	-	-
R03	59 Carinya Ave	Residential	-	-	36	51	52	65	-	36	-	54	54	58	-	-	-
R04	43 Carinya Ave	Residential	-	-	36	51	52	65	-	27	-	46	46	50	-	-	-
R05	41 Carinya Ave	Residential	-	-	36	51	52	65	-	27	-	45	45	49	-	-	-
R06	9 Kungala St	Residential	-	-	36	51	52	65	-	15	-	34	34	38	-	-	-
R07	13 Benalong St	Residential	-	-	36	51	52	65	-	17	-	38	38	42	-	-	-
R08	7 Waratah St	Residential	-	-	36	51	52	65	-	24	-	46	46	50	-	-	-
R09	17 Araluen St	Residential	-	-	36	51	52	65	-	41	-	50	50	54	-	-	-
R10	14 Nariel St	Residential	-	-	36	51	52	65	-	36	-	48	48	52	-	-	-
R11	34-36 Phillip St	Residential	-	-	36	51	52	65	-	28	-	59	59	63	-	-	-
R12	36A Phillip St	Residential	-	-	36	51	52	65	-	29	-	49	49	53	-	-	-
R13	30 Phillip St	Residential	-	-	36	51	52	65	-	44	-	52	52	56	-	-	-
R14	7 Lethbridge St	Residential	-	-	36	51	52	65	-	37	-	50	50	54	-	-	-
R15	16 Phillip St	Residential	-	-	36	51	52	65	-	39	-	50	50	54	-	-	-
R16	8 Phillip St	Residential	-	-	36	51	52	65	-	31	-	41	41	45	-	-	-
R17	109 Glossop St	Residential	-	-	36	51	52	65	-	28	-	38	38	42	-	-	-
R18	1 Phillip St	Residential	-	-	36	51	52	65	-	25	-	38	38	42	-	-	-
R19	9 Phillip St	Residential	-	-	36	51	52	65	-	36	-	42	42	46	-	-	-
R20	19A Phillip St	Residential	-	-	36	51	52	65	-	40	-	54	54	58	-	-	-
R21	29 Phillip St	Residential	-	-	36	51	52	65	-	43	-	50	50	54	-	-	-
R22	2 Gidley St	Residential	-	-	36	51	52	65	-	24	-	54	54	58	-	-	-
R23	1 Ross Pl	Residential	-	-	36	51	52	65	-	22	-	49	49	53	-	-	-
R24	43 Little Chapel St	Residential	-	-	36	51	52	65	-	16	-	44	44	48	-	-	-
R25	20 Blair Ave	Residential	-	-	36	51	52	65	-	42	-	45	45	49	-	-	-
R26	3 Station St	Residential	-	-	36	51	52	65	-	63	-	75	75	79	-	-	-
R27	1 Station St	Residential	-	-	36	51	52	65	-	56	-	75	75	79	-	-	-
R28	1A Chesham St	Residential	-	-	36	51	52	65	-	49	-	62	62	66	-	-	-
R29	6 Chesham St	Residential	-	-	36	51	52	65	-	46	-	57	57	61	-	-	-
R30	10A Chesham St	Residential	-	-	36	51	52	65	-	42	-	54	54	58	-	-	-
C10 [#]	St Mary's Hotel	Residential	-	-	36	51	52	65	-	41	-	65	65	69	-	-	-

The predicted LA1,1min levels shown are considered to be approximately equivalent to LAmax levels.

The amber shaded cells indicate exceedances of LAmax 52 dBA recognised by the NPfl

The red shaded cells indicate levels in excess of the LAmax 65 dBA level recognised by the NSW Road Noise Policy, based on a synopsis of research on sleep disturbance and awakenings.

APPENDIX C

Predicted Construction Noise Contours



Noise Model Scenario 20 - Materials Laydown and Amenities Compound on Station Street



Noise Model Scenario 21b - Stormwater Drainage Works on Station Street



Noise Model Scenario 21c - Pavement Reconstruction Works on Station Street



Noise Model Scenario 21d – Asphalt Works (Mill & Resheet) on Station Street



Noise Model Scenario 22b – CCTV Installation Works on Station Street



Noise Model Scenario 20 - Materials Laydown and Amenities Compound on Station Street



Noise Model Scenario 21b - Stormwater Drainage Works on Station Street



Noise Model Scenario 21c - Pavement Reconstruction Works on Station Street



Noise Model Scenario 21d – Asphalt Works (Mill & Resheet) on Station Street



Noise Model Scenario 22b – CCTV Installation Works on Station Street





**ST MARY'S TEMPORARY BUS
INTERCHANGE EARLY WORKS
ADDENDUM DETAILED NOISE &
VIBRATION IMPACT STATEMENT
(DNVIS) – LETHBRIDGE
VARIATION**

Report 11.00323R_AD2-05

prepared for Ward Civil Engineering Pty Ltd
on 25/02/2022



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BASIS OF REPORT

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

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from ACA. ACA disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

REFERENCE	DATE	PREPARED	REVIEWED	AUTHORISED
11.00323R_AD2-01	20/01/2022	SF	MdIM	SF
11.00323R_AD2-02	21/01/2022	SF	MdIM	SF
11.00323R_AD2-03	11/02/2022	SF	MdIM	SF
11.00323R_AD2-04	24/02/2022	SF	MdIM	SF
11.00323R_AD2-05	25/02/2022	SF	MdIM	SF

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Report 11.00323R_AD2-05

1. INTRODUCTION

Acoustics Consultants Australia (ACA) has been engaged by Ward Civil & Engineering Pty Ltd (Ward) to prepare a Detailed Noise and Vibration Impact Statement (DNVIS) for the Advanced and Enabling Works (AEW) in relation to the St Marys Temporary Bus Interchange (TBI), which form part of the Sydney Metro Western Sydney Airport (SMWSA) Project (SSI 10051).

Details the DNVIS assessment are set out in ACA report 11.00323R-04.

Subsequent to the issue of the DNVIS assessment (ACA report 11.00323R-04), this report provides an addendum assessment in relation to the following additional scope items:

- Civil works scope variation – Pavement works at Lethbridge and Phillip Street intersection.

This addendum report should be read in conjunction with the main DNVIS (Report 11.00323R-04).

The included assessments have been undertaken in accordance with the provisions of the NSW Interim Construction Noise Guideline – (ICNG), the Sydney Metro – Western Sydney Airport Construction Noise & Vibration Strategy (Ver 4.2, 8 September 2020) – (CNVS) and relevant Conditions of Approval as set out in the Department of Planning, Industry and Environment's Critical State Significant Infrastructure Approval for Sydney Metro – Western Sydney Airport (SSI 10051).

The AEW – St Marys TBI scope is not subject to an Environment Protection Licence (EPL).

This document details Noise Management Level (NML) exceedances and mitigation requirements for the identified civil works scope variation.

The main objectives of this addendum DNVIS are to minimise unreasonable noise and vibration impacts on residents and businesses, and to avoid structural damage to buildings or heritage items as a result of construction vibration.

This addendum DNVIS aims to support active community communication and maintain positive, cooperative relationships with local residents, businesses and building owners. The mitigation measures proposed in this DNVIS have been determined in consultation with the potentially affected members of the community.

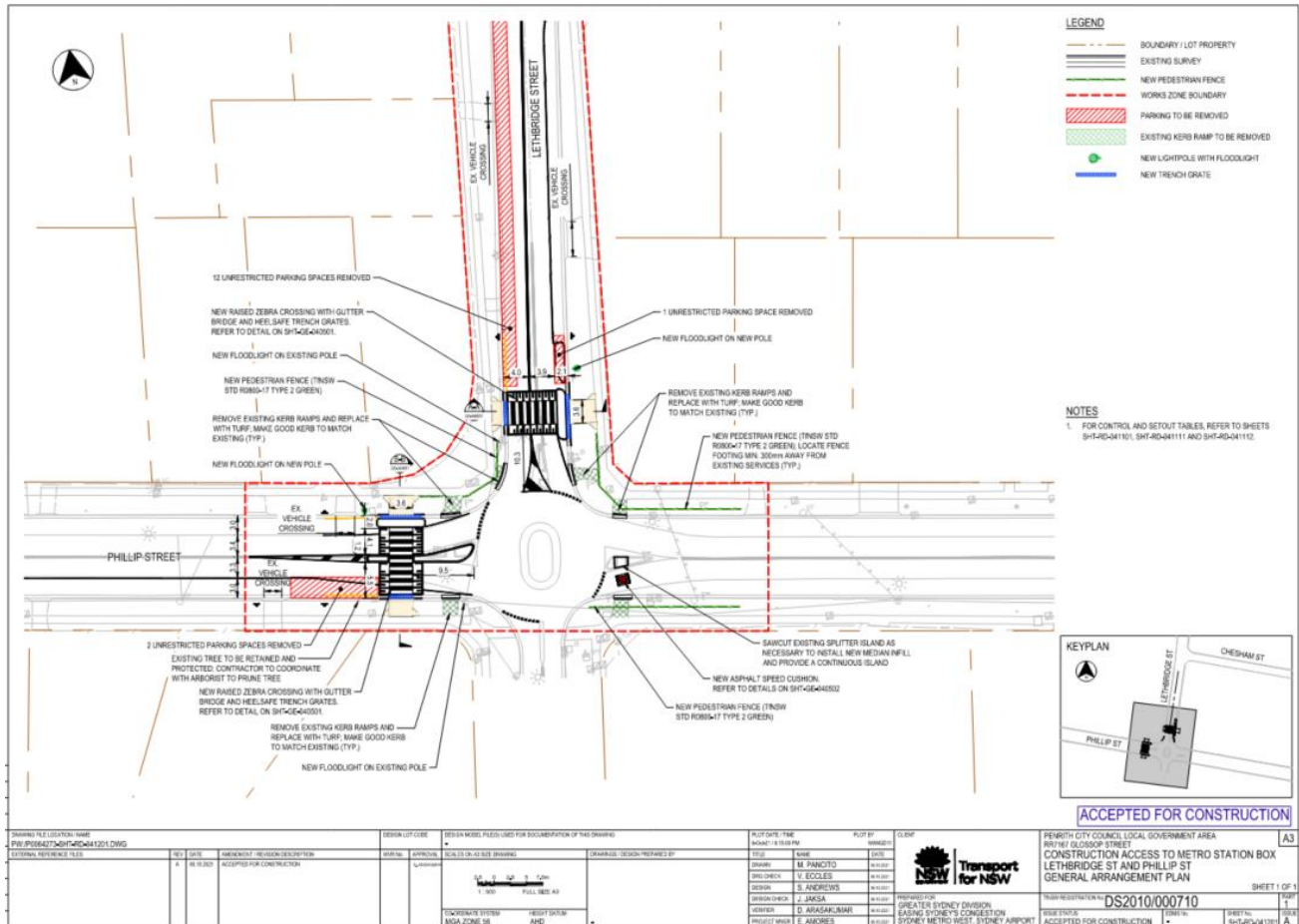
It is noted that ongoing community engagement and management of such relationships is primarily managed via the Sydney Metro – Western Sydney Airport Community Communications Strategy.

A copy of this addendum DNVIS must be provided to the ER before commencement of the works.

2. DESCRIPTION OF PROPOSED WORKS

Figure 2-1 shows the location of the civil works at the intersection of Lethbridge and Phillip Street.

Figure 2-1 Lethbridge and Phillip Street Additional Works



The scope of works includes the construction of two (2) raised pedestrian crossings, pedestrian fencing, traffic medians and new lighting poles. The works will also include the removal of on-street parking on Lethbridge Street (approximately 16 car park spaces).

During the works, noise would be generated by the following key construction activities:

- Potholing
- Saw cut and demo kerb and gutter, median islands
- Saw cut and demo asphalt

- Excavation
- Form Reo Pour – concrete works
- Electrical install works
- Asphalt works – full depth and mill and re-sheet
- Line-marking
- Footpath works

Construction Hours

The intersection works will be predominantly undertaken during standard daytime hours. However, to avoid conflicts with road traffic, it will be necessary to be undertake the asphalt works (full depth and mill and re-sheet) and line marking outside standard hours.

It is expected that approximately 30-40 daytime shifts and 3-5 out-of-hours shifts would be required to complete the works, assuming that each out-of-hours shift would commence at approximately 8.00pm and be completed by approximately 5.00am.

Standard construction hours defined by Condition E38, consistent with the CNVS, are:

- (a) 7:00am to 6:00pm Mondays to Fridays, inclusive;
- (b) 8:00am to 1:00pm Saturdays; and
- (c) at no time on Sundays or public holidays.

The proposed out-of-hours works will be managed under the Sydney Metro Out of Hours Works Protocol as required under CSSI Condition E42, which applies to out of hours work not subject to an EPL.

Where works are proposed to be undertaken outside of the standard hours, specific respites and management measures would be considered and developed for those works as required.

In accordance with the Sydney Metro Out of Hours Work Protocol, an out of hours application will be submitted to Sydney Metro, and independent Environmental Representative for relevant endorsements and approval when out of hours works are planned.

The Community Communication Strategy will also support Ward's application for commencing out of hours work. It will detail how the community will be notified in advance of planned activities, kept informed of works progress and how potential noise impacts will be managed.

3. RELEVANT CONDITIONS OF APPROVAL

The Sydney Metro Western Sydney Airport Approval includes several Conditions that relate to noise and vibration. These Conditions are interrelated with the requirements of the DNVIS and accordingly have been considered by this assessment.

The specific requirements of the DNVIS are set out under Condition E47, as follows:

E47 - Detailed Noise and Vibration Impact Statements (DNVIS) must be prepared for any work that may exceed the NMLs, vibration criteria and / or ground-borne noise levels specified in Conditions E43 and E44 at any residence outside construction hours identified in Condition E38, or where receivers will be highly noise affected or subject to vibration levels above those otherwise determined as appropriate by a suitably qualified structural engineer under Condition E87. The DNVIS must include specific mitigation measures identified through consultation with affected sensitive land user(s) and the mitigation measures must be implemented for the duration of the works. A copy of the DNVIS must be provided to the ER before the commencement of the associated works. The Planning Secretary and the EPA may request a copy (ies) of the DNVIS.

Table 3-1 summarises the DNVIS requirements set out in the CNVS and **Table 3-2** summarises the various noise and vibration Approval Conditions and where reference to these is made by this DNVIS.

Table 3-1 DNVIS Requirements per CNVS

DNVIS Requirements	Where Addressed
Identify all Noise and Vibration Sensitive Receivers (NSRs) which may be affected by the project.	Section 4
Conduct background noise monitoring at representative NSRs to determine the rating background noise levels (RBLs) in accordance with the procedures presented in the EPA's Noise Policy for Industry, where RBLs have not been established in previous project stages.	Section 5
Determine the appropriate noise and vibration management levels of each NSR.	Section 6 / 7
Determine the source noise levels (Sound Power Levels) of each noise generating plant and equipment item required to undertake the construction scenario. Note: Sound Power Levels for each plant and equipment would be less than the maximum allowable levels found in Table 13 and Table 14.	Section 6
Clearly indicate which mitigation measures identified in Section 4 have been/are to be incorporated into the noise assessment. Noise mitigation measures to be implemented will vary for reasons such as safety and space constraints, these are to be identified and the calculations adjusted accordingly.	Section 6

DNVIS Requirements	Where Addressed
<i>For location specific construction scenarios and where applicable for generic scenarios, include the effects of noise shielding provided by site offices, residential fences, noise barriers or natural topographic features.</i>	Section 6
<i>Where applicable include the effects of noise reflections and ground attenuation.</i>	Section 6
<i>Calculate the LAeq noise or range of levels from construction scenarios at sensitive receiver groups, with the use of noise contour maps where appropriate and/or at 10 m, 25 m, 50 m, 75 m, 100 m and 200 m for more general construction activities.</i>	Section 6 Appendix B Appendix C
<i>Compare these against the goals identified for each NSR and identify predicted exceedances.</i>	Appendix B
<i>For night-time activities, calculate exceedances over the:</i> <ul style="list-style-type: none"> <i>o LAeq, 15min 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and</i> <i>o LAFmax 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater.</i> <i>Where exceedances are predicted to occur, undertake a detailed maximum noise level event assessment in accordance with the Noise Policy for Industry (EPA, 2017).</i>	Appendix B
<i>On completion of all DNVIS reports for the subjective classification of the noise impact is to be evaluated and documented as:</i> <ul style="list-style-type: none"> <i>o Low Impact</i> <i>o Moderate Impact</i> <i>o High Impact</i> 	Section 10
<i>As a result of noise classification and/or the noise level exceedances at sensitive receivers provided by the DNVIS reports, appropriate reasonable and feasible noise mitigation is to be adopted and implemented. For sites where works are predicted to significantly exceed noise goals and impact on receivers for a significant period of time, additional reasonable and feasible noise mitigation measures such as those outlined in Section 5 would be considered if practical to reduce the noise levels and impact on sensitive receivers.</i>	Section 9/10 Appendix B

Table 3-2 Approval Conditions Relating to Noise and Vibration

Approval Conditions	Where Addressed
<p>E37 - Land Use Survey</p> <p><i>A detailed land use survey must be undertaken to confirm sensitive land use(s) (including critical working areas such as operating theatres and precision laboratories) potentially exposed to construction noise and vibration and construction ground-borne noise. The survey may be undertaken on a progressive basis but must be undertaken in any one area before the commencement of work which generates construction noise, vibration or ground-borne noise in that area. The results of the survey must be included in the Detailed Noise and Vibration Impact Statements required under Condition E47.</i></p>	Section 4
<p>E38 - Construction Hours</p> <p><i>Work must only be undertaken during the following hours:</i></p> <p>(a) 7:00am to 6:00pm Mondays to Fridays, inclusive;</p> <p>(b) 8:00am to 1:00pm Saturdays; and</p> <p>(c) at no time on Sundays or public holidays.</p>	Section 2
<p>E39 - Highly Noise Intensive Work</p> <p><i>Except as permitted by an EPL or approved in accordance with the Out-of-Hours Works Protocol required by Condition E42, highly noise intensive work that result in an exceedance of the applicable NML at the same receiver must only be undertaken:</i></p> <p>(a) between the hours of 8:00 am to 6:00 pm Monday to Friday;</p> <p>(b) between the hours of 8:00 am to 1:00 pm Saturday; and</p> <p>(c) if continuously, then not exceeding three (3) hours, with a minimum cessation of work of not less than one (1) hour.</p> <p><i>For the purposes of this condition, 'continuously' includes any period during which there is less than one (1) hour between ceasing and recommencing any of the work.</i></p>	Section 6

Approval Conditions	Where Addressed
<p>E41- Variation to Work Hours</p> <p><i>Notwithstanding Conditions E38 and E39 work may be undertaken outside the hours specified in the following circumstances:</i></p> <p><i>(a) Safety and Emergencies, including:</i></p> <p><i>(i) for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or</i></p> <p><i>(ii) 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</i></p> <p><i>(b) Low impact, including:</i></p> <p><i>(i) construction that causes LAeq(15 minute) noise levels:</i></p> <ul style="list-style-type: none"> • <i>no more than 5 dB(A) above the rating background level at any residence in accordance with the ICNG, and</i> • <i>no more than the 'Noise affected' NMLs specified in Table 3 of the ICNG at other sensitive land user(s); and</i> <p><i>(ii) construction that causes:</i></p> <ul style="list-style-type: none"> • <i>continuous or impulsive vibration values, measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.2 of Assessing Vibration: a technical guideline (DEC, 2006), or</i> • <i>intermittent vibration values measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.4 of Assessing Vibration: a technical guideline (DEC, 2006); or</i> <p><i>(c) By Approval, including:</i></p> <p><i>(i) where different construction hours are permitted or required under an EPL in force in respect of the CSSI; or</i></p> <p><i>(ii) works which are not subject to an EPL that are approved under an Out-of-Hours Work Protocol as required by Condition E42; or</i></p> <p><i>(iii) negotiated agreements with directly affected residents and sensitive land user(s);</i></p>	<p>Section 6</p>

Approval Conditions	Where Addressed
<p>E42 - Out-of-Hours Work Protocol – Work not subject to an EPL</p> <p><i>An Out-of-Hours Work Protocol must be prepared to identify a process for the consideration, management and approval of work (not subject to an EPL) that is outside the hours defined in Conditions E38 and E39. The Protocol must be approved by the Planning Secretary before commencement of the out-of-hours work. The Protocol must be prepared in consultation with the ER. The Protocol must provide:</i></p> <ul style="list-style-type: none"> <i>(a) justification for why out-of-hours work need to occur;</i> <i>(b) identification of low and high-risk activities and an approval process that considers the risk of activities, proposed mitigation, management, and coordination, including where:</i> <ul style="list-style-type: none"> <i>(i) the ER reviews all proposed out-of-hours activities and confirms their risk levels;</i> <i>(ii) low risk activities that can be approved by the ER; and</i> <i>(iii) high risk activities that are approved by the Planning Secretary;</i> <i>(c) a process for the consideration of out-of-hours work against the relevant NML and vibration criteria;</i> <i>(d) a process for selecting and implementing mitigation measures for residual impacts in consultation with the community at each affected location, including respite periods consistent with the requirements of Condition E56. The measures must take into account the predicted noise levels and the likely frequency and duration of the out-of-hours works that sensitive land user(s) would be exposed to, including the number of noise awakening events;</i> <i>(e) procedures to facilitate the coordination of out-of-hours work including those approved by an EPL or undertaken by a third party, to ensure appropriate respite is provided; and</i> <i>(f) notification arrangements for affected receivers for all approved out-of-hours works and notification to the Planning Secretary of approved low risk out-of-hours works.</i> <p><i>This condition does not apply if the requirements of Condition E41 are met.</i></p> <p><i>Note: Out-of-hours work is any work that occurs outside the construction hours identified in Condition E38 and E39.</i></p>	<p>Section 6 Section 7</p>

Approval Conditions	Where Addressed
<p>E43 - Construction Noise Management Levels and Vibration Criteria</p> <p>Mitigation measures must be implemented with the aim of achieving the following construction noise management levels and vibration criteria:</p> <p>(a) construction 'Noise affected' noise management levels established using the Interim Construction Noise Guideline (DECC, 2009);</p> <p>(b) preferred vibration criteria established using the Assessing vibration: a technical guideline (DEC, 2006) (for human exposure);</p> <p>(c) Australian Standard AS 2187.2 - 2006 "Explosives - Storage and Use - Use of Explosives" (for human exposure);</p> <p>(d) BS 7385 Part 2-1993 "Evaluation and measurement for vibration in buildings Part 2" as they are "applicable to Australian conditions"; and</p> <p>(e) the vibration limits set out in the German Standard DIN 4150-3: Structural Vibration-effects of vibration on structures (for structural damage).</p> <p>Any work identified as exceeding the noise management levels and / or vibration criteria must be managed in accordance with the Noise and Vibration CEMP Sub-plan.</p> <p>Note that in accordance with the Sydney Metro Staging Plan, a noise and vibration sub-plan is not required for this scope of works. Noise and vibration impacts will be managed under the Project CEMP and relevant management procedures.</p> <p>Note: The ICNG identifies 'particularly annoying' activities that require the addition of 5 dB(A) to the predicted level before comparing to the construction Noise Management Level.</p>	<p>Section 6/7</p>
<p>E44 - All reasonable and feasible mitigation measures must be applied when the following residential ground-borne noise levels are exceeded:</p> <p>(a) evening (6:00 pm to 10:00 pm) — internal LAeq(15 minute): 40 dB(A); and</p> <p>(b) night (10:00 pm to 7:00 am) — internal LAeq(15 minute): 35 dB(A).</p> <p>The mitigation measures must be outlined in the Noise and Vibration CEMP Sub-plan, including in any Out-of-Hours Work Protocol, required by Condition E42.</p>	<p>Section 9 Section 10</p>

Approval Conditions	Where Addressed
<p>E45 - Noise generating work in the vicinity of potentially-affected community, religious, educational institutions and noise and vibration-sensitive businesses and critical working areas (such as theatres, laboratories and operating theatres) resulting in noise levels above the NMLs must not be timetabled within sensitive periods, unless other reasonable arrangements with the affected institutions are made at no cost to the affected institution.</p>	Section 4
<p>E46 - Construction Noise and Vibration Mitigation and Management Industry best practice construction methods must be implemented where reasonably practicable to ensure that noise and vibration levels are minimised around sensitive land use(s). Practices may include, but are not limited to:</p> <ul style="list-style-type: none"> (a) use of regularly serviced low sound power equipment; (b) at source control, temporary noise barriers (including the arrangement of plant and equipment) around noisy equipment and activities such as rock hammering and concrete cutting; (c) use of non-tonal reversing alarms; and (d) use of alternative construction and demolition techniques. 	Section 9/10
<p>E47 - Detailed Noise and Vibration Impact Statements (DNVIS) must be prepared for any work that may exceed the NMLs, vibration criteria and / or ground-borne noise levels specified in Conditions E43 and E44 at any residence outside construction hours identified in Condition E38, or where receivers will be highly noise affected or subject to vibration levels above those otherwise determined as appropriate by a suitably qualified structural engineer under Condition E87. The DNVIS must include specific mitigation measures identified through consultation with affected sensitive land user(s) and the mitigation measures must be implemented for the duration of the works. A copy of the DNVIS must be provided to the ER before the commencement of the associated works. The Planning Secretary and the EPA may request a copy (ies) of the DNVIS.</p>	Throughout
<p>E48 - Owners and occupiers of properties at risk of exceeding the screening criteria for cosmetic damage must be notified before works that generate vibration commences in the vicinity of those properties. If the potential exceedance is to occur more than once or extend over a period of 24 hours, owners and occupiers must be provided a schedule of potential exceedances on a monthly basis for the duration of the potential exceedances, unless otherwise agreed by the owner and occupier. These properties must be identified and considered in the Noise and Vibration CEMP Sub-plan</p>	Section 7

Approval Conditions	Where Addressed
<p>E49 - Where sensitive land use(s) are identified in Appendix B [re the EIS] as exceeding the highly noise affected criteria during typical case construction, mitigation measures must be implemented with the objective of reducing typical case construction noise below the highly noise affected criteria at each relevant sensitive landuse(s). Activities that would exceed highly noise affected criteria during typical case construction must not commence until the measures identified in this condition have been implemented, unless otherwise agreed with the Planning Secretary.</p> <p>Note: Mitigation measures may include path barrier controls such as acoustic sheds and/or noise walls, at-property treatment, or a combination of path and at-property treatment.</p>	Section 6/9
<p>E50 - For all construction sites where acoustic sheds are installed, the sheds must be designed, constructed and operated to minimise noise emissions. This would include the following considerations:</p> <p>(a) all significant noise producing equipment that would be used during the night-time would be inside the sheds, where feasible and reasonable;</p> <p>(b) noise generating ventilation systems such as compressors, scrubbers, etc, would be located inside the sheds and external air intake/discharge ports would be appropriately acoustically treated; and</p> <p>(c) the doors of acoustic sheds would be kept closed during the night-time period. Where night-time vehicle access is required at sites with nearby residences, the shed entrances would be designed and constructed to minimise noise breakout.</p>	n/a
<p>E51 - Where Condition E49 determines that at-property treatment (temporary or permanent) is the appropriate measure to reduce noise impacts, this at-property treatment must be offered to landowners of residential properties for habitable living spaces, unless other mitigation or management measures are agreed to by the landowner.</p> <p>Landowners must be advised of the range of options that can be installed at or in their property and given a choice as to which of these they agree to have installed.</p> <p>A copy of all guidelines and procedures that will be used to determine at-property treatment at their residence must be provided to the landowner.</p>	n/a
<p>E52 - Any offer for at-property treatment or the application of other noise mitigation measures in accordance with Condition E51, does not expire until the noise impacts specified in Condition E49, affecting that property are completed, even if the landowner initially refuses the offer.</p> <p>Note: If an offer has been made but is not accepted, this does not preclude the commencement of construction under Condition E49.</p>	n/a

Approval Conditions	Where Addressed
<p>E53 - <i>The implementation of at-property treatment does not preclude the application of other noise and vibration mitigation and management measures including temporary and long-term accommodation.</i></p>	Section 6/9
<p>E54 - Construction Vibration Mitigation – Heritage Items</p> <p><i>Vibration testing must be conducted during vibration generating activities that have the potential to impact on Heritage items to verify minimum working distances to prevent cosmetic damage. In the event that the vibration testing and attended monitoring shows that the preferred values for vibration are likely to be exceeded, the Proponent must review the construction methodology and, if necessary, implement additional mitigation measures. Such measures must include, but not be limited to, review or modification of excavation techniques.</i></p>	Section 7
<p>E55 - <i>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 items.</i></p>	Section 7
<p>E56 - Utility Coordination and Respite</p> <p><i>All 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:</i></p> <ul style="list-style-type: none"> <i>(a) reschedule any work to provide respite to impacted noise sensitive land use(s) so that the respite is achieved in accordance with Condition E57; or</i> <i>(b) consider the provision of alternative respite or mitigation to impacted noise sensitive land use(s); and</i> <i>(c) provide documentary evidence to the ER in support of any decision made by the Proponent in relation to respite or mitigation.</i> <p><i>The consideration of respite must also include all other approved Critical SSI, SSI and SSD projects which may cause cumulative and / or consecutive impacts at receivers affected by the delivery of the CSSI.</i></p> 	Section 6/9

Approval Conditions	Where Addressed
<p>E57 – Out-of-Hours Works – Community Consultation on Respite</p> <p><i>In order to undertake out-of-hours work outside the work hours specified under Condition E38, appropriate respite periods for the out-of-hours work must be identified 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:</i></p> <ul style="list-style-type: none"> <i>(a) a progressive schedule for periods no less than three (3) months, of likely out-of-hours work;</i> <i>(b) a description of the potential work, location and duration of the out-of-hours work;</i> <i>(c) the noise characteristics and likely noise levels of the work; and</i> <i>(d) likely mitigation and management measures which aim to achieve the relevant NMLs under Condition E43 (including the circumstances of when respite or relocation offers will be available and details about how the affected community can access these offers).</i> <p><i>The outcomes of the community consultation, the identified respite periods and the scheduling of the likely out-of-hour work must be provided to the ER, EPA and the Planning Secretary prior to the out-of-hours work commencing.</i></p> <p><i>Note: Respite periods can be any combination of days or hours where out-of-hours work would not be more than 5 dB(A) above the RBL at any residence.</i></p>	<p>Section 6</p>

4. SENSITIVE RECEIVERS

Figure 4-1 shows the representative residential receivers surrounding the works areas previously considered by the DNVIS assessment and Figure 4-2 shows the representative non-residential (commercial) receivers surrounding the works areas.

For consistency with the DNVIS predictions have been undertaken for all representative receivers. However, for the identified works, the representative receivers potentially most impacted may be expected to be the receivers in the near vicinity of the Lethbridge intersection works – e.g. R14, R15, R20. It is noted that R15 is a newly constructed residential apartment block. It is understood that the building is still under construction and it is anticipated that it will remain uninhabited during the Lethbridge intersection works.

Figure 4-1 Representative Residential Receivers Surrounding the Works



Figure 4-2 Representative Non-Residential Receivers Surrounding the Works



Note: Receiver C10 is the St Mary's Hotel which includes a residential component on the first floor. For the purposes of assessment, the first floor has been considered a residential use. Receiver C26 is a Childcare Centre located within the Station Plaza building – this has a semi-enclosed play area to the east of the building.

5. EXISTING NOISE ENVIRONMENT

The noise and vibration assessment undertaken as part of the Sydney Metro - Western Sydney Airport Environmental Impact Statement (EIS) is documented in the EIS Technical Paper 2 (*Sydney Metro - Western Sydney Airport Technical Paper 2: Noise and Vibration*).

The EIS study defined Noise Catchment Areas (NCAs) for the wider project. The sensitive receivers potentially affected by the St May's Bus Exchange Early Works are located within NCA3.

Table 5-1 sets out the existing ambient and background noise levels considered by this assessment. The levels for the Day, Evening and Night periods are consistent with the survey results identified by the EIS.

Table 5-1 Summary of NCA3 Unattended Noise Monitoring Results – Determined by EIS

Location	Rating Background Level - RBL (L_{A90} dBA)			Ambient Noise Level (L_{Aeq} dBA)		
	Day	Evening	Night	Day	Evening	Night
NM02	37	37	36	55	59	51

Time periods defined as follows – Day: 7.00am to 6.00pm Monday to Saturday, 8.00am to 6.00pm Sunday; Evening: 6.00pm to 10.00pm; and Night: 10.00pm to 7.00am Monday to Saturday, 10.00pm to 8.00am Sunday.

Consistent with the EIS study, the Rating Background Noise Levels (RBLs) shown have been considered in determining the construction noise criteria, as discussed in **Section 6**.

Whilst the EIS background noise levels have been applied for the purposes of assessment, it has been noted during daytime site inspections that the RBLs in the vicinity of the intersection works are notably higher than L_{A90} 37 dBA during the daytime.

6. AIRBORNE CONSTRUCTION NOISE

Airborne Construction Noise Criteria

The CNVS notes that Construction Noise Management Levels (NMLs) for all Sydney Metro projects should be determined in accordance with the procedures nominated in the DECCW's "*Interim Construction Noise Guideline*" dated July 2009 (ICNG).

The noise criteria set out in the ICNG have been considered in the assessment of potential impacts from the project works. **Table 6-1** summarises the construction noise criteria recommended by the ICNG for residential receivers and **Table 6-2** summarises the criteria for non-residential receivers. **Table 6-2** additionally includes the construction noise criteria for relevant special use receivers (other sensitive land uses) not identified by the ICNG.

With consideration to the out of hours periods identified by the Sydney Metro Construction Noise and Vibration Standard, the resultant project specific NMLs are set out in **Table 6-3**.

Table 6-1 ICNG Airborne Construction Noise Criteria – Noise at Residences¹

Time of Day	Management Level $L_{Aeq,15min}$	How to Apply
Recommended Standard Hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or Public Holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq,15min}$ is greater than the noise affected level, the proponent would apply all feasible and reasonable work practices to minimise noise. The proponent would also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the proponent would consider very carefully if there is any other feasible and reasonable way to reduce noise to below this level. If no quieter work method is feasible and reasonable, and the works proceed, the proponent would communicate with the impacted residents by clearly explaining the duration and noise level of the works, and by describing any respite periods that will be provided.
Outside recommended standard hours	Noise affected RBL + 5 dB	A strong justification would typically be required for works outside the recommended standard hours. The proponent would apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dBA above the noise affected level, the proponent would negotiate with the community. For guidance on negotiating agreements see Section 7.2.2 of the ICNG
Note 1:	Adopted from the ICNG.	
Note 2:	Noise levels apply at the property boundary that is most exposed to construction noise (or receiver building façade that is most exposed to construction noise, noting that noise levels may be higher at upper floors of the noise affected receiver buildings). 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 6-2 ICNG Airborne Construction Noise Criteria – Other Sensitive Land Uses

Land Use	Management Level $L_{Aeq, 15min}$ (applies when properties are being used)	Reference
Classrooms at schools and other educational	Internal noise level: 45 dBA ¹	ICNG ⁵
Hospital wards and operating theatres	Internal noise level: 45 dBA ²	ICNG ⁵
Places of worship	Internal noise level: 45 dBA ³	ICNG ⁵
Active recreation areas	External noise level: 65 dBA	ICNG ⁵
Passive recreation areas	External noise level: 60 dBA	ICNG ⁵
Commercial premises (offices, etc)	External noise level: 70 dBA	ICNG ⁵
Industrial premises	External noise level: 75 dBA	ICNG ⁵
Childcare Centres (Sleeping areas)	Internal noise level: 35 dBA ⁴	AAAC ⁶
Childcare Centres (External areas)	Internal noise level: 55 dBA ⁴	AAAC ⁶

Notes: 1, 2, 3: External Noise Management Levels (NML) of $L_{Aeq, 15min}$ 55 dBA are considered by this assessment, assuming 10dB attenuation achieved by façades with open window(s);
4: Based on visual inspection of the childcare centre on Station Street, external Noise Management Levels (NML) of $L_{Aeq, 15min}$ 60 dBA are considered by this assessment, assuming 25 dB attenuation achieved by the building elements with closed/fixed window(s) for the indoor sleeping areas and 5 dB attenuation for the external play area;
5: Management Levels specified by Interim Construction Noise Guideline;
6: Management Level based on Australian Acoustical Consultants (AAAC) Technical Guideline on Child Care Centre Noise Assessments.

Table 6-3 Airborne Noise Management Levels (External Levels)

Location	Standard Hours (Day)		OOHW (Day)		OOHW (Evening)		OOHW (Night)	
	RBL	NML	RBL	NML	RBL	NML	RBL	NML
Residential	37	47	37	42	37	42	36	41
School (Classrooms)	n/a	55	n/a	55	n/a	55	n/a	55
Commercial (Offices)	n/a	70	n/a	70	n/a	70	n/a	70
Childcare Centre (External Play Areas)	n/a	60	n/a	60	n/a	60	n/a	60
Childcare Centre (External to Sleeping Areas)	n/a	60	n/a	60	n/a	60	n/a	60

Notes: RBL - Rating Background Noise Level; NML - Noise Management Level; Non-residential criteria only apply when receiver building is in use. Noise levels apply at the property boundary that is most exposed to construction noise (or receiver building façade 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. It is anticipated that the recommended internal noise levels would be readily achieved at the Station Street childcare centre if the identified external levels are achieved.

Sydney Metro Construction Noise & Vibration Standard (CNVS)

In addition to the ICNG, the noise criteria set out in the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (CNVS) have been considered.

The CNVS recognises that works requiring the use of heavy machinery can generate high noise and vibration levels and in urban areas there is often limited setback distance between these noise sources and nearby buildings and receivers. Under such circumstances, typically there is limited opportunity to practicably mitigate the noise and vibration effects in a cost-effective manner. Therefore, potential disturbance impacts are usually minimised as much as practicable through management techniques. For residential receivers, depending on how far the predicted airborne construction noise level is above RBL, the CNVS recommends the adoption of the management measures set out in **Table 6-4**. Full definitions of the identified management measures are set out in the CNVS.

Table 6-4 Additional Airborne Noise Management Measures (Residential)

Time Period		Mitigation Measures			
		Predicted $L_{Aeq,15min}$ Noise Level Above NML			
		0 to 10 dB	10 to 20 dB	20 to 30 dB	> 30 dB
Standard Hours	Mon-Fri (7.00am - 6.00pm)				
	Sat (8.00am - 1.00pm)	-	LB	LB, M, SN	LB, M, SN
	Sun/Pub Hol (Nil)				
OOH (Evening)	Mon-Fri (6.00pm - 10.00pm)				
	Sat (1.00pm - 10.00pm)	LB	LB, M	LB, M, SN, RO	LB, M, SN, IB, PC, RO
	Sun/Pub Hol (8.00am - 6.00pm)				
OOH (Night)	Mon-Fri (10.00pm - 7.00am)				
	Sat (10.00pm - 8.00am)	LB	LB, M, SN, RO	LB, M, SN, IB, PC, RO, AA	LB, M, SN, IB, PC, RO, AA
	Sun/Pub Hol (6.00pm - 7.00am)				

Notes: AA – Alternative Accommodation; M – Monitoring; IB – Individual Briefings; LB – Letterbox drops; RO – Project Specific Respite Offer; PC – Phone Calls and emails; SN – Specific Notifications. Full definitions of these Additional Mitigation Measures are set out in Table 15 of the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (Ver 4.3, 04/11/2020).

Highly Noise Intensive Work

Condition E39 requires the following regarding highly noise intensive work:

Except as permitted by an EPL or approved in accordance with the Out-of-Hours Works Protocol required by Condition E42, highly noise intensive work that result in an exceedance of the applicable NML at the same receiver must only be undertaken:

- (a) between the hours of 8:00 am to 6:00 pm Monday to Friday;*
- (b) between the hours of 8:00 am to 1:00 pm Saturday; and*
- (c) if continuously, then not exceeding three (3) hours, with a minimum cessation of work of not less than one (1) hour.*

For the purposes of this condition, 'continuously' includes any period during which there is less than one (1) hour between ceasing and recommencing any of the work.

Sleep Disturbance at Residences

Section 4.3 of the ICNG provides the following with respect to sleep disturbance at residences:

Where construction works are planned to extend over more than two consecutive nights, and a quantitative assessment method is used, the analysis should cover the maximum noise level, and the extent and the number of times that the maximum noise level exceeds the RBL. Some guidance indicating the potential for sleep disturbance is in the NSW Environmental Criteria for Road Traffic Noise (EPA 1999) (ECRTN).

Section 2.9 of the CNVS sets out the Sydney Metro sleep disturbance and maximum noise event requirements, as follows:

Maximum noise level events from construction activities during the night-time period can trigger both awakenings and disturbance to sleep stages. The approach to managing events that cause sleep disturbance shall be consistent with the Noise Policy for Industry (EPA, 2017). Where night-time noise levels at a residential location exceed the:

- $L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, or the*
- L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,*

a detailed maximum noise level event assessment is to be undertaken.

The detailed assessment will cover the maximum noise level, the extent to which the maximum noise level exceeds the RBL, and the number of times this happens during the night-time period.

Maximum noise level event assessments should be based on the L_{AFmax} descriptor on an event basis under 'fast' time response. The detailed assessment will consider all feasible and reasonable noise mitigation measures with a goal of achieving the above trigger levels for night-time activities.

ACA notes that the EPA has conducted an independent and comprehensive review of the most recent research on sleep disturbance and maximum noise levels and a synopsis of this research is included in the *NSW Road Noise Policy* (RNP) and previously in the ECRTN. The EPA concluded that from the research on sleep disturbance to date:

- *Maximum internal noise levels below 50-55dBA are unlikely to awaken people from sleep;*
- *One or two noise events per night with maximum internal noise levels of 65-70dBA are not likely to affect health and wellbeing significantly.*

The 55 dBA maximum noise level may be considered to be equivalent to an external maximum noise level of 65 dBA, considering the 10 dB attenuation typically achieved through partially open windows.

Based on the above, this DNVIS considers the external screening level of L_{AFmax} 52 dBA in accordance with the CNVS and additionally considers the external noise criterion of L_{AFmax} 65 dBA referenced by the RNP.

Airborne Construction Noise Assessment

Construction Activities

Assessment of airborne noise impacts from the construction activities have been determined by modelling the noise sources, receiver locations, topographical features and buildings.

Key details regarding the construction site layouts, the likely plant and equipment and hours of operation were informed by the construction team.

Table 6-5 provides a summary of the works to be undertaken and the timeframes at which the works would occur.

Table 6-5 Construction Scenarios (Key Works Stages and Timeframes)

Model ID	Stage	Activity	Standard Hours	Out-of-Hours Day	Out-of-Hours Evening	Out-of-Hours Night
23	Potholing	Potholing	✓	x	x	x
24a	Saw Cut and Demolish Kerb and Gutter, Median Islands	Saw Cut Kerb and Gutter, Median Islands	✓	x	x	x
24b		Demolish Kerb and Gutter, Median Islands	✓	x	x	x
25a	Saw Cut and Demolish Asphalt	Saw Cut Asphalt	✓	x	x	x
25b		Demolish Asphalt	✓	x	x	x
26	Excavation	Excavate	✓	x	x	x
27	Concrete works	Form Reo Pour	✓	x	x	x
28	Service Installation	Electrical Install Works	✓	x	x	x
29	Pavement Reconstruction and Resurfacing Works	Asphalt Works – Full Depth and Mill and Re-Sheet	x	x	✓	✓
30	Line Marking	Line Marking	x	x	✓	✓
31	Footpath	Footpath Works	✓	x	x	x

Construction Equipment

For the purposes of this assessment, the construction equipment and sound power levels set out in **Table 6-6** have been considered across the identified works areas as shown in **Figure 2-1**. The sound power levels have been determined by measurements undertaken by ACA on other similar projects, or have been adopted from other similar CSSI projects.

Table 6-6 Construction Plant Sound Power Levels

Stage	Activity	Construction Equipment	Sound Power Level - SWL (L _{Aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL (L _{Aeq,15min} dBA)	Activity SWL (L _{A1,1min} dBA)
23	Potholing	Vacuum Truck	103	10	101	104	110
		2t Tipper	105	5	100		
24a	Saw Cut Kerb and Gutter, Median Islands	2t Tipper	105	5	100	111	120
		Concrete Saw*	118	3	111		
24b	Demolish Kerb and Gutter, Median Islands	Hand Tools	90	5	85	110	115
		Jackhammer	113	5	108		
		14t Excavator with Bucket	105	5	100		
		2t Tipper	105	5	100		
		Rigid Truck / Bogie	105	5	100		
25a	Saw Cut Asphalt	2t Tipper	105	5	100	111	120
		Concrete Saw*	118	3	111		
25b	Demolish Asphalt	Hand Tools	90	5	85	110	115
		Jackhammer	113	5	108		
		14t Excavator with Bucket	105	5	100		
		2t Tipper	105	5	100		
		Rigid Truck / Bogie	105	5	100		
26	Excavation	Hand Tools	90	5	85	104	113
		5t Excavator with Bucket	95	5	90		
		2t Tipper	105	5	100		

		Rigid Truck / Bogie	105	5	100		
27	Form Reo Pour – Concrete Works	Concrete Agitator	109	5	104	105	111
		Form Work Tools	90	5	85		
		Rigid Truck / Bogie	105	5	100		
28	Electrical Install Works	Hand Tools	90	5	85	106	111
		5t Excavator with Bucket	95	5	90		
		2t Tipper	105	5	100		
		Plate Compactor	106	5	101		
		Jumping Jack	106	5	101		
29	Asphalt Works – Full Depth and Mill and Re-Sheet	Milling Machine / Profiler	117	5	112	112	119
		Paver	114	5	109		
		7t Smooth Drum Static Roller	107	5	102		
		7t Multi Tyre Static Roller	107	5	102		
30	Line Marking	Line Marking Truck	108	10	106	106	110
		Line Marking Gernie	90	5	85		
31	Footpath	5t Excavator with Bucket	95	5	90	102	110
		7t Smooth Drum Static Roller	107	5	102		

Note: Sources marked with an asterisk (e.g. concrete saws, grinders, hydraulic hammers, vibratory rollers) can emit noise with special audible (annoying) characteristics. In accordance with the ICNG and the CNVS, predicted noise levels for these stages incur a +5 dB penalty to for account for the additional annoyance that could arise. This penalty has been applied to the predicted levels. The activity sound power levels for each stage take account of the potential for the coinciding use of plant items – where certain plant items would operate at the same time adjustments have been calculated.

Construction Noise Modelling

Construction noise emissions from the works have been modelled using the SoundPLAN (Version 8-2) environmental noise prediction software. This program is used and recognised internationally and is also recognised by NSW regulatory authorities as a preferred computer noise model. Factors that are addressed in the noise modelling are:

- Construction equipment sound power levels;

- Location of construction equipment;
- Screening from existing structures;
- Receiver locations, including multiple storey receivers;
- Ground topography;
- Noise attenuation due to geometric spreading;
- Ground absorption; and
- Atmospheric absorption.

Construction Noise Predictions

The predicted worst-case construction noise levels at the identified representative receivers for the modelled construction activities are set out in a series of tables in **Appendix B**. Additionally, the Additional Mitigation Measures that are required to be considered by the CNVS are identified in **Appendix B**.

A series of predicted noise contours is provided in **Appendix C**.

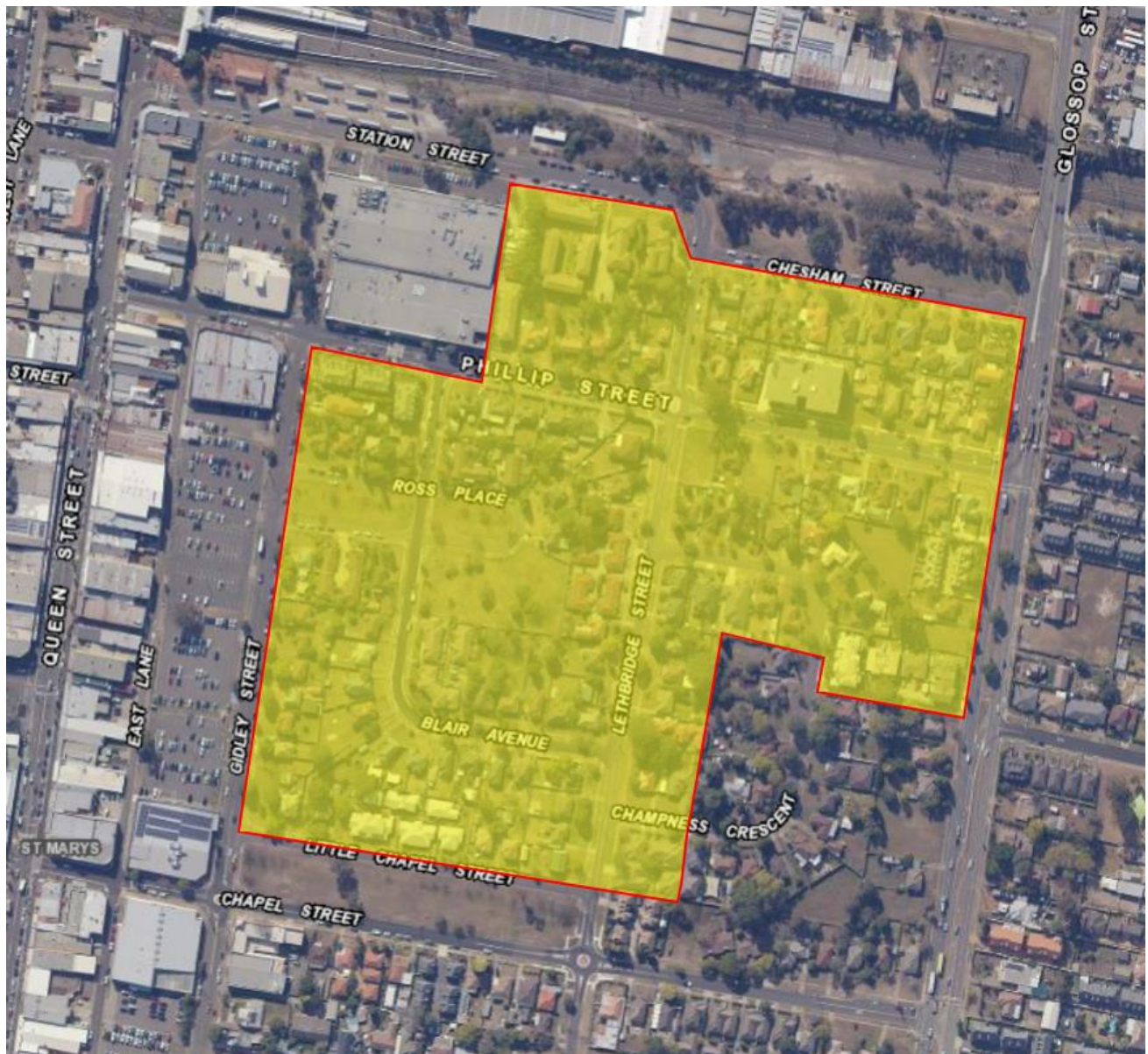
The predictions represent the typical-worst case noise levels that may be expected to arise at the external facades of the receiver buildings. It should be noted that construction noise levels would frequently be lower than the worst-case levels considered for significant periods of time. This would be apparent as works move around the work areas and are therefore more distant/more shielded from receivers and when less noisy activities are being undertaken.

The results show the airborne noise NLMs have potential to be exceeded at various localities and times depending on the works schedule. Given the likelihood of exceedances, the Sydney Metro standard mitigation measures will be applied throughout all of the identified work stages and the Additional Mitigation Measures (AMMs) will be considered at the locations indicated.

CNVS Additional Mitigation Measures - Noise Affected Receivers - (Out of Hours Works)

Figure 6-1 identifies the area indicated by modelling where the NML has potential to be exceeded at times during the out-of-hours works. Letterbox notifications have been provided to the properties identified to inform residents of the forthcoming works. The notifications include contact details for any concerns or feedback from the community. Ward would consider any received community feedback during the scheduling of the works.

Figure 6-1 Residential Buildings Notified by Letterbox Drops (Out-of-Hours Works)



CNVS Additional Mitigation Measures - Highly Noise Affected Receivers - (Out of Hours Works)

The modelling indicates the potential for some relatively high noise levels during the works. The highest levels and greatest impacts are anticipated at the closest receivers to the night works. These receivers may be expected to be highly noise affected at times during the works, that is, noise levels may be expected to exceed the NML by > 20 dB externally to these receivers.

The highlighted Additional Mitigation Measure (AMM) triggers shown in tables set out in **Appendix B** are based on the exceedance of the $L_{Aeq,15min}$ NMLs. The tables identify some AMM triggers of Respite Offer (RO) and Alternative Accommodation (AA).

Whilst the noise levels identified in **Appendix B** are representative of the typical worst case noise levels that may be expected to arise during the works, it is noted that given the scheduling of the works there is potential for the most exposed receivers to be impacted over more than two consecutive evenings and nights.

Figure 6-2 indicates the residential receiver buildings where RO is to be considered and **Figure 6-3** indicates the residential receiver buildings where AA is to be considered.

Figure 6-2 Residential Buildings where Respite Offer (RO) Trigger Levels Predicted during Night Works



Note: Potentially affected properties are 3 Lethbridge Street; 5 Lethbridge Street, 21 Phillip Street, 23 Phillip Street, 25 Phillip Street, 27 Phillip Street, 29 Phillip Street, 31 Phillip Street, 32 Phillip Street, 30 Phillip Street, 28 Phillip Street, 26 Phillip Street, 24 Phillip Street, 7 Lethbridge Street, 9 Lethbridge Street, 11 Lethbridge Street, 2 Champness Cres, 14-18 Phillip Street (if occupied – currently under construction), 11-15 Phillip Street, 17 Phillip Street, 19A Phillip Street, 1A Chesham Street, 2A Chesham Street, 2 Station Street, 3 Station Street, 34-36 Phillip Street, 10-14 Ross Place, 12 Ross Place, 14 Ross Place, 16 Ross Place, 13-17 Lethbridge Street, 19 Lethbridge Street, 21 Lethbridge Street, 20 Lethbridge Street, 18 Lethbridge Street, 16 Lethbridge Street, 14A Lethbridge Street, 12 Lethbridge Street, 1A Champness Cres, 1 Champness Cres, 3 Champness Cres, 5 Champness Cres, 12 Phillip Street, 10 Phillip Street, 8 Phillip Street, 6 Phillip Street, 4 Phillip Street, 2 Phillip Street, 109 Glossop Street, 1 Phillip Street, 3 Phillip Street, 5 Phillip Street, 7 Phillip Street, 9 Phillip Street, 3 Chesham Street, 4 Chesham Street.

Figure 6-3 Residential Buildings where Alternative Accommodation (AA) Trigger Levels Predicted during Night Works



Note: Potentially affected properties are 3 Lethbridge Street; 5 Lethbridge Street, 21 Phillip Street, 23 Phillip Street, 25 Phillip Street, 27 Phillip Street, 29 Phillip Street, 31 Phillip Street, 32 Phillip Street, 30 Phillip Street, 28 Phillip Street, 26 Phillip Street, 24 Phillip Street, 7 Lethbridge Street, 9 Lethbridge Street, 11 Lethbridge Street, 2 Lethbridge Street, 14-18 Phillip Street (if occupied – currently under construction), 11-15 Phillip Street, 17 Phillip Street, 19A Phillip Street, 1A Chesham Street, 2A Chesham Street.

As identified above, RO consideration is triggered at 56 residential addresses and AA consideration is triggered at 23 residential addresses. It is noted that some of these addresses are apartment blocks with more than one residential receiver per address.

Given the relatively high number of RO triggers, Ward has consulted with TfNSW and Sydney Metro to determine a practicable approach for community consultation and offers of RO and AA. Following discussions with TfNSW and Sydney Metro, the owners/residents of properties which trigger RO consideration have been consulted (as identified in **Figure 6-2**), but in the first instance offers of RO have been limited to the owners/residents of properties which trigger AA consideration (as identified in **Figure 6-3**).

Generally, it is not currently proposed to provide AA from the outset; instead a consultative approach has been taken and residents have been informed of the potential for relatively high noise levels to arise during the evening and night for a number of consecutive evenings. AA would then be considered in the event of substantiated complaints or non-compliances.

ACA considers this a reasonable and practical approach that would address any concerns of the potentially most affected residents.

Ward will consult with the receivers identified in **Figures 6-2** and **6-3** to determine mitigation requirements on a case-by-case basis. The outcomes of this consultation will be included within the out of hours permit developed for the works.

CNVS Additional Mitigation Measures - Noise Affected Receivers - (Standard Hours Works)

Modelling additionally indicates the potential for noise impacts during the standard hours works.

Figure 6-4 identifies the residential receiver buildings indicted by modelling where the standard hours NML has potential to be exceeded by >10 dB at times during the standard hours works. In accordance with the CNVS, the identified potentially affected residences have been provided with Letterbox notifications regarding the potential for noise impacts during the works. The locations indicated by **Figure 6-4** are all captured within the out-of-hours Letterbox notifications area for the out of hours works as shown in **Figure 6-1**.

Additionally, **Figure 6-5** indicates the residential receiver buildings where the standard hours NML has potential to be exceeded by >20 dB at times during the standard hours works. Specific Notifications (SN) and Monitoring (M) are to be considered at these locations in accordance with the CNVS. These receivers have been consulted regarding the works.

The standard hours work will be managed to ensure that the requirements of Condition E39 are upheld. Ward will manage the works to ensure that highly intensive construction noise is not continuously generated for more than three hours at the same receiver location. If highly intensive construction noise occurs continuously at any given location for up to three hours, this would be immediately followed by a minimum respite of at least one hour before any works recommence.

This commitment has been communicated by Ward to residents during the community consultation, undertaken in accordance with Condition E57.

It is noted that the highest impacts are associated with the use of concrete / road saws and rock breaking equipment. This equipment is only anticipated to be used for short durations (< two hours) and is only anticipated to be required up to eight times during the works.

In accordance with Condition E46 (b) standard mitigation measures (not reflected in the predictions) will be used where practicable to reduce these impacts. These mitigation measures would include temporary noise barriers such as sound curtains and/or arrangement of plant and equipment to provide shielding around noisy equipment and activities such as rock hammering and concrete cutting (it is noted that noise monitoring will be undertaken to confirm modelling predictions). Ward will consult with the most potentially affected receivers as part of the DNVIS process and consider any community feedback during the works scheduling and implement respite offer outcomes.

Figure 6-4 Residential Buildings Notified by Letterbox Drops (Standard Hours Works)



Figure 6-5 Residential Buildings where Specific Notification (SN) Trigger Levels Predicted during Standards Hours Works



Note: Potentially affected properties are 21 Phillip Street, 23 Phillip Street, 25 Phillip Street, 27 Phillip Street, 29 Phillip Street, 28 Phillip Street, 26 Phillip Street, 24 Phillip Street, 7 Lethbridge Street, 14-18 Phillip Street (if occupied – currently under construction), 11-15 Phillip Street, 17 Phillip Street, 19A Phillip Street.

Receiver Consultation in Accordance with E57

During the development of this Addendum DNVIS, Ward on behalf of TfNSW has consulted with the identified affected receivers and will continue to consult with the community during the works and consider any community feedback during the works scheduling.

This consultation with the affected receivers has included provision of the following information regarding the works:

- schedule for periods of likely out-of-hours work;
- description of the potential work, location and duration of the out-of-hours work;
- the noise characteristics and likely noise levels of the work;
- mitigation and management measures that will be implemented to minimise noise impacts; and
- receiver respite requirements/preferences and where relevant any AA requirements.

Details of the focussed community consultation undertaken is provided in the Community Consultation report, prepared by Kath Elliot Communications, which is included in **Appendix D**.

Following community consultation and with consideration to the feedback received Ward proposes the following with respect to noise management and RO:

- Works to be predominantly undertaken with standard hours (with the exception of milling and re-sheeting and line marking).
- All high noise intensity construction activities undertaken during standard hours to be restricted to durations not exceeding three continuous hours, followed by a minimum of one hour of respite.
- Where practicable temporary noise barriers (sound curtains) and/or arrangement of plant and equipment to be used to reduce noise from noisy equipment and activities such as rock hammering and concrete cutting.
- Out of hours RO to be provided to the residents identified by the Community Consultation.
- Any further community feedback that is received will be considered in the programming of the works.

It is noted that, as permissible under Condition 39, highly noise intensive work that results in an exceedance of the applicable NML at the same receiver must be approved in accordance with the Out-of-Hours Works Protocol required by Condition E42.

In accordance with Conditions E57, in order to undertake out-of-hours work outside the work hours specified under Condition E38, appropriate respite periods for the out-of-hours work must be identified in consultation with the community at each affected location on a regular basis.

During the works Ward will continue to consult closely with the potentially highly impacted residential receivers identified in **Figures 6-2** and **6-3** and will consider any community feedback during the works scheduling.

The outcomes of this community consultation including any identified respite periods will be provided to TfNSW. This information will then be distributed to the ER, EPA and the Planning Secretary prior to the out-of-hours work commencing.

All potentially affected receivers, as previously identified by the TBI DNVIS in addition to those identified in **Figure 6-1** will be provided with regular letterbox drop notifications regarding the works, as required by the CNVS.

Noise Monitoring

Noise monitoring would be undertaken during the works at the most affected residential boundaries, based on on-site subjective evaluation.

The results of the noise monitoring at the identified locations would be reviewed as the works proceed and would be compared against the NML. Where necessary the results would be used to inform the construction team of any notable exceedances, over the levels set out in **Appendix B** and would be used to identify any recommended modifications to work methods or to identify the requirements for additional specific amelioration measures.

Sleep Disturbance

Maximum noise level events from construction activities during the night-time period can trigger both awakenings and disturbance to sleep stages. The CNVS approach to managing events that cause sleep disturbance is consistent with the Noise Policy for Industry (EPA, 2017). A detailed maximum noise level event assessment is to be undertaken where night-time noise levels at a residential location exceed the:

- $L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, or the
- L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater.

The CNVS notes the maximum noise level event assessments should be based on the L_{AFmax} descriptor on an event basis under 'fast' time response. The detailed assessment will consider all feasible and reasonable noise mitigation measures with a goal of achieving the above trigger levels for night-time activities.

To assess the likelihood of sleep disturbance, **Table B-11 (Appendix B)** sets out the predicted maximum noise levels for each stage and identifies where exceedances may occur during works undertaken in the night period.

It is noted that the CNVS AMMs are based on the degree to which the $L_{Aeq,15min}$ level exceeds the RBL and not the L_{Amax} level. The AMMs based on the $L_{Aeq,15min}$ assessment would be expected to adequately address potential sleep disturbance impacts.

As discussed, this DNVIS considers the external screening level of L_{AFmax} 52 dBA in accordance with the CNVS and additionally considers the external noise criterion of L_{AFmax} 65 dBA referenced by the RNP.

During the out of hours night works, the greatest potential sleep disturbance impacts may be expected to occur at the receivers directly adjacent the works area. However, with windows closed, internal noise levels would not be expected to exceed the internal noise levels identified by the RNP at these locations.

7. GROUNDBORNE CONSTRUCTION NOISE & VIBRATION

Construction Vibration Criteria

The effects of vibration in buildings can be divided into three main categories; those in which the occupants or users of the building are inconvenienced or possibly disturbed (human comfort), those where the building contents may be affected (effects on building contents) and those in which the integrity of the building or the structure itself may be prejudiced (structural damage).

Human Comfort

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

British Standard 6472-1992 "Guide to evaluation of human exposure to vibration in building" nominates guideline values for various categories of disturbance, the most stringent of which are the levels of building vibration associated with a "low probability of adverse comment" from occupants.

BS 6472-1992 provides guideline values for continuous, transient and intermittent events that are based on a Vibration Dose Value (VDV), rather than a continuous vibration level. The vibration dose value is dependent upon the level and duration of the short-term vibration event, as well as the number of events occurring during the daytime or night-time period.

The vibration dose values recommended in BS 6472-1992 for which various levels of adverse comment from occupants may be expected are presented in **Table 7 -1** (based on CNVS Table 4).

Table 7-1 Vibration Dose Values re Expected Adverse Comment in Residential Buildings

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	0.13	0.26	0.51

With respect to VDV, ACA notes that there can be practical difficulties in the prediction and measurement of this parameter, particularly given the limited available measured data. ACA considers the Peak Particle Velocity (PPV) levels as recognised by AVTG is an acceptable substitution (as per table C1.1 of the AVTG – i.e. Residential Daytime: 0.28 to 0.56 mm/s PPV; Residential Night: 0.2 to 0.4 mm/s PPV; Commercial: 0.56 to 1.1 mm/s PPV).

This is a common approach in the industry and allows alignment with structural damage vibration guide values and provides an opportunity for the same vibration equipment to measure for comfort and damage.

Effects on Building Contents

People can perceive floor vibration at levels well below those likely to cause damage to building contents or affect the operation of typical equipment found in most buildings that is not particularly vibration sensitive.

For most receivers, the controlling vibration criterion is the human comfort criterion, and it is therefore not normally required to set separate criteria in relation to the effect of construction vibration on typical building contents.

Where appropriate, objectives for the satisfactory operation of vibration sensitive critical instruments or manufacturing processes should be sourced from manufacturer's data and/or other published objectives.

Structural Damage

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.

There are currently no Australian Standards or guidelines to provide guidance on assessing the potential for building damage from vibration. It is common practice to derive goal levels from international standards. British Standard BS7385:1993 and German Standard DIN4150:1999 both provide goal levels, below which vibration is considered insufficient to cause building damage.

It is noted that the CNVS references the British Standard BS7385:1993, however, the Conditions of Approval also specifies German Standard *DIN 4150-3: Structural vibration – Effects of vibration on structures* (DIN 4150). Of these, DIN4150 is the more stringent and has therefore been considered by this DNVIS.

Table 7-2 summarises the recommended limits outlined in DIN 4150 to ensure minimal risk of cosmetic damage to residential and industrial buildings. Achieving the DIN 4150 vibration levels would also result in compliance with the British Standard BS7385:1993.

Table 7-2 Recommended Vibration Limits for Minimal Risk of Cosmetic Damage

Type of Building	Guideline Values for Velocity, v_i , in mm/s Vibration at the Foundation at a Frequency of			Plane of Floor of Uppermost Storey
	1 Hz to 10 Hz	10 Hz to 50Hz	50 Hz to 100 Hz	Frequency Mixture
Buildings used for commercial purposes, industrial buildings, and buildings of similar design	20	20 - 40	40 - 50	40
Dwellings and buildings of similar design and/or occupancy	5	5 - 15	15 - 20	15
Structures that, because of their particular sensitivity to vibration, cannot be classified and are of great intrinsic value (e.g. listed buildings under preservation order)	3	3 - 8	8 - 10	8

On this basis, conservative general vibration screening levels (Peak Particle Velocity (PPV)) are provided for intermittent vibration sources as follows:

- reinforced or framed structures: 20 mm/s
- unreinforced or light framed structures 5 mm/s.

At locations where the predicted and/or measured vibration levels are greater than shown above, monitoring should be performed during construction. A more detailed analysis of the building structure, vibration source, dominant frequencies and dynamic characteristics of the structure would also be performed to determine the applicable safe vibration level.

Additionally, Condition E84 requires that before commencement of construction, all buildings identified as being at risk of damage must be inspected and a building condition survey undertaken by a suitably qualified and experienced person.

Due to the current difficulties in conducting internal building inspections due to Covid-19 restrictions, Ward generally proposes to minimise any building inspection requirements by minimising the potential for cosmetic damage effects by selection of low vibration plant.

Guidelines for Heritage Structures

Heritage buildings and structures would be assessed as per the screening criteria as they should not be assumed to be more sensitive to vibration unless they are found to be structurally unsound. If a heritage building or structure is found to be structurally unsound (following inspection) the more conservative cosmetic damage criteria of 2.5 mm/s peak component particle velocity (from DIN 4150) would be considered.

Table 7-3 outlines the heritage listed items within the vicinity of the project, none of which have been assessed as being structurally unsound.

Table 7-3 Heritage Items

Heritage Item / Location	Register Listings	Significance	Location
St Marys Railway Station	State Heritage Register and State Rail S170 register under the Heritage Act	State	North of Site
St Marys Railway Station Parcel Office	Penrith City Council LEP (01249)	Local	North of Site

Guidelines for Sensitive Scientific & Medical Equipment

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

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 Table 6 and Figure 3 of the CNVS.

The land use survey undertaken by ward has not identified any uses that may be expected to include sensitive scientific or medical equipment.

Other Vibration Sensitive Structures & Utilities

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 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 with the structure or utility's owner in order to determine acceptable vibration levels.

In lieu of specific vibration criteria being provided by the asset owner, screening criteria would be adopted from guidance provided in DIN 4150-3 for buried pipework. The screening criteria are outlined in **Table 7-4**.

Table 7-4 Guideline Values for Vibration Velocity to be used when Evaluating the Effects of Vibration on Buried Pipework

Pipe Material	Guideline Values for Velocity Measured on the Pipe, v_i , in mm/s
Steel (including welded pipes)	100
Clay, concrete, reinforced concrete, pre-stressed concrete, metal (with or without flange)	80
Masonry, plastic	50

CNVS Additional Mitigation Measures – Groundborne Construction Vibration

In addition to the vibration criteria discussed above, the CNVS requires the consideration of Additional Mitigation Measures, in the case of appreciable levels of vibration occurring at sensitive receivers.

Table 7-5 (based on Table 17 of the CNVS) sets out the Additional Mitigation Measures (AMMs) to be applied in the case of exceedances of the groundborne vibration management levels.

Table 7-5 Additional Mitigation Measures - Ground-Borne Vibration

Time Period	Mitigation Measures
	Predicted Vibration Levels Exceed Maximum Levels
Standard Hours	Mon-Fri (7.00am - 6.00pm)
	Sat (8.00am - 1.00pm)
	Sun/Pub Hol (Nil)
OOH (Evening)	Mon-Fri (6.00pm - 10.00pm)
	Sat (1.00pm - 10.00pm)
	Sun/Pub Hol (8.00am - 6.00pm)
OOH (Night)	Mon-Fri (10.00pm - 7.00am)
	Sat (10.00pm - 8.00am)
	Sun/Pub Hol (6.00pm - 7.00am)

Notes: AA – Alternative Accommodation; M – Monitoring; IB – Individual Briefings; LB – Letterbox drops; RO – Project Specific Respite Offer; PC – Phone Calls and emails; SN – Specific Notifications. Full definitions of these Additional Mitigation Measures are set out in Table 15 of the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (Ver 4.2, 08/09/2020). The 'maximum' vibration value is taken as the 'Maximum Peak Velocity (mm/s)' value identified in Table C1.1 in the Assessing Vibration: A technical guideline (DEC 2006).

ICNG Groundborne Construction Noise Criteria

Groundborne (regenerated) noise is noise generated by vibration transmitted through the ground into a structure. Groundborne noise caused, for example by underground works such as tunnelling, can be more noticeable than airborne noise. The following groundborne noise levels for residences are nominated in the ICNG and indicate when management actions would be implemented. These levels recognise the temporary nature of construction and are only applicable when groundborne noise levels are higher than airborne noise levels.

The groundborne noise management levels considered by this assessment are shown in **Table 7-6**.

Table 7-6 Ground-Borne Noise Management Levels

Receiver Type	Standard Hours (Day)	OOHW (Day)	OOHW (Evening)	OOHW (Night)
	$L_{Aeq,15min}$ dBA	$L_{Aeq,15min}$ dBA	$L_{Aeq,15min}$ dBA	$L_{Aeq,15min}$ dBA
Residential	45	40	40	35
Commercial		50 when in use		
Childcare		40 when in use		
School		45 when in use		

Note: The Groundborne Noise Management Levels for non-residential uses only apply when the building is in use.

The daytime criteria are applicable to both residential and commercial receivers, whereas the evening and night-time criteria are only applicable to residential receivers. The Groundborne Noise Management Levels for non-residential uses only apply when the receiver building is in use.

The internal noise levels are to be assessed at the centre of the most-affected habitable room.

With respect to groundborne noise, Condition E44 requires the following:

All reasonable and feasible mitigation measures must be applied when the following residential ground-borne noise levels are exceeded:

(a) evening (6:00 pm to 10:00 pm) — internal $L_{Aeq(15\text{ minute})}$: 40 dB(A); and

(b) night (10:00 pm to 7:00 am) — internal $L_{Aeq(15\text{ minute})}$: 35 dB(A).

The mitigation measures must be outlined in the Noise and Vibration CEMP Sub-plan, including in any Out-of-Hours Work Protocol, required by Condition E42.

CNVS Additional Mitigation Measures – Groundborne Construction Noise

Table 7-7 (based on Table 15 of the CNVS) sets out the AAMs to be applied in the case of exceedances of the groundborne noise management levels.

Table 7-7 Additional Groundborne Noise Management Measures (Residential)

Time Period		Mitigation Measures		
		Predicted $L_{Aeq,15min}$ Noise Level Above NML		
		0 to 10 dB	10 to 20 dB	>20 dB
Standard Hours	Mon-Fri (7.00am - 6.00pm)	No NML for GBN during Standard Hours		
	Sat (8.00am - 1.00pm)			
	Sun/Pub Hol (Nil)			
OOH (Evening)	Mon-Fri (6.00pm - 10.00pm)	LB	LB, M, SN	LB, M, SN, IB, PC, RO
	Sat (1.00pm - 10.00pm)			
	Sun/Pub Hol (8.00am - 6.00pm)			
OOH (Night)	Mon-Fri (10.00pm - 7.00am)	LB, M, SN	LB, M, SN, IB, PC, RO, AA	LB, M, SN, IB, PC, RO, AA
	Sat (10.00pm - 8.00am)			
	Sun/Pub Hol (6.00pm - 7.00am)			

Notes: AA – Alternative Accommodation; M – Monitoring; IB – Individual Briefings; LB – Letterbox drops; RO – Project Specific Respite Offer; PC – Phone Calls and emails; SN – Specific Notifications. Full definitions of these Additional Mitigation Measures are set out in Table 15 of the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (Ver 4.3, 04/11/2020).

Groundborne Construction Noise & Vibration Assessment

Certain construction activities require the use of vibration intensive equipment that have potential to adversely impact the closest sensitive receivers.

With respect to groundborne noise, ACA notes that for the proposed surface works airborne noise levels would dominate over groundborne noise. It is considered that management of airborne noise impacts in addition to management of vibration impacts would satisfactorily manage any groundborne noise effects. Accordingly, this assessment does not consider groundborne noise effects any further.

Minimum working distances to sensitive receivers for cosmetic building damage and human response have been identified for vibration generating plant that may be used during the works. If equipment operates closer to a sensitive receiver, vibration from construction works may potentially exceed the vibration guidelines. It should be noted, however, the minimum working distances are conservative and indicative. Actual distances may be expected to vary depending on the activity/operator, equipment particularities, local ground conditions and receiver conditions (e.g. building footings).

Notwithstanding this, Ward has selected plant and works methods to, as far as practicable, minimise any potential vibration (and noise) effects. In particular, only static (non-vibratory) rollers would generally be used. Out of hours compaction works would be undertaken with less vibration intensive plate compactors and jumping jacks, in lieu of vibratory rollers.

Additionally, concrete saws would be used in lieu of hydraulic hammers to mitigate any vibration impacts during demolition.

Table 7-8 shows the vibration generating plant that would be used and the associated minimum working distances. The TfNSW guidelines do not include reference distances for plate compactors or jumping jacks. The distances identified for these items are based on measurements undertaken by the University of Western Australia which are consistent with ACA's experience.

Vibration monitoring trials would be undertaken on site at the commencement of the works to confirm vibration levels and safe working distances for all vibration generating equipment.

Table 7-8 Recommended Minimum Working Distances for Vibration Intensive Equipment

Plant Item	Minimum Distance – Cosmetic Damage (BS 7385)	Cosmetic Damage (DIN 4150) Heritage and other Sensitive Structures	Minimum Distance – Human Response (OE&H Vibration Guideline)
60kg Plate Compactor	2	4	7
Jumping Jack	2	4	7
Jackhammer	1 m (nominal)	4	3

Note 1: Jackhammer distances are consistent with the TfNSW Construction Noise and Vibration Strategy (V 4.1).

Note 2: Plate compactor distances are based on measurements undertaken by University of Western Australia.

For the compaction works requiring plate compactors or jumping jacks, safe working distances with respect to cosmetic building damage will be maintained and there would be no material risk of exceedances of the identified vibration screening criteria.

Whilst, it is not currently intended to use a vibratory roller for the Lethbridge intersection asphalt works, the use of a 4.3 tonne vibratory roller may be considered for contingency.

Ward has recently undertaken vibration monitoring trials at the Sy Marys TBI site of a 4.3 tonne vibratory roller (HAMM HD 14). The measured peak particle velocity (PPV) levels at varying distances from the plant item are shown in **Table 7.9**, along with the measured dominant frequencies of vibration.

Considering the measured dominant frequencies of vibration, in accordance with DIN 4150-3, it would be expected that there would be no material risk of building damage for the identified plant item and local conditions, for vibration levels of up to PPV 8 mm/s.

The areas that would require rolling for the Lethbridge asphalt works are setback by at least approximately 5 m from any structures. At this setback distance roller vibration levels of PPV < 5 mm/s have been measured by Ward. On this basis, no material risk of building damage would

be expected if the 4.3 tonne vibratory roller was used for the Lethbridge asphalt works and requirement to undertake building condition surveys per Condition E84 would not be triggered.

Table 7-9 Measured Vibration Levels from HAMM HD 14 4.3 T Vibratory Roller

Plant Item	Distance from Vibration Source	Dominant Frequency (Hz)	Peak Particle Velocity PPV (mm/s)
4.3 T Vibratory Roller	1 m	51	6.3
	2 m	43	5.5
	4 m	25	4.4
	7 m	52	3.9
	10 m	46	3.6
	12 m	49	3.0
	15 m	41	0.6

Note: Measurements undertaken by Ward Civil

CNVS Additional Mitigation Measures – Groundborne Noise & Vibration

Given Ward's proposed vibration controls, further specific additional mitigation measures relating to groundborne noise or vibration are not considered necessary, beyond the standard measures defined by the CNVS. Application of the standard measures (outlined in **Section 9**) in addition to the controls discussed above (and the AMMs that would be applied for noise impacts) would be expected to be sufficient to ensure vibration effects on the occupants of nearby buildings are satisfactorily managed.

8. CONSTRUCTION ROAD TRAFFIC NOISE

Construction Road Traffic Noise Guidelines

Criteria for off-site road traffic noise applicable to existing residences affected by additional traffic on existing local roads generated by land use developments are specified in the NSW Road Noise Policy (RNP). Whilst these criteria do not specifically apply to construction traffic movements, they have been conservatively considered and are summarised in **Table 8-1**.

Table 8-1 RNP Criteria for Road Traffic Noise

Type of Development	Daytime (07:00-22:00)	Night (22:00-07:00)
Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	L _{Aeq,15 hour} 60 (external)	L _{Aeq,9 hour} 55 (external)
Existing residences affected by additional traffic on existing local roads generated by land use developments	L _{Aeq,1 hour} 55 (external)	L _{Aeq,1 hour} 50 (external)

Note: The identified criteria do not apply to vehicle movements within the Project Site. For the purpose of assessment, any noise generated by on-site vehicle movements is considered as construction noise and assessed holistically with on-site mobile plant in accordance with the ICNG.

As required by the RNP, an initial screening test should first be applied by evaluating whether noise levels would increase by more than 2 dB (an increase in the number vehicles of approximately 60%) due to construction traffic or a temporary reroute due to a road closure.

Where noise levels increase by more than 2 dB further assessment is required using the criteria presented in the RNP, as shown in **Table 8-1**. A 2 dB increase is typically considered not noticeable.

Construction Road Traffic Assessment

Ward estimates that a maximum of 5 heavy vehicle movements per hour would be required during the peak construction phase.

Considering the existing volume of traffic on the adjacent roads, the noise impact generated by construction delivery vehicles arriving and leaving the site would be expected to result in an increase in road traffic noise levels of significantly less than 2 dB which is in compliance with the established criteria.

On this basis, no material construction traffic noise impacts are expected.

9. CONSTRUCTION NOISE & VIBRATION MITIGATION MEASURES

CNVS Additional Mitigation Measures

The CNVS sets out standard construction noise and vibration mitigation measures to be implemented on all Sydney Metro projects by default in order to minimise the potential noise and vibration impacts at the surrounding Noise Sensitive Receivers. These will be implemented by Ward where feasible and reasonable and are summarised in **Table 9-1**. A summary of roles and responsibilities is provided in **Table 9-2**.

Table 9-1 Standard Mitigation Measures to Reduce Construction Noise and Vibration

Action Required	Applies To	Details
Management Measures		
Implementation of any project specific mitigation measures required	Airborne noise Ground-borne noise and vibration	In addition to the measures set out in this table, any project specific mitigation measures identified in the environmental assessment documentation (e.g. EA, REF, submissions or representations report) or approval or licence conditions must be implemented.
Implement community consultation measures	Airborne noise Ground-borne noise and vibration	A register of all noise and vibration sensitive receivers (NSRs) would be kept on site. The register would include the following details for each NSR: <ul style="list-style-type: none"> • Address of receiver • Category of receiver (e.g. Residential, Commercial etc.) • Contact name and phone number
Site Inductions	Airborne noise Ground-borne noise and vibration	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: <ul style="list-style-type: none"> • All relevant project specific and standard noise and vibration mitigation measures • Relevant licence and approval conditions • Permissible hours of work • Any limitations on high noise generating activities • Location of nearest sensitive receivers • Construction employee parking areas • Designated loading/unloading areas and procedures • Site opening/closing times (including deliveries) • Environmental incident procedures

ST MARY'S TEMPORARY BUS INTERCHANGE EARLY WORKS
ADDENDUM DETAILED NOISE & VIBRATION IMPACT STATEMENT (DNVIS) – LETHBRIDGE VARIATION

Behavioural practices	Airborne noise	No swearing or unnecessary shouting or loud stereos/radios; on site. No dropping of materials from height; throwing of metal items; and slamming of doors. No excessive revving of plant and vehicle engines Controlled release of compressed air.
Monitoring	Airborne noise Ground-borne noise and vibration	A noise monitoring program is to be carried out for the duration of the works in accordance with the Construction Noise and Vibration Management Plan and any approval and licence conditions.
Attended vibration measurements	Ground-borne vibration	Attended vibration measurements are required at the commencement of vibration generating activities to confirm that vibration levels satisfy the criteria for that vibration generating activity. Where there is potential for exceedances of the criteria further vibration site law investigations would be undertaken to determine the site-specific safe working distances for that vibration generating activity. Continuous vibration monitoring with audible and visible alarms would be conducted at the nearest sensitive receivers whenever vibration generating activities need to take place inside the applicable safe-working distances.
Source Controls		
Construction hours and scheduling	Airborne noise Ground-borne noise and vibration	Where feasible and reasonable, construction would be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels would be scheduled during less sensitive time periods.
Construction respite period	Ground-borne noise and vibration Airborne noise	High noise and vibration generating activities ² may only be carried out in continuous blocks, not exceeding 3 hours each, with a minimum respite period of one hour between each block ³ .
Equipment selection	Airborne noise Ground-borne noise and vibration	Use quieter and less vibration emitting construction methods where feasible and reasonable. For example, when piling is required, bored piles rather than impact-driven piles will minimise noise and vibration impacts. Similarly, diaphragm wall construction techniques, in lieu of sheet piling, will have significant noise and vibration benefits.
Maximum noise levels	Airborne-noise	The noise levels of plant and equipment must have operating Sound Power Levels compliant with the criteria in Table 13 (of the CNVS).
Rental plant and equipment	Airborne-noise	The noise levels of plant and equipment items are to be considered in rental decisions and in any case cannot be used on site unless compliant with the criteria in Table 13 (of the CNVS).

ST MARY'S TEMPORARY BUS INTERCHANGE EARLY WORKS
ADDENDUM DETAILED NOISE & VIBRATION IMPACT STATEMENT (DNVIS) – LETHBRIDGE VARIATION

Plan worksites and activities to minimise noise and vibration	Airborne noise Ground-borne vibration	Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.
Non-tonal reversing alarms	Airborne noise	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.
Minimise disturbance arising from delivery of goods to construction sites	Airborne-noise	<p>Loading and unloading of materials/deliveries is to occur as far as possible from NSRs</p> <p>Select site access points and roads as far as possible away from NSRs</p> <p>Dedicated loading/unloading areas to be shielded if close to NSRs</p> <p>Delivery vehicles to be fitted with straps rather than chains for unloading, wherever feasible and reasonable</p>
Path Controls		
Shield stationary noise sources such as pumps, compressors, fans etc	Airborne-noise	<p>Stationary noise sources would be enclosed or shielded whilst ensuring that the occupational health and safety of workers is maintained.</p> <p>Appendix F of AS 2436: 1981 lists materials suitable for shielding.</p>
Shield sensitive receivers from noisy activities	Airborne-noise	<p>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 siting plant.</p>

Table 9-2 Roles and Responsibilities

Role	Definition and Responsibilities
Project Environment Manager	<ul style="list-style-type: none"> Oversee the implementation of all noise and vibration management initiatives including coordinating responses to noise and vibration complaints. Manage review and continual improvement of the DNVIS/CNVMP. Ensure that sufficient resources are allocated for the implementation of the DNVIS/CNVMP. Consider and advise senior management on compliance obligations regarding noise and vibration. 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.
Site Supervisor	<ul style="list-style-type: none"> Ensure that all requirements of the DNVIS/CNVMP are effectively implemented. Ensure all appropriate noise and vibration mitigation measures are implemented.
EHS Coordinators	<ul style="list-style-type: none"> Assist the Project Environment Manager and Construction Managers in implementing the DNVIS/CNVMP. Oversee noise and vibration training including inductions, toolbox talks and specific technical training on monitoring equipment. Ensure all appropriate noise and vibration mitigation measures are implemented. Monitoring and reporting on compliance.
Site Engineers	<ul style="list-style-type: none"> Assist the Construction Manager in implementing the DNVIS/CNVMP.
Project Noise and Vibration Consultant	<ul style="list-style-type: none"> Provide Ward with specialist noise and vibration input and advice including development of the CNVMP, DNVIS and discussions regarding progressive construction works. Undertaking noise and vibration monitoring when required. Assisting in community consultation when required.
Construction Manager	<ul style="list-style-type: none"> Manage the delivery of the construction process, in relation to noise and vibration management across the site together with the Environment Manager. Ensure that all requirements of the DNVIS/CNVMP are effectively implemented, including all subcontractors
Stakeholder and Community Relations Manager	<ul style="list-style-type: none"> Manage notifications and consultation for noise and vibration and liaise with the Environment Manager about management of noise and vibration complaints. Assist in coordinating responses to noise and vibration complaints.

CNVS Additional Mitigation Measures

Based on the predictions, all reasonable and feasible mitigation measures to minimise noise and vibration from construction will be implemented. This includes the Standard Mitigation Measures (SMM) set out in **Table 9-1** and the Additional Mitigation Measures (AMM) required by the CNVS, as set out in **Section 5** and **Appendix B**.

Construction Noise & Vibration Monitoring Program

Conditions C13 - C15 specify in detail requirements for monitoring. These matters are addressed in the Construction Noise & Vibration Monitoring Program provided in the TBI Early Works DNVIS.

10. NOISE IMPACT SUBJECTIVE CLASSIFICATION

Predominantly the Lethbridge/Phillip Street intersection works would be undertaken during standard hours to minimise noise impacts on local residences.

The out of hours works on the Lethbridge/Phillip Street intersection would be required for 3 to 5 work shifts and these works may be expected to result in residential NML exceedances at times >20dB at the closest receivers on these Streets. However, the construction noise levels would naturally fluctuate during the works being undertaken and for most of the time the levels would be significantly lower than reported.

At these receivers predicted maximum construction noise levels may also exceed the sleep disturbance levels. To mitigate, the standard and additional mitigation measures identified by this DNVIS will be provided.

The closest commercial receivers are well separated from the works and would not be materially affected during the works.

The potentially affected receivers will be consulted regarding the forthcoming works, with Ward's community engagements consultants undertaking door knocking and briefings at the most affected addresses. A community consultation report will be developed and incorporated into this DNVIS and will summarise the receiver notifications and interactions. This DNVIS will be updated as required.

Considering the above, the proposed works are generally considered **moderate impact**.

The standard and additional mitigation measures identified by this DNVIS will be provided.

As a result of noise classification and/or the noise level exceedances at sensitive receivers provided by this DNVIS, appropriate reasonable and feasible noise mitigation is to be adopted and implemented during the works. For sites where works are predicted to significantly exceed noise goals and impact on receivers for a significant period of time, additional reasonable and feasible noise mitigation measures such as those outlined in **Appendix B** would be implemented to reduce the noise levels and impact on sensitive receivers.

The following key controls will be implemented:

- High noise works will be restricted to daytime hours as far as practicable.
- Where concrete sawing is required to be undertaken, this activity will be restricted to standard hours.
- As far as practicable and safe to do so, sound curtains will be used around works sites to reduce construction noise emissions.
- Noise monitoring will be undertaken throughout the works to verify construction noise levels and inform the construction team where, if necessary, construction methods require modification to reduce noise levels.

- Vibration monitoring will be undertaken at the commencement of work involving vibration generating equipment to confirm safe working distances and compliance with German Standard DIN4150:1999.
- Static rollers will generally be used in lieu of vibratory rollers to minimise any vibration impacts.
- Periodic letterbox notifications will be provided to update local residents and business owners regarding the progress of the works.
- Community Consultation in accordance with the CNVS and the Out of Hours Works Protocol (SM-21-00306108) will be undertaken at potentially affected receivers and feedback from the receivers will be considered during scheduling of the works.

11. CONCLUSION

Acoustics Consultants Australia (ACA) has previously prepared on behalf of Ward Civil & Engineering Pty Ltd (Ward) a Detailed Noise and Vibration Impact Statement (DNVIS) for the St Mary's Temporary Bus Interchange (TBI) Early Works, which form part of the Sydney Metro Western Sydney Airport (SMWSA) Project (SSI 10051).

Details the DNVIS assessment are set out in ACA report 11.00323R-04.

Subsequent to the issue of the DNVIS assessment (ACA report 11.00323R-04), this addendum report has been prepared in relation to the following additional scope items:

- Civil works scope variation – Pavement works at Lethbridge and Phillip Street intersection.

This addendum report should be read in conjunction with the main DNVIS (Report 11.00323R-04).

This addendum assessment has identified further Additional Mitigation Measures required to manage the proposed out of hours works.

Ward has undertaken focussed community consultation with the most potentially affected receivers and has considered their feedback. In particular, community consultation has been conducted and completed with residents highly noise affected by standard hours works prior to the commencement of these activities. Additionally, consultation has been conducted and completed with the residents potentially affected by out of hours works prior to the works commencing. A community consultation report summarising the receiver notifications and interactions and respite offer outcomes to be implemented is provided in Appendix D.

As required by Condition E47 this DNVIS includes the consultation outcomes in terms of specific mitigation measures to be implemented.

It is expected that noise and vibration impacts can be effectively managed through the adoption of the measures identified by this DNVIS.

The key conclusions are as follows:

- Construction traffic noise is expected to be no more than 2 dB above current traffic noise levels.
- With the incorporation of specific controls, construction vibration is expected to comply with the DIN building damage values nominated in this assessment and on this basis the risk of building damage (even cosmetic) is considered negligible to all building structures. Nevertheless, vibration levels would be monitoring during the vibration generating works to confirm levels.
- Given Ward's proposed vibration controls, no specific additional mitigation measures relating to groundborne noise or vibration are considered necessary, beyond the standard measures defined by the CNVS. Application of the measures outlined by this DNVIS would be expected

to be sufficient to ensure vibration effects on the occupants of nearby buildings are satisfactorily managed.

- Airborne noise levels may be expected to exceed criteria at times at several receivers. These exceedances may be effectively managed through a combination of standard mitigation measures and additional mitigation measures required by the CNVS, principally through letterbox notifications, and verification monitoring. The following key controls will be implemented:
 - High noise works will be restricted to daytime hours as far as practicable.
 - Where concrete sawing is required to be undertaken, this activity will be restricted to prior to standard hours.
 - As far as practicable and safe to do so, sound curtains will be used around works sites to reduce construction noise emissions.
 - Noise monitoring will be undertaken throughout the works to verify construction noise levels and inform the construction team where, if necessary, construction methods require modification to reduce noise levels.
 - Vibration monitoring will be undertaken at the commencement of work involving vibration generating equipment to confirm safe working distances and compliance with German Standard DIN4150:1999.
 - Static rollers will be used in lieu of vibratory rollers to minimise any vibration impacts (as a contingency measure a 4.3 tonne vibratory roller (HAMM HD 14) could be used, which would not be expected to exceed the DIN4150:1999 building damage vibration levels).
 - Periodic letterbox notifications will be provided to update local residents and business owners regarding the progress of the works.
 - Community Consultation in accordance with the CNVS and the Out of Hours Works Protocol (SM-21-00306108) has been undertaken at potentially affected receivers and feedback from the receivers has been considered during scheduling of the works and respite offer outcomes implemented.
 - Community consultation has been conducted and completed with residents predicted to be highly noise affected by the standard hours works before the standard hours noise generating activities commence and with the residents affected by night-works before night works commence.

APPENDIX A: Glossary of Noise & Vibration Terms

1 Sound Level (or Noise Level)

Sound may be defined as any pressure variation that the human ear can detect. The human ear responds to a wide range of changes in sound pressure. As the greatest sound pressures to which the human ear responds are 10,000,000 times greater than the lowest, the decibel (dB) scale, by the use of logarithms is used to express sound pressure levels more conveniently.

The standard reference sound pressure used to define a Sound Pressure Level is 2×10^{-5} Pascals (Pa).

The decibel is defined as ten times the logarithmic ratio of two pressures. The smallest perceptible change is approximately 1 dB.

Sound Pressure Level is typically abbreviated as SPL, L_p , or L.

2 "A" Weighted Sound Pressure Level

The most common frequency rating is 'A-Weighting'. The A-weighting frequency response curve is designed to approximate the sensitivity of the human ear. The symbol L_A represents A-weighted Sound Pressure Level - The overall broadband level of a sound/noise is typically expressed as a dB(A) level.

Human hearing is most sensitive mid frequencies sounds (500 Hz to 4000 Hz), and less sensitive at higher and lower frequencies. Therefore, the level expressed in dB(A) correlates strongly with the perceived loudness of the sound/noise.

A change in sound pressure level of 1-2 dB is barely noticeable to most people, whilst a 3-5 dB change is perceived as a small but noticeable change in loudness. A 10 dB change is perceived as an approximate doubling or halving in loudness. The table below present the sound pressure levels of some common sources.

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

In addition to A-weighting, other less commonly applied frequency weightings include B, C and D weightings. Unweighted or Linear levels are sound levels measured without any weighting. These are expressed as simply dB, or dB(lin) or dB(Z).

3 Sound Power Level

The rate at which a noise source emits acoustic energy is defined by its Sound Power Level. Sound Power Levels are also expressed in decibel units (dB or dB(A)). Sound Power is typically identified as SWL or LW. The standard reference sound power used to define a Sound Power Level is 1×10^{-12} Watts (W).

4 Statistical Noise Levels

Environmental noise levels from various sources in the environment will vary in level over time. Statistical exceedance levels are typically expressed as L_{AN} levels (i.e. the A-weighted sound pressure level exceeded for N% of a specific measurement period).

The most commonly used statistical noise levels are as follows:

L_{Amax}	Maximum noise level over a sample period (typically measured on fast time-weighting response).
L_{A1}	Noise level exceeded for 1% of a sample period (typically 15-minute interval).
L_{A10}	Noise level exceeded for 10% of a sample period (typically 15-minute interval).
L_{A90}	Noise level exceeded for 90% of a sample period. This noise level is commonly used to describe the background noise level (in the absence of the source under investigation).
L_{Aeq}	A-weighted equivalent noise level. This is equivalent to the steady sound level containing the same amount of acoustical energy as the time-varying sound. Often referred to as the average noise level.
ABL	Assessment Background Level. This is the single figure background level representing each assessment period (day, evening and night) for each day. It is determined by calculating the lowest 10th percentile background noise level (L_{A90}) for each period.
RBL	Rating Background Level. This is the median value of the ABL values for each period (day, evening, night), determined over several days of measurements.

Common Vibration Terms

Hertz (Hz) – Units in which frequency is expressed. Synonymous with cycles per second.

Decibel – Ratios of identical quantities are expressed in decibel or dB units. The number of dB is “ratio” against some standard or reference value in terms of the base 10 logarithm of that ratio. In measuring acoustic or vibration power (as in PSD or ASD of random vibration), the number of dB = $10 \text{ Log}_{10} (P/P_0)$. P_0 , the reference level, equals 0 dB. In measuring the more common voltage-like quantities such as acceleration, the number of dB = $20 \text{ Log}_{10} (E/E_0)$ E_0 , the reference level, equals 0 dB.-

Displacement – A vector quantity that specifies the change of position of a body or particle with respect to a reference frame.

Velocity – A vector quantity that specifies the time derivative of displacement.

Acceleration – Acceleration is rate of change of velocity with time usually along a specified axis, usually expressed in m/s^2

Peak – Extreme value of a varying quantity, measured from the zero or mean value. Also, a maximum spectral value.

Peak-to-peak value – The algebraic difference between extreme values (as $D = 2X$).

Duration of a shock pulse is how long it lasts. Time is usually measured between instants when the amplitude is greater than 10% of the peak value.

Amplitude – The magnitude of variation (in a changing quantity) from its zero value. Always modify it with an adjective such as **peak, RMS, average**, etc. May refer to displacement, velocity, acceleration.

Crest factor – Of an oscillating quantity. The ratio of the peak value to the r.m.s. value.

VDV – The Vibration Dose Value is the accumulation of energy measured over a given time period, proportional to the root mean quad of acceleration. This is usually measured in each of the three axes of motion. In most cases, vibration tends to be higher in the Z (vertical) axis. This is measured with units of $m/s^{1.75}$.

PPV – Peak Particle Velocity is the instantaneous peak of the resultant vector sum of all three axes of motion. Results are expressed in terms of velocity normally mm/s.

Peak Acceleration – This is the peak acceleration level measured in each of the three axes of motion. In some cases, this can also be combined in a vector sum. This is measured in m/s^2 .

Accelerometer – A sensor or transducer or pickup for converting acceleration to an electrical signal. Two common types are piezoresistive and piezoelectric.

Charge amplifier – An amplifier which converts a charge input signal (as from an accelerometer) into an output voltage; a charge-to-voltage converter.

Geophone – A sensor or transducer or pickup for converting velocity to an electrical signal.

APPENDIX B

Construction Noise Prediction Tables and CNVS Additional Mitigation Measures



Table B-1 L_{Aeq,15min} Construction Noise Predictions for Activities 23, 24a, 24b, 25a, 25b, 26, 27, 28, 29, 30, 31 – Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	23	24a*	24b	25a*	25b	26	27	28	29	30	31
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	26	37	32	37	32	26	27	26	34	28	33
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	28	38	34	38	34	28	29	25	36	30	35
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	28	38	34	38	34	28	29	29	36	30	34
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	33	43	39	43	39	33	34	34	41	35	42
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	36	45	42	45	42	36	37	33	44	38	42
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	31	41	37	41	37	31	32	35	39	33	38
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	33	42	39	42	39	33	34	36	41	35	38
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	31	40	37	40	37	31	32	32	39	33	39
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	32	42	38	42	38	32	33	32	40	34	39
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	24	35	30	35	30	24	25	25	32	26	30
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	46	57	52	57	52	46	47	48	54	48	53
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	50	61	56	61	56	50	51	51	58	52	56
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	55	67	61	67	61	55	56	57	63	57	61
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	72	84	78	84	78	72	73	70	80	74	81
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	62	74	68	74	68	62	63	63	70	64	75
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	52	64	58	64	58	52	53	54	60	54	60
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	46	58	52	58	52	46	47	47	54	48	53
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	44	56	50	56	50	44	45	45	52	46	52
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	53	65	59	65	59	53	54	54	61	55	61
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	67	78	73	78	73	67	68	66	75	69	79
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	58	69	64	69	64	58	59	59	66	60	63
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	36	45	42	45	42	36	37	35	44	38	45
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	37	46	43	46	43	37	38	40	45	39	43
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	26	37	32	37	32	26	27	31	34	28	32
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	34	45	40	45	40	34	35	36	42	36	39
R26	3 Station St	Residential	37	37	36	47	42	42	41	40	50	46	50	46	40	41	39	48	42	48
R27	1 Station St	Residential	37	37	36	47	42	42	41	53	64	59	64	59	53	54	54	61	55	59
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	49	59	55	59	55	49	50	47	57	51	55
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	37	48	43	48	43	37	38	41	45	39	42
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	26	38	32	38	32	26	27	27	34	28	31
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41	26	37	32	37	32	26	27	25	34	28	33

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver.

Note: *The predictions for concrete saw activities include a +5dB penalty for annoying characteristics.

- 23 – Lethbridge - Potholing
- 24a - Lethbridge - Saw Cut Kerb and Gutter, Median Islands (Approx 30 mins)
- 24b - Lethbridge - Demolish Kerb and Gutter, Median Islands
- 25a - Lethbridge - Saw Cut Asphalt (Approx 30 mins)
- 25b - Lethbridge - Demolish Asphalt
- 26 - Lethbridge - Excavation
- 27 - Lethbridge - Form Reo Pour – Concrete Works
- 28 - Lethbridge - Electrical Install Works
- 29 - Lethbridge - Asphalt Works – Full Depth and Mill and Re-Sheet
- 30 - Lethbridge - Line Marking
- 31 - Lethbridge - Footpath

Table B-2 L_{Aeq,15min} Construction Noise Predictions for Activities 23, 24a, 24b, 25a, 25b, 26, 27, 28, 29, 30, 31 – Non-Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	23	24a*	24b	25a*	25b	26	27	28	29	30	31
C01	TBC	Commercial	-	-	-	70	70	70	70	24	35	30	35	30	24	25	26	32	26	31
C02	TBC	Commercial	-	-	-	70	70	70	70	27	38	33	38	33	27	28	26	35	29	34
C03	TBC	Commercial	-	-	-	70	70	70	70	27	38	33	38	33	27	28	29	35	29	34
C04	TBC	Commercial	-	-	-	70	70	70	70	26	37	32	37	32	26	27	26	34	28	34
C05	TBC	Commercial	-	-	-	70	70	70	70	21	33	27	33	27	21	22	23	29	23	27
C06	TBC	Commercial	-	-	-	70	70	70	70	34	46	40	46	40	34	35	29	42	36	42
C07	TBC	Commercial	-	-	-	70	70	70	70	26	37	32	37	32	26	27	27	34	28	33
C08	TBC	Commercial	-	-	-	70	70	70	70	19	31	25	31	25	19	20	21	27	21	26
C09	TBC	Commercial	-	-	-	70	70	70	70	21	32	27	32	27	21	22	23	29	23	27
C10#	TBC	Commercial	-	-	-	70	70	70	70	26	37	32	37	32	26	27	25	34	28	33
C11	TBC	Commercial	-	-	-	70	70	70	70	43	54	49	54	49	43	44	43	51	45	49
C12	TBC	Commercial	-	-	-	70	70	70	70	25	36	31	36	31	25	26	26	33	27	31
C13	TBC	Commercial	-	-	-	70	70	70	70	21	33	27	33	27	21	22	23	29	23	28
C14	TBC	Commercial	-	-	-	70	70	70	70	25	36	31	36	31	25	26	28	33	27	32
C15	TBC	Commercial	-	-	-	70	70	70	70	24	35	30	35	30	24	25	27	32	26	30
C16	TBC	Commercial	-	-	-	70	70	70	70	23	34	29	34	29	23	24	27	31	25	30
C17	TBC	Commercial	-	-	-	70	70	70	70	24	34	30	34	30	24	25	24	32	26	31
C18	TBC	Commercial	-	-	-	70	70	70	70	24	35	30	35	30	24	25	21	32	26	31
C19	TBC	Commercial	-	-	-	70	70	70	70	30	41	36	41	36	30	31	34	38	32	37
C20	TBC	Commercial	-	-	-	70	70	70	70	43	55	49	55	49	43	44	43	51	45	50
C21	TBC	Commercial	-	-	-	70	70	70	70	45	57	51	57	51	45	46	45	53	47	52
C22	TBC	Commercial	-	-	-	70	70	70	70	45	57	51	57	51	45	46	47	53	47	52
C23	TBC	Commercial	-	-	-	70	70	70	70	51	63	57	63	57	51	52	53	59	53	57
C24	TBC	Commercial	-	-	-	70	70	70	70	50	62	56	62	56	50	51	50	58	52	56
C25	TBC	Commercial	-	-	-	70	70	70	70	47	58	53	58	53	47	48	46	55	49	53
C26	TBC	Childcare Centre	-	-	-	60	60	-	-	40	50	46	50	46	40	41	39	48	42	48

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver.

Note: *The predictions for concrete saw activities include a +5dB penalty for annoying characteristics.

- 23 – Lethbridge - Potholing
- 24a - Lethbridge - Saw Cut Kerb and Gutter, Median Islands (Approx 30 mins)
- 24b - Lethbridge - Demolish Kerb and Gutter, Median Islands
- 25a - Lethbridge - Saw Cut Asphalt (Approx 30 mins)
- 25b - Lethbridge - Demolish Asphalt
- 26 - Lethbridge - Excavation
- 27 - Lethbridge - Form Reo Pour – Concrete Works
- 28 - Lethbridge - Electrical Install Works
- 29 - Lethbridge - Asphalt Works – Full Depth and Mill and Re-Sheet
- 30 - Lethbridge - Line Marking
- 31 - Lethbridge - Footpath

Table B-3 L_{Aeq,15min} Construction Noise Predictions – Standard Hours NML Exceedances for Activities 23, 24a, 24b, 25a, 25b, 26, 27, 28, 29, 30, 31 & Additional Mitigation – Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	23	24a*	24b	25a*	25b	26	27	28	29	30	31
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	-	10	5	10	5	-	-	1	7	1	6
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	3	14	9	14	9	3	4	4	11	5	9
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	8	20	14	20	14	8	9	10	16	10	14
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	25	37	31	37	31	25	26	23	33	27	34
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	15	27	21	27	21	15	16	16	23	17	28
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	5	17	11	17	11	5	6	7	13	7	13
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	-	11	5	11	5	-	-	-	7	1	6
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	-	9	3	9	3	-	-	-	5	-	5
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	6	18	12	18	12	6	7	7	14	8	14
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	20	31	26	31	26	20	21	19	28	22	32
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	11	22	17	22	17	11	12	12	19	13	16
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R26	3 Station St	Residential	37	37	36	47	42	42	41	-	3	-	3	-	-	-	-	1	-	1
R27	1 Station St	Residential	37	37	36	47	42	42	41	6	17	12	17	12	6	7	7	14	8	12
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	2	12	8	12	8	2	3	-	10	4	8
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	-	1	-	1	-	-	-	-	-	-	-
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-

Note: *The exceedances for activities involving concrete saws include a +5dB penalty for annoying characteristics. These exceedances are expected to be relatively brief (e.g. approx. 30 minutes per shift). Activities 29 (Asphalt Works – Full Depth and Mill and Re-Sheet) and 30 (Line Marking) would not be undertaken during daytime standard hours.

Yellow = -
Amber = LB
Red = LB, M, SN
Purple = LB, M, SN

Note, the highlighted Additional Mitigation triggers are based on the exceedance of the L_{Aeq,15min} NMLs. To determine whether it is justified to provide Respite Offer measures, consideration must also be given to the duration of the works.

Note that exceedances are shown for all activities, however, activities 29 (Asphalt Works – Full Depth and Mill and Re-Sheet) and 30 (Line Marking) would not be undertaken during standard hours. It is expected that 30 to 40 standard hours shifts may be required to complete the identified works.

Given the scheduling of the works, it would be expected that the identified impacts may occur for consecutive shifts at the impacted locations. On this basis, Ward will consult with the identified residents to determine appropriate mitigation measures, prior to the commencement of the works.

Table B-4 L_{Aeq,15min} Construction Noise Predictions – Out-of-Hours Daytime NML Exceedances for Activities 23, 24a, 24b, 25a, 25b, 26, 27, 28, 29, 30, 31 & Additional Mitigation – Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	23	24a*	24b	25a*	25b	26	27	28	29	30	31
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	4	15	10	15	10	4	5	6	12	6	11
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	8	19	14	19	14	8	9	9	16	10	14
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	13	25	19	25	19	13	14	15	21	15	19
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	30	42	36	42	36	30	31	28	38	32	39
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	20	32	26	32	26	20	21	21	28	22	33
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	10	22	16	22	16	10	11	12	18	12	18
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	4	16	10	16	10	4	5	5	12	6	11
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	2	14	8	14	8	2	3	3	10	4	10
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	11	23	17	23	17	11	12	12	19	13	19
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	25	36	31	36	31	25	26	24	33	27	37
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	16	27	22	27	22	16	17	17	24	18	21
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	-	3	-	3	-	-	-	2	-	3	
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	-	5	1	5	1	-	-	3	-	1	
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	3	-	3	-	-	-	-	-	-	
R26	3 Station St	Residential	37	37	36	47	42	42	41	-	8	4	8	4	-	-	6	-	6	
R27	1 Station St	Residential	37	37	36	47	42	42	41	11	22	17	22	17	11	12	12	19	13	17
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	7	17	13	17	13	7	8	5	15	9	13
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	-	6	1	6	1	-	-	3	-	0	
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	

Note: *The exceedances for activities involving concrete saws include a +5dB penalty for annoying characteristics. These exceedances are expected to be relatively brief (e.g. approx. 30 minutes per shift). Activities 29 (Asphalt Works – Full Depth and Mill and Re-Sheet) and 30 (Line Marking) would not be undertaken during the daytime out-of-hours period.

Yellow = LB
Amber = LB, M
Red = LB, M, SN, RO
Purple = LB, M, SN, IB, PC, RO

Note, the highlighted Additional Mitigation triggers are based on the exceedance of the L_{Aeq,15min} NMLs. To determine whether it is justified to provide Respite Offer measures, consideration must also be given to the duration of the works.

Note that exceedances are shown for all activities for information purposes only. No works would occur during the daytime out-of-hours period.

Table B-5 L_{Aeq,15min} Construction Noise Predictions – Out-of-Hours Evening NML Exceedances for Activities 23, 24a, 24b, 25a, 25b, 26, 27, 28, 29, 30, 31 & Additional Mitigation – Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	23	24a*	24b	25a*	25b	26	27	28	29	30	31
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	1	-	1	-	-	-	-	-	-	-
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	3	-	3	-	-	-	-	2	-	-
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	4	15	10	15	10	4	5	6	12	6	11
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	8	19	14	19	14	8	9	9	16	10	14
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	13	25	19	25	19	13	14	15	21	15	19
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	30	42	36	42	36	30	31	28	38	32	39
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	20	32	26	32	26	20	21	21	28	22	33
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	10	22	16	22	16	10	11	12	18	12	18
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	4	16	10	16	10	4	5	5	12	6	11
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	2	14	8	14	8	2	3	3	10	4	10
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	11	23	17	23	17	11	12	12	19	13	19
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	25	36	31	36	31	25	26	24	33	27	37
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	16	27	22	27	22	16	17	17	24	18	21
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	-	3	-	3	-	-	-	-	2	-	3
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	-	4	1	4	1	-	-	-	3	-	1
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	3	-	3	-	-	-	-	-	-	-
R26	3 Station St	Residential	37	37	36	47	42	42	41	-	8	4	8	4	-	-	-	6	-	6
R27	1 Station St	Residential	37	37	36	47	42	42	41	11	22	17	22	17	11	12	12	19	13	17
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	7	17	13	17	13	7	8	5	15	9	13
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	-	6	1	6	1	-	-	-	3	-	-
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-

Note: *The exceedances for activities involving concrete saws include a +5dB penalty for annoying characteristics. These exceedances are expected to be relatively brief (e.g. approx. 30 minutes per shift). Only Activities 29 (Asphalt Works – Full Depth and Mill and Re-Sheet) and 30 (Line Marking) would not be undertaken during the evening out-of-hours period.

Yellow = LB
Amber = LB, M
Red = LB, M, SN, RO
Purple = LB, M, SN, IB, PC, RO

Note, the highlighted Additional Mitigation triggers are based on the exceedance of the L_{Aeq,15min} NMLs. To determine whether it is justified to provide Respite Offer measures, consideration must also be given to the duration of the works.

Note that exceedances are shown for all activities, however, only activities 29 (Asphalt Works – Full Depth and Mill and Re-Sheet) and 30 (Line Marking) would occur during the evening period. It is expected that 3 to 5 out-of-hours shifts may be required to complete the identified works.

Given the scheduling of the works, it would be expected that the identified impacts may occur for consecutive shifts at the impacted locations. On this basis, Ward will consult with the identified residents to determine appropriate mitigation measures, prior to the commencement of the works.

Table B-6 L_{Aeq,15min} Construction Noise Predictions – Out-of-Hours Night NML Exceedances for Activities 23, 24a, 24b, 25a, 25b, 26, 27, 28, 29, 30, 31 & Additional Mitigation – Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	23	24a*	24b	25a*	25b	26	27	28	29	30	31
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	2	-	2	-	-	-	-	-	-	1
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	4	1	4	1	-	-	-	3	-	1
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	1	-	1	-	-	-	-	-	-	-
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	1	-	1	-	-	-	-	-	-	-
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	5	16	11	16	11	5	6	7	13	7	12
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	9	20	15	20	15	9	10	10	17	11	15
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	14	26	20	26	20	14	15	16	22	16	20
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	31	43	37	43	37	31	32	29	39	33	40
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	21	33	27	33	27	21	22	22	29	23	34
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	11	23	17	23	17	11	12	13	19	13	19
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	5	17	11	17	11	5	6	6	13	7	12
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	3	15	9	15	9	3	4	4	11	5	11
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	12	24	18	24	18	12	13	13	20	14	20
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	26	37	32	37	32	26	27	25	34	28	38
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	17	28	23	28	23	17	18	18	25	19	22
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	-	4	1	4	1	-	-	-	3	-	4
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	-	5	2	5	2	-	-	-	4	-	2
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	4	-	4	-	-	-	-	1	-	-
R26	3 Station St	Residential	37	37	36	47	42	42	41	-	9	5	9	5	-	-	-	7	1	7
R27	1 Station St	Residential	37	37	36	47	42	42	41	12	23	18	23	18	12	13	13	20	14	18
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	8	18	14	18	14	8	9	6	16	10	14
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	-	7	2	7	2	-	-	-	4	-	1
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-

Note: *The exceedances for activities involving concrete saws include a +5dB penalty for annoying characteristics. These exceedances are expected to be relatively brief (e.g. approx. 30 mins per shift). Only Activities 29 (Asphalt Works – Full Depth and Mill and Re-Sheet) and 30 (Line Marking) would not be undertaken during the night out-of-hours period.

Yellow = LB
Amber = LN, M, SN, RO
Red = LB, M, SN, IB, PC, RO, AA
Purple = LB, M, SN, IB, PC, RO, AA

Note, the highlighted Additional Mitigation triggers are based on the exceedance of the L_{Aeq,15min} NMLs. To determine whether it is justified to provide Respite Offers and Alternative Accommodation measures, consideration must also be given to the duration of the works.

Note that exceedances are shown for all activities, however, only activities 29 (Asphalt Works – Full Depth and Mill and Re-Sheet) and 30 (Line Marking) would occur at night. It is expected that 3 to 5 out-of-hours shifts may be required to complete the identified works.

Given the scheduling of the works, it would be expected that the identified impacts may occur for consecutive shifts at the impacted locations. On this basis, Ward will consult with the identified residents to determine appropriate mitigation measures, prior to the commencement of the works.

Table B-7 L_{Aeq,15min} Construction Noise Predictions – Standard Hours NML Exceedances for Activities 23, 24a, 24b, 25a, 25b, 26, 27, 28, 29, 30, 31 & Additional Mitigation – Non-Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	23	24a*	24b	25a*	25b	26	27	28	29	30	31
C01	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C02	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C03	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C04	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C05	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C06	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C07	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C08	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C10#	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C26	-	Childcare Centre	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-	-	-	-

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results. Additional Mitigation Measures are only applicable when the receiver building is in use.

Yellow = -
Amber = LB
Red = LB, M, SN
Purple = LB, M, SN

Table B-8 L_{Aeq,15min} Construction Noise Predictions – Out-of-Hours Daytime NML Exceedances for Activities 23, 24a, 24b, 25a, 25b, 26, 27, 28, 29, 30, 31 & Additional Mitigation – Non- Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OO H Day	OOH Eve NML	OOH Night NML	23	24a*	24b	25a*	25b	26	27	28	29	30	31
C01	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C02	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C03	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C04	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C05	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C06	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C07	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C08	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C10	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C26	-	Childcare	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-	-	-	-

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results. Additional Mitigation Measures are only applicable when the receiver building is in use.

- Yellow = LB
- Amber = LB, M
- Red = LB, M, SN, RO
- Purple = LB, M, SN, IB, PC, RO

Table B-9 L_{Aeq,15min} Construction Noise Predictions – Out-of-Hours Evening NML Exceedances for Activities 23, 24a, 24b, 25a, 25b, 26, 27, 28, 29, 30, 31 & Additional Mitigation – Non-Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	23	24a*	24b	25a*	25b	26	27	28	29	30	31
C01	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C02	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C03	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C04	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C05	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C06	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C07	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C08	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C10	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C26	-	Childcare Centre	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-	-	-	-

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results. Additional Mitigation Measures are only applicable when the receiver building is in use.

Yellow = LB
Amber = LB, M
Red = LB, M, SN, RO
Purple = LB, M, SN, IB, PC, RO

Table B-10 $L_{Aeq,15min}$ Construction Noise Predictions – Out-of-Hours Night NML Exceedances for Activities 23, 24a, 24b, 25a, 25b, 26, 27, 28, 29, 30, 31 & Additional Mitigation – Non-Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	23	24a*	24b	25a*	25b	26	27	28	29	30	31
C01	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C02	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C03	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C04	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C05	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C06	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C07	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C08	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C10	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-
C26	-	Childcare Centre	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-	-	-	-

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results. Additional Mitigation Measures are only applicable when the receiver building is in use.

- Yellow = LB
- Amber = LN, M, SN, RO
- Red = LB, M, SN, IB, PC, RO, AA
- Purple = LB, M, SN, IB, PC, RO, AA

Table B-11 L_{A1,1min} Maximum Construction Noise Predictions – Out-of-Hours Night - for Activities 23, 24a, 24b, 25a, 25b, 26, 27, 28, 29, 30, 31 – Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	RBL+15 NML	NPfl	RNP	-	23	24a*	24b	25a*	25b	26	27	28	29	30	31
R01	69 Carinya Ave	Residential	-	-	36	51	52	65	-	32	41	37	41	37	35	33	31	41	32	41
R02	65-67 Carinya Ave	Residential	-	-	36	51	52	65	-	34	42	39	42	39	37	35	30	43	34	43
R03	59 Carinya Ave	Residential	-	-	36	51	52	65	-	34	42	39	42	39	37	35	34	43	34	42
R04	43 Carinya Ave	Residential	-	-	36	51	52	65	-	39	47	44	47	44	42	40	39	48	39	50
R05	41 Carinya Ave	Residential	-	-	36	51	52	65	-	42	49	47	49	47	45	43	38	51	42	50
R06	9 Kungala St	Residential	-	-	36	51	52	65	-	37	45	42	45	42	40	38	40	46	37	46
R07	13 Benalong St	Residential	-	-	36	51	52	65	-	39	46	44	46	44	42	40	41	48	39	46
R08	7 Waratah St	Residential	-	-	36	51	52	65	-	37	44	42	44	42	40	38	37	46	37	47
R09	17 Araluen St	Residential	-	-	36	51	52	65	-	38	46	43	46	43	41	39	37	47	38	47
R10	14 Nariel St	Residential	-	-	36	51	52	65	-	30	39	35	39	35	33	31	30	39	30	38
R11	34-36 Phillip St	Residential	-	-	36	51	52	65	-	52	61	57	61	57	55	53	53	61	52	61
R12	36A Phillip St	Residential	-	-	36	51	52	65	-	56	65	61	65	61	59	57	56	65	56	64
R13	30 Phillip St	Residential	-	-	36	51	52	65	-	61	71	66	71	66	64	62	62	70	61	69
R14	7 Lethbridge St	Residential	-	-	36	51	52	65	-	78	88	83	88	83	81	79	75	87	78	89
R15	16 Phillip St	Residential	-	-	36	51	52	65	-	68	78	73	78	73	71	69	68	77	68	83
R16	8 Phillip St	Residential	-	-	36	51	52	65	-	58	68	63	68	63	61	59	59	67	58	68
R17	109 Glossop St	Residential	-	-	36	51	52	65	-	52	62	57	62	57	55	53	52	61	52	61
R18	1 Phillip St	Residential	-	-	36	51	52	65	-	50	60	55	60	55	53	51	50	59	50	60
R19	9 Phillip St	Residential	-	-	36	51	52	65	-	59	69	64	69	64	62	60	59	68	59	69
R20	19A Phillip St	Residential	-	-	36	51	52	65	-	73	82	78	82	78	76	74	71	82	73	87
R21	29 Phillip St	Residential	-	-	36	51	52	65	-	64	73	69	73	69	67	65	64	73	64	71
R22	2 Gidley St	Residential	-	-	36	51	52	65	-	42	49	47	49	47	45	43	40	51	42	53
R23	1 Ross Pl	Residential	-	-	36	51	52	65	-	43	50	48	50	48	46	44	45	52	43	51
R24	43 Little Chapel St	Residential	-	-	36	51	52	65	-	32	41	37	41	37	35	33	36	41	32	40
R25	20 Blair Ave	Residential	-	-	36	51	52	65	-	40	49	45	49	45	43	41	41	49	40	47
R26	3 Station St	Residential	-	-	36	51	52	65	-	46	54	51	54	51	49	47	44	55	46	56
R27	1 Station St	Residential	-	-	36	51	52	65	-	59	68	64	68	64	62	60	59	68	59	67
R28	1A Chesham St	Residential	-	-	36	51	52	65	-	55	63	60	63	60	58	56	52	64	55	63
R29	6 Chesham St	Residential	-	-	36	51	52	65	-	43	52	48	52	48	46	44	46	52	43	50
R30	10A Chesham St	Residential	-	-	36	51	52	65	-	32	42	37	42	37	35	33	32	41	32	39
C10#	St Mary's Hotel	Residential	-	-	36	51	52	65	-	32	41	37	41	37	35	33	30	41	32	41

Note: Only Activities 29 (Asphalt Works – Full Depth and Mill and Re-Sheet) and 30 (Line Marking) would not be undertaken during the night out-of-hours period.

The predicted L_{A1,1min} levels shown are considered to be approximately equivalent to L_{Amax} levels.

The amber shaded cells indicate exceedances of L_{Amax} 52 dBA recognised by the NPfl

The red shaded cells indicate levels in excess of the L_{Amax} 65 dBA level recognised by the NSW Road Noise Policy, based on a synopsis of research on sleep disturbance and awakenings.

Note that maximum noise levels are shown for all activities, however, only activities 29 (Asphalt Works – Full Depth and Mill and Re-Sheet) and 30 (Line Marking) would occur at night. It is expected that 3 to 5 out-of-hours shifts may be required to complete the identified works.

Community Consultation in accordance with the CNVS and the Out of Hours Works Protocol (SM-21-00306108) will be undertaken at potentially affected receivers and feedback from the receivers will be considered during scheduling of the works and respite offer outcomes implemented.

APPENDIX C

Predicted Construction Noise Contours



Noise Model Scenario 23 – Lethbridge Street Potholing (Standard Hours)



Noise Model Scenario 24a - Lethbridge Street Saw Cut Kerb and Gutter, Median Islands (Standard Hours)



Noise Model Scenario 24b - Lethbridge Street Demolish Kerb and Gutter, Median Islands



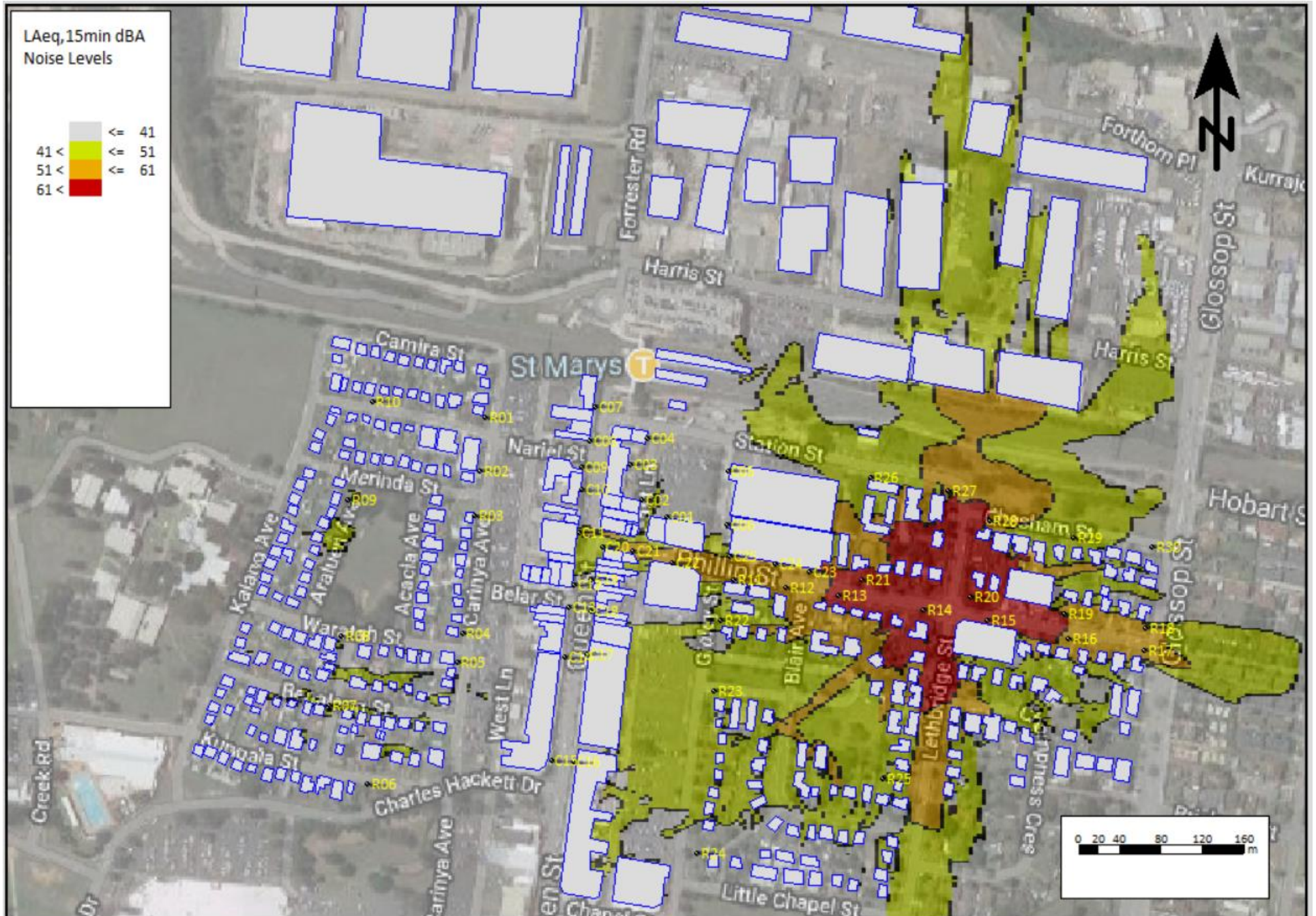
Noise Model Scenario 26 - Lethbridge Street Excavation (Standard Hours)



Noise Model Scenario 28 - Lethbridge Street Electrical Install Works (Standard Hours)



Noise Model Scenario 29 - Lethbridge Street Asphalt Works – Full Depth and Mill and Re-Sheet (Out-of-Hours)



Noise Model Scenario 30 - Lethbridge Street Line Marking (Out-of-Hours)



Noise Model Scenario 31 - Lethbridge Street Footpath Works (Standard Hours)



APPENDIX D

Community Consultation Report



Friday, 25 February 2022

REPORT

St Mary's Temporary Bus Interchange Project pedestrian works- Consultation

KEC was requested to notify properties possibly affected by noise and traffic changes from pedestrian works, both day and night, at the intersection of Phillip and Lethbridge Streets, St Marys, and provide offer of respite to reduce noise impacts to some selected properties.

As part of the consultation, KEC advised residents that to minimise noise impacts, as far as practicable the works would be undertaken during standard daytime hours. The residents were advised that during the standard hours works any highly noise intensive construction activities would be restricted to ensure noise respite would be provided. In this respect, any high noise works during standard hours would be undertaken in periods of up to three continuous hours, followed by a minimum of one hour of respite.

Additionally, residents were advised that it would be necessary to undertake some works out-of-hours during the night and that these works may be undertaken over up to five consecutive night shifts. For the most impacted residents respite offers have been discussed.

KEC was provided with two maps and lists of addresses:

1. Those affected and who needed to be offered a white noise machine and/or noise cancelling headphones to mitigate noise impacts
2. Those that needed to be notified that works were being undertaken and that they would be noisy during the day, and on up to five nights. These people were not as affected and were not being offered any respite.

It should be noted that all properties had been letterboxed the notification prior to our visit and we were reminding people of this and reinforcing the need to read the notification. We discussed the project hours and impacts and highlighted the contact number to call on the notification if there were any issues arising.

Overview

Residents were visited in St Marys on February 21 and 23, 2022 to inform them of upcoming day and some night works and to offer them white noise machines or noise cancelling headphones.

Properties are listed on the accompanying excel spreadsheet.

There were a few properties which were vacant.

- The apartments at 14 Philip St are all empty – the building is new community housing and has not been tenanted as yet. We spoke to the security officer, and he was unable to tell us when the tenanting would begin.

To be on the safe side we put the notification in the letterboxes there but not the mitigation forms.

- Four houses in Philip St (Lethbridge St corner towards town centre) are also vacant, and it appears that they may be slated for a development.

Unless otherwise shown on the accompanying spreadsheet, residents were given the relevant document and form or, if not home, the document was put under their door or, if the premises were locked and not accessible, into their letterbox.

Some people filled in the form and submitted them to us for forwarding when language or internet access/technology skills did not permit them to fulfil the instructions themselves.

In a few cases, properties were padlocked. One development at 34-36 Phillip St has security access. At two properties we deemed it unsafe to enter because of dereliction, hoarding, trash etc. At 3 Station St, all unit blocks were secured.

At 11-13 Phillip St there are two towers which are secured, and both are managed by Link Wentworth Housing.

We contacted Link Wentworth Housing who advised that they were able to assist us with tenants who were elderly and had no email. They undertook to complete forms (emailed to them) for those who wanted respite and submit them to us on tenants behalf.

Overall, the people we spoke to were pleasant and understanding, with very few concerns.

Issues

- Work being conducted by BDM has disturbed a number of snakes that have found their way into the gardens on Chesham St and there were complaints about that. We noted that the community contact number on the gate for the contractor of that project, BDM was painted over and advised our Project Manager who undertook to advise the Transport Project Manager of the issue.
- Some people had health or other issues which may deem it appropriate for them to receive both items.
- We received a compliment from a resident at 3 Station St about the noise cancelling headphones he had been given for previous works.
- There was one comment that the reversing tone on the construction vehicles at night was the most invasive of all the noises.
Some residents were very pleased to hear that there would be two pedestrian crossings as they were needed.



Kath Elliott
Director



APPENDIX B. OUT OF HOURS WORKS PROTOCOL



Sydney Metro Western Sydney Airport Out-of-hours Work Protocol

SM-21-00306108

Sydney Metro Integrated Management System (IMS)

Applicable to:	Sydney Metro Western Sydney Airport
Document Owner:	Environment Manager
System Owner:	Director Environment, Sustainability & Planning – Sydney Metro - Western Sydney Airport
Status:	Final
Version:	2.0
Date of issue:	8 November 2021
Review date:	
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1. Definitions and acronyms

All terminology in this document is taken to mean the generally accepted or dictionary definition. Other terms and jargon specific to this document are defined within the [SM-17-0000203 Sydney Metro glossary](#). Acronyms and terminology specifically used throughout this document are listed below.

	Definitions
CEMF	Construction Environment Management Framework https://icentral.tdocs.transport.nsw.gov.au/otcs/cs.exe/app/nodes/272123288
CNVS	Construction and Noise Standard https://icentral.tdocs.transport.nsw.gov.au/otcs/cs.exe/app/nodes/272123288
CNVMP	Construction Noise and Vibration Management Plan
CoA	Conditions of Approval
CSSI	Critical State Significant Infrastructure
DNVIS	Detailed Noise and Vibration Impact Statement
DPIE	Department of Planning, Industry and Environment (formerly DPE)
EIS	Environmental Impact Statement
EPA	Environment Protection Authority (of New South Wales)
EPL	Environment Protection Licence
ER	Environmental Representative
ICNG	<i>Interim Construction Noise Guideline</i> (DECC, 2009)
MOD	Modification (to a planning approval)
OOH	Out-of-hours (i.e. outside of the standard construction hours stipulated in planning approval conditions)
POEO Act	<i>Protection of the Environment Operations Act 1997</i> (NSW)
REMM	Revised Environmental Mitigation Measure
SBOEP	Small Business Owners Engagement Plan
Secretary	The Secretary of the New South Wales Department of Planning, Industry and Environment
SM-WSA	Sydney Metro - Western Sydney Airport

2. Introduction

This document outlines the process for preparing, considering, assessing, managing and approving work on the Sydney Metro - Western Sydney Airport project that is undertaken outside of standard construction hours (i.e. Out-of-hours) that are subject to the following Critical State Significant Infrastructure (CSSI) planning approvals:

- Sydney Metro - Western Sydney Airport (SSI_10051)

2.1. Purpose

This document has been developed to comply with various CSSI Conditions of Approval (CoAs)). Table 1 indicates where these requirements have been addressed.

Table 1: Out-of-hours Work CSSI CoAs

Condition Number	Condition	Where this condition is addressed
E37	<p>A detailed land use survey must be undertaken to confirm sensitive land use(s) (including critical working areas such as operating theatres and precision laboratories) potentially exposed to construction noise and vibration and construction ground-borne noise.</p> <p>The survey may be undertaken on a progressive basis but must be undertaken in any one area before the commencement of work which generates construction noise, vibration or ground-borne noise in that area.</p> <p>The results of the survey must be included in the Detailed Noise and Vibration Impact Statements required under Condition E47.</p>	<p>Section 2.3.2.3 Detailed Noise and Vibration Impact Statement Construction Noise and Vibration Standard</p>
E38	<p>Work must only be undertaken during the following hours:</p> <p>(a) 7:00am to 6:00pm Mondays to Fridays, inclusive;</p> <p>(b) 8:00am to 1:00pm Saturdays; and</p> <p>(c) at no time on Sundays or public holidays.</p>	<p>Section 3.0 Standard hours</p>
E39	<p>Except as permitted by an EPL or approved in accordance with the Out-of-Hours Works Protocol required by Condition E42, highly noise intensive work that result in an exceedance of the applicable NML at the same receiver must only be undertaken:</p> <p>(a) between the hours of 8:00 am to 6:00 pm Monday to Friday;</p> <p>(b) between the hours of 8:00 am to 1:00 pm Saturday; and</p> <p>(c) if continuously, then not exceeding three (3) hours, with a minimum cessation of work of not less than one (1) hour.</p> <p>For the purposes of this condition, 'continuously' includes any period during which there is less than one (1) hour between ceasing and recommencing any of the work.</p>	<p>Construction Noise and Vibration Standard</p>
E40	<p>This approval does not permit blasting.</p>	<p>Section 4.0 OOH Work</p>
E41	<p>Notwithstanding Conditions E38 and E39 work may be undertaken outside the hours specified in the following circumstances:</p> <p>(a) Safety and Emergencies, including:</p> <p>(i) for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or</p> <p>(ii) 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</p>	<p>Section 4.0 OOH Work Construction Noise and Vibration standard</p>

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	<p>(b) Low impact, including:</p> <p>(i) construction that causes LAeq(15 minute) noise levels:</p> <ul style="list-style-type: none"> • no more than 5 dB(A) above the rating background level at any residence in accordance with the ICNG, and • no more than the 'Noise affected' NMLs specified in Table 3 of the ICNG at other sensitive land user(s); and <p>(ii) construction that causes:</p> <ul style="list-style-type: none"> • continuous or impulsive vibration values, measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.2 of Assessing Vibration: a technical guideline (DEC, 2006), or • intermittent vibration values measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.4 of Assessing Vibration: a technical guideline (DEC, 2006); or <p>(c) By Approval, including:</p> <p>(i) where different construction hours are permitted or required under an EPL in force in respect of the CSSI; or</p> <p>(ii) works which are not subject to an EPL that are approved under an Out-of-Hours Work Protocol as required by Condition E42; or</p> <p>(iii) negotiated agreements with directly affected residents and sensitive land user(s); or</p> <p>(d) By Prescribed Activity, including:</p> <p>(i) tunnelling and ancillary support activities (excluding cut and cover tunnelling and surface works not directly supporting tunneling) are permitted 24 hours a day, seven days a week; or</p> <p>(ii) grout batching at the Orchard Hills construction site is permitted 24 hours per day, seven days per week; or</p> <p>(iii) delivery of material that is required to be delivered outside of standard construction hours in Condition E38 to directly support tunnelling activities, except between the hours 10:00 pm and 7:00 am to / from the Orchard Hills ancillary facility; or</p> <p>(iv) haulage of spoil generated through tunnelling is permitted 24 hours per day, seven days per week except between the hours of 10:00 pm and 7:00 am to / from the Orchard Hills construction site; or</p> <p>(v) works within an acoustic enclosure are permitted 24 hours a day, seven days a week where there is no exceedance of noise levels or intermittent vibration levels under Low impact circumstances identified in Condition E41(b), unless otherwise agreed with the Planning Secretary; or</p> <p>(vi) tunnel and underground station box fit out works are permitted 24 hours per day, seven days per week.</p> <p>On becoming aware of the need for emergency work in accordance with (a)(ii) above, the ER, the Planning Secretary and the EPA must be notified of the reasons for such work. The Proponent must use best endeavours to notify as soon as practicable all noise and/or vibration affected sensitive land user(s) of the likely impact and duration of those work.</p> <p>Notes:</p> <ol style="list-style-type: none"> 1. Tunnelling does not include station box excavation. 2. Tunnelling ancillary support activities includes logistics support and material handling and delivery 	
<p>E42</p>	<p>An Out-of-Hours Work Protocol must be prepared to identify a process for the consideration, management and approval of work (not subject to an EPL) that is outside the hours defined in Conditions E38 and E39. The Protocol must be approved by the Planning Secretary before commencement of the out-of-hours</p>	<p>This document Section 4.0 OOH Work Construction Noise and Vibration Standard</p>

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	<p>work. The Protocol must be prepared in consultation with the ER. The Protocol must provide:</p> <ul style="list-style-type: none"> (a) justification for why out-of-hours work need to occur; (b) identification of low and high-risk activities and an approval process and the section within this protocol ss that considers the risk of activities, proposed mitigation, management, and coordination, including where: <ul style="list-style-type: none"> (i) the ER reviews all proposed out-of-hours activities and confirms their risk levels; (ii) low risk activities that can be approved by the ER; and (iii) high risk activities that are approved by the Planning Secretary; (c) a process for the consideration of out-of-hours work against the relevant NML and vibration criteria; (d) a process for selecting and implementing mitigation measures for residual impacts in consultation with the community at each affected location, including respite periods consistent with the requirements of Condition E56. The measures must take into account the predicted noise levels and the likely frequency and duration of the out-of-hours works that sensitive land user(s) would be exposed to, including the number of noise awakening events; (e) procedures to facilitate the coordination of out-of-hours work including those approved by an EPL or undertaken by a third party, to ensure appropriate respite is provided; and (f) notification arrangements for affected receivers for all approved out-of-hours works and notification to the Planning Secretary of approved low risk out-of-hours works. <p>This condition does not apply if the requirements of Condition E41 are met</p> <p>Note: <i>Out-of-hours work is any work that occurs outside the construction hours identified in Condition E38 and E39.</i></p>	<p>4.2.2.6 Approval Notification Arrangements</p>
<p>E44</p>	<p>All reasonable and feasible mitigation measures must be applied when the following residential ground-borne noise levels are exceeded:</p> <ul style="list-style-type: none"> (a) evening (6:00 pm to 10:00 pm) — internal LAeq(15 minute): 40 dB(A); and (b) night (10:00 pm to 7:00 am) — internal LAeq(15 minute): 35 dB(A). <p>The mitigation measures must be outlined in the Noise and Vibration CEMP Sub-plan, including in any Out-of-Hours Work Protocol, required by Condition E42.</p>	<p>Section 2.3 Governance Section 4.5 Ground-borne noise level exceedance Construction Noise and Vibration Standard</p>
<p>E45</p>	<p>Noise generating work in the vicinity of potentially-affected community, religious, educational institutions and noise and vibration-sensitive businesses and critical working areas (such as theatres, laboratories and operating theatres) resulting in noise levels above the NMLs must not be timetabled within sensitive periods, unless other reasonable arrangements with the affected institutions are made at no cost to the affected institution.</p>	<p>Section 2.3 Governance Construction Noise and Vibration Standard</p>
<p>E47</p>	<p>Detailed Noise and Vibration Impact Statements (DNVIS) must be prepared for any work that may exceed the NMLs, vibration criteria and / or ground-borne noise levels specified in Conditions E43 and E44 at any residence outside construction hours identified in Condition E38, or where receivers will be highly noise affected or subject to vibration levels above those otherwise determined as appropriate by a suitably qualified structural engineer under Condition E87. The DNVIS must include specific mitigation measures identified through consultation with affected sensitive land user(s) and the mitigation measures must be implemented for</p>	<p>Section 2.3.2.3 Detailed Noise and Vibration Impact Statements Construction Noise and Vibration Standard</p>

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	<p>the duration of the works. A copy of the DNVIS must be provided to the ER before the commencement of the associated works. The Planning Secretary and the EPA may request a copy (ies) of the DNVIS.</p>	
E49	<p>Where sensitive land use(s) are identified in Appendix B as exceeding the highly noise affected criteria during typical case construction, mitigation measures must be implemented with the objective of reducing typical case construction noise below the highly noise affected criteria at each relevant sensitive landuse(s). Activities that would exceed highly noise affected criteria during typical case construction must not commence until the measures identified in this condition have been implemented, unless otherwise agreed with the Planning Secretary.</p> <p>Note: Mitigation measures may include path barrier controls such as acoustic sheds and/or noise walls, at-property treatment, or a combination of path and at-property treatment.</p>	<p>Section 2.3 Governance Construction Noise and Vibration Standard</p>
E57	<p>In order to undertake out-of-hours work outside the work hours specified under Condition E38, appropriate respite periods for the out-of-hours work must be identified 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:</p> <ul style="list-style-type: none"> (a) a progressive schedule for periods no less than three (3) months, of likely out-of-hours work; (b) a description of the potential work, location and duration of the out-of-hours work; (c) the noise characteristics and likely noise levels of the work; and (d) likely mitigation and management measures which aim to achieve the relevant NMLs under Condition E43 (including the circumstances of when respite or relocation offers will be available and details about how the affected community can access these offers). <p>The outcomes of the community consultation, the identified respite periods and the scheduling of the likely out-of-hour work must be provided to the ER, EPA and the Planning Secretary prior to the out-of-hours work commencing.</p> <p>Note: Respite periods can be any combination of days or hours where out-of-hours work would not be more than 5 dB(A) above the RBL at any residence.</p>	<p>Section 4.2.2 and 4.3 Communications Construction Noise and Vibration Standard</p>

2.2. Document Requirements

The Out-of-hours Work Protocol needs to meet the following consultation, endorsement and approval requirements in accordance with the Sydney Metro - Western Sydney Airport CoAs

- Be prepared in consultation with the Environmental Representative (ER); and
- Be approved by the Planning Secretary of the NSW Department of Planning, Industry and Environment (the Secretary).

These requirements were complied with as demonstrated in Sections 2.2.1.

2.2.1. ER Endorsements and Approval

This document has been prepared in consultation with and reviewed and endorsed by the ER. Copies of the ER endorsements are provided in Appendix A.

2.2.2. Secretary Approval

In accordance with CSSI 10051 CoA E42, construction will not commence for OOH works that are not subject to an EPL prior to this document's preparation and submission to the Secretary for approval.

2.3. Governance

This document should be used in conjunction with the Construction Environmental Management Framework, [https://icentral.tdocs.transport.nsw.gov.au/otcs/cs.exe/app/nodes/272116977_Construction Noise and Vibration Strategy](https://icentral.tdocs.transport.nsw.gov.au/otcs/cs.exe/app/nodes/272116977_Construction_Noise_and_Vibration_Strategy) and any applicable EPLs. These documents establish minimum requirements for managing noise and vibration impacts on the SM-WSA project.

2.3.1. Construction Environment Management Framework

The CSSI planning approval includes [SM-21-00279320 Construction Environment Management Framework](https://icentral.tdocs.transport.nsw.gov.au/otcs/cs.exe/app/nodes/272116977) <https://icentral.tdocs.transport.nsw.gov.au/otcs/cs.exe/app/nodes/272116977> in its documentation. The CEMF represents Sydney Metro's minimum requirements for environmental management and specifies a standard framework that each contractor must establish and document in their Construction Environmental Management Plan and sub-plans. These requirements, including those relating to construction noise and vibration management, are specified in Chapter 9.

2.3.2. Construction Noise and Vibration Standard

The Construction Noise and Vibration Standard (CNVS) <https://icentral.tdocs.transport.nsw.gov.au/otcs/cs.exe/app/nodes/272123288> establishes a framework for managing construction noise and vibration impacts and adopting appropriate mitigation measures (including minimum requirements);

- Is included in the CSSI planning approval documentation;
- Forms part of the contract requirements that contractors must comply with;

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- Defines a minimum standard for managing noise and vibration impacts that considers current best practice guidelines and other regulatory requirements; and
- Sets minimum requirements for all OOH work, including the need for and development of Construction Noise and Vibration Management Plans, Construction Noise and Vibration Impact Statements and Detailed Noise and Vibration Impact Statements.

2.3.2.1. Construction Noise and Vibration Management Plans

A Construction Noise and Vibration Management Plan (CNVMP) sets out how noise and vibration impacts will be mitigated and managed. These may also include a Noise & Vibration Monitoring Program, which typically outlines how noise and vibration monitoring will be undertaken, how the results of monitoring will be reported and procedures to identify and implement additional mitigation measures as necessary.

2.3.2.2. Detailed Noise and Vibration Impact Statement

A Detailed Noise and Vibration Impact Statement (DNVIS) is a document developed by Contractors which assesses and documents the anticipated noise and vibration impacts at receivers of proposed construction activities. In accordance with the CSSI planning approvals, a DNVIS is to be prepared for each construction site before construction noise and vibration impacts commence for any work that may exceed the NMLs, vibration criteria and / or ground-borne noise levels specified in Conditions E43 and E44 at any residence outside construction hours identified in Condition E38, or where receivers will be highly noise affected or subject to vibration levels above those otherwise determined as appropriate by a suitably qualified structural engineer under Condition E87.

The DNVIS must include specific mitigation measures identified through consultation with affected sensitive receivers. It also clarifies assumptions made in the EIS and allows the Contractor to provide more detailed quantitative assessments of the EIS due to their better understanding of the exact equipment list and construction methodology they will be using to complete the scope of works.

2.3.3. Environment Protection Licence

An Environment Protection Licence (EPL) is a regulatory approval issued to strategically control the localised, cumulative and acute impacts of pollution. The NSW Environment Protection Authority (EPA) is responsible for issuing EPLs for 'scheduled activities' under the Protection of the Environment Operations (POEO) Act 1997 (NSW).

Some aspects of the SM-WSA construction and operation works will constitute 'scheduled activities' under the POEO Act and therefore need to be subject to an EPL. SM-WSA contractors are required to either comply with Sydney Trains' EPL or obtain and comply with any EPLs as applicable to their scope of works.

The process for approving OOH work outside of those already permitted in accordance with an EPL, is governed by the conditions of the EPL. In order for these types of OOH work to be approved, an application to vary the EPL is to be prepared and submitted to the EPA for approval. The application is to be in accordance with the CNVS and EPL requirements.

OOH work that is subject to an EPL does not require an 'OOH approval' prior to the

commencement of the proposed OOH works in accordance with the CSSI planning approval conditions.

2.4. Roles and Responsibilities

2.4.1. Sydney Metro - Western Sydney Airport Director of Sustainability, Environment & Planning

The Sydney Metro - Western Sydney Airport Director of Sustainability, Environment & Planning is accountable for this document. Accountability includes authorising the document, monitoring its effectiveness and performing a formal document review.

Roles reporting to the Director are accountable for ensuring the requirements of this document are implemented within their area of responsibility. The roles that are accountable for specific projects/programs are accountable for ensuring associated contractors comply with the requirements of this document.

2.4.2. Sydney Metro Environment Manager

A Sydney Metro Environment Manager will be allocated to each contract package on the Sydney Metro - Western Sydney Airport project. The Environment Manager is responsible for ensuring that all environmental management requirements associated with their contract package are being complied with.

2.4.3. Place manager

Either a Sydney Metro or contractor Place Manager will be allocated to each site on the Sydney Metro - Western Sydney Airport project. The Place Manager is responsible for ensuring that all project communication requirements with the surrounding community are being complied with.

2.4.4. Independent Environmental Representative

The CSSI planning approval conditions under CoA A32 requires an Environmental Representative (ER) to be appointed to the project prior to work commencing. The ER is to act as an independent point of contact for all environmental and planning approval compliance matters. Refer to A32 for a comprehensive list of the ER's responsibilities under CSSI 10051.

Section 4.2.2 includes descriptions of the ER's responsibilities with respect to reviewing and approving OOH work.

3. Standard Hours

The SM-WSA CSSI planning approval conditions define standard construction hours as:

- 7:00am to 6:00pm Mondays to Fridays, inclusive;
- 8:00am to 1:00pm Saturdays for works and
- At no time on Sundays or public holidays.

Construction activity on the SM-WSA project must only be undertaken within these standard hours, unless otherwise permitted in accordance with this document or the conditions of an applicable EPL.

3.1. Covid Health Orders

Due to the Covid-19 pandemic affecting Sydney, the NSW Government has issued a number of Health Orders to assist in the population living through Covid. In order to assist infrastructure projects, the Government has issued the COVID Infrastructure Construction Work Days Order (2020-2020-75). This Order allows an infrastructure Project to work the following hours as Normal Hours:

- 7:00am to 6:00pm, Saturdays, Sundays or public holidays for works inclusive.

These Orders are subject to updates, with the latest update being:

Environmental Planning and Assessment (COVID-19 Development—Infrastructure Construction Work Days No. 2) Order 2020.

Condition 6 of this Order specifies the following for Infrastructure construction work days:

(1) The carrying out of any building work or work, or the demolition of a building or work, on a Saturday, Sunday or public holidays is development specified for this Order.

(2) The conditions specified for the development are that the development must—

(a) be the subject of an approval, and

(b) comply with all conditions of the approval other than any condition that restricts the hours of work or operation on a Saturday, Sunday or public holiday, and

(c) for work or operation on a Saturday, Sunday or public holiday—

(i) comply with the conditions of the approval that restrict the hours of work or operation on any other day as if the conditions applied to work or operation on a Saturday, Sunday or public holiday, and

(ii) not involve the carrying out of rock breaking, rock hammering, sheet piling, pile driving or similar activities during the hours of work or operation that would not be permitted but for this Order, and

(iii) take all feasible and reasonable measures to minimise noise.

These orders are for a finite time and may be updated again. The Project is to work to the conditions of any updates as they are issued.

4. OOH Work

Out-of-hours (OOH) work is defined as any work that is undertaken outside of standard construction hours.

CoA E40 applies to OOH work and is not allowed during normal or OOH.

In accordance with CoA E41 any type of OOH work is permitted to be undertaken on the SM-WSA project provided that it is subject to this document.

A list of work activities that may typically be undertaken OOH is provided below:

- (a) Work which could result in a high risk to construction personnel or public safety, based on a risk assessment carried out in accordance with AS/NZS ISO 31000:2009 “Risk Management Principles and Guidelines”; or
- (b) where the relevant road authority has advised the Proponent in writing that carrying out the activities could result in a high risk to road network operational performance; or
- (c) where the relevant utility service operator has advised the Proponent in writing that carrying out the activities could result in a high risk to the operation and integrity of the utility network; or
- (d) where the Transport for NSW Transport Management Centre (or other road authority) has advised the Proponent in writing that a road occupancy licence is required and will not be issued for the activities during the hours specified in Conditions E19 and E20; or
- (e) where Sydney Trains (or other rail authority) has advised the Proponent in writing that a Rail Possession is required.

All works that are proposed to be undertaken OOH and are subject to this document must be supported by a clear statement justifying the reason(s) why the work is being proposed to be undertaken OOH. Furthermore, this statement must demonstrate how the works are being scheduled in accordance with the following OOH work period prioritisation list:

1. Standard Hours.
2. Daytime OOH.
3. Evening OOH.
4. Night Time OOH.

Further guidance on the provision of justification is provided in the Out-of-hours application form (refer to Section 4.2.2). Normally, program acceleration is normally not a justifiable reason to undertake works OOH, however in these times of Covid, with health restrictions, program acceleration may be acceptable.

4.1. OOH Work Endorsement and Approval

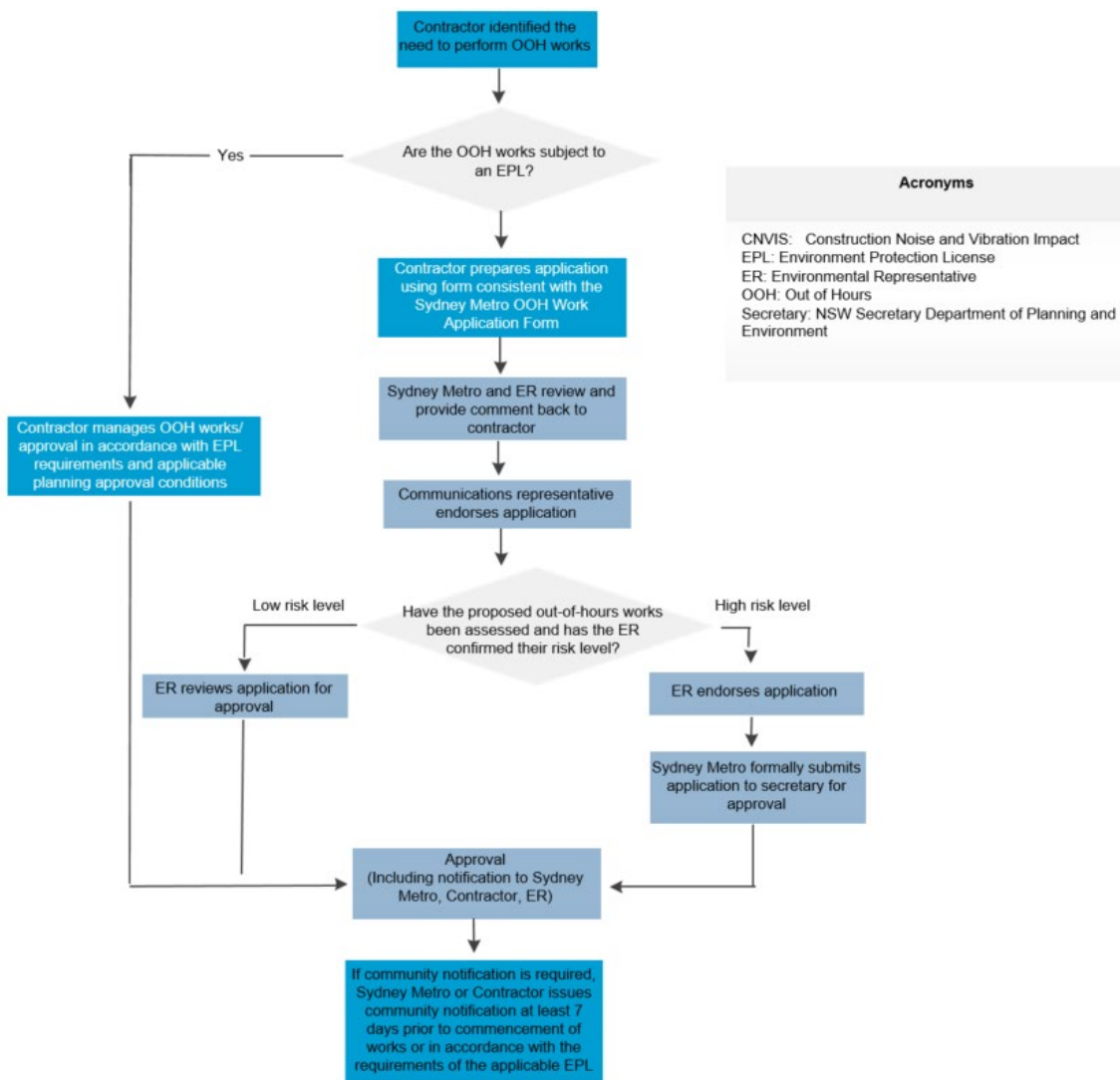
In accordance with CoA E42 and with the exception of OOH work that is subject to an EPL, all OOH work subject to the planning approval requires approval by either the ER, or in the case of ‘high risk’ works approval by the Secretary.

In accordance with CoA E42(b) OOH work that is subject to the planning approval and not subject to an EPL only require approval from the ER, or in the case of ‘high risk’ works approval by the Secretary.

4.2. OOH Work Approval Process

Figure 1 provides the OOH work approval process for the Sydney Metro - Western Sydney Airport project. This includes a requirement to prepare an application that covers the assessment of noise and vibration impacts, mitigation measures (including community notification requirements) and review and approval for all proposed OOH work.

All OOH work applications that are not subject to an EPL will be submitted to the Place Manager, Sydney Metro Environment Manager and ER for review and comment. These reviews will take into consideration a range of aspects, including reviewer experience and expert understanding, local knowledge of the area, current understanding of sensitive receiver requirements and other relevant documents (for example, the applicable SBOEP Plan detailing predicted impacts to affected businesses, key issues and appropriate mitigation measures for implementation). This review process is further explained in Section 4.2.2.



Acronyms
CNVIS: Construction Noise and Vibration Impact
EPL: Environment Protection License
ER: Environmental Representative
OOH: Out of Hours
Secretary: NSW Secretary Department of Planning and Environment

Figure 1: OOH Work Approval Process

4.2.1. OOH Work subject to an EPL

For OOH work that is subject to an EPL, the EPL conditions will dictate the approval process. As a minimum however, for proposed OOH work that is not approved within the EPL and a license variation is required, the contractor is expected to:

- Prepare an application to the EPA in accordance with the CNVS and EPL requirements;
- Submit the revised application to the EPA for approval and submit the application to the Place Manager, Sydney Metro Environment Manager and the ER for information;
- Notify Sydney Metro and ER upon receiving EPA approval; and
- Ensure any required community notifications have been issued (by either Sydney Metro or the contractor directly) within the timeframe(s) specified and in accordance with any relevant conditions of the EPL.

For individual OOH work applications that are subject to an EPL (including Sydney Trains' EPL), endorsement/approval from the ER is not required. However, Sydney Metro may request the ER's endorsement prior to approval and commencement of the proposed OOH works (at Sydney Metro's discretion).

4.2.2. OOH Work not subject to an EPL

For OOH work that is not subject to an EPL, the approval process is dictated by CoA E42.

Contractors are required to prepare an OOH application using a form consistent with Out-of-hours Work application form. This form requires a noise and vibration impact assessment to be undertaken and contains a consolidated and conservative version of Table 14 from the CNVS. This facilitates simpler consideration of applicable additional mitigation measures to implement. The form also requires demonstration of how a range of additional noise and vibration mitigation measures have been considered for implementation, including community notifications and respite offers. The applicant is also required to indicate its risk level for the proposed OOH work within the application.

Where Third Party permits (e.g. Road Occupancy Licences and/or rail possessions) require works to be undertaken OOH, these works will be exempt from classification as 'high risk' (described under section 4.2.2.3) and will be subject to approval by ER as required under CoA E42 in accordance with the 'Low Risk' approval pathway. Evidence of Third Party approval applicable to the works, specifying the time that the works must be undertaken must be included as part of application.

4.2.2.1. Respite

Respite offers for impacted receivers will be considered in accordance with the CNVS. Respite may be offered in the form of a reduction or absence of noise emissions for a period of time, or by removing the affected receiver from the noise emission point source (e.g. dinner/movie tickets and/or alternative accommodation offers).

The CNVS requires respite offers to be considered for all OOH works that are predicted to generate impacts higher than the applicable exceedance criteria for the applicable OOH period. Proposed OOH works must be coordinated to avoid the same receiver being affected over consecutive nights as much as is reasonable. OOH works must be staggered as much as is reasonable in order to maximise the respite period between OOH works.

If consideration of respite offers is required, a decision to implement respite offers will be determined on a case-by-case basis and considering, but not limited to, the following factors:

- The predicted maximum exceedance level;
- The predicted exceedance levels and associated duration and timings of those exceedance levels;
- The overall duration of the predicted exceedance levels;
- Surrounding land uses;
- Community feedback provided by Place Managers; and
- Any other OOH works (Sydney Metro or otherwise) that have affected or will affect the same receivers concurrently or within three days of either the start or end of the proposed OOH works.

In the event that respite is determined to be implemented for works that are subject to the planning approval, respite will be implemented to meet the intent of CoA E39 as applicable and so far is reasonable and practicable.

4.2.2.2. Review

Once the contractor has prepared an OOH work application, the application is submitted to the Place Manager, Sydney Metro Environment Manager, and ER for review. Any of the reviewers may provide comments on the application, which need to be adequately addressed by the contractor in a resubmitted application to the satisfaction of the comment provider(s).

4.2.2.3. Communications Endorsement and Default Risk Level Identification

The first endorsement of an OOH application is from the applicable communications representative (from Sydney Metro). This endorsement represents an agreement from the communications representative that the OOH works have been proposed in accordance with the relevant communications requirements and that the community's interests have been addressed as much as is reasonable (including appropriate consideration and implementation of additional mitigation measures, such as respite). This person may also add any comments and/or conditions that need to be complied with.

Following this person's endorsement, the ER is required to consider the applicant's risk level for the proposed OOH work and determine whether this risk level is appropriate. Once the ER has considered the applicant's risk level, the ER indicates the risk level of the proposed OOH work in its own professional judgement in accordance with CoA E42. This risk level will be categorised as either 'Low risk' or 'High risk'.

As a default risk level, OOH work will be categorised as 'high risk' if all of the following three criteria apply:

- The type and sensitivity of the affected noise sensitive receivers is categorised as either Moderate Impact receivers (e.g. standard residential/typical density) or High Impact receivers (e.g. elderly/high density/persistent complainers/residents experiencing construction noise fatigue); and
- The predicted noise level of the OOH work has a likelihood for potential sleep disturbance (i.e. Rating Background Level + 15 dB or more); and
- The type of and intensity of noise emitted from the OOH work is categorised as High Impact (e.g. prolonged high noise and/or vibration intensive activities), and

These criteria are based on Section 3.1 of the CNVS.

For non-residential receivers, OOH work may be considered as 'high risk' if undertaken during trading hours and in close proximity to their place of business (for example, during Saturday evening trading hours). Since each non-residential receiver has different business needs, it is imperative that the Place Manager and ER discuss each OOH work application to better understand how the proposed OOH work would impact the business.

4.2.2.4. Modification of Default Risk Level

Using the default risk level as a 'starting point', the ER will consider all other relevant factors in order to identify a final risk level. These relevant factors include:

- Those identified in Section 3.1 of the CNVS (noting that the reference to 'impact levels' is different from the 'risk level' with respect to CoA E42(b));
- Those listed in Table 2 of this document;
- Third Party permits; and
- Any other factors the ER considers relevant in their professional opinion.

These factors may cause the default risk level to be modified from either 'high risk' to 'low risk' (or vice-versa), as the ER deems appropriate in their professional opinion.

Once the ER has identified a final risk level for the OOH work application, the ER indicates the risk level on the application (including any risk identification commentary). Depending on the risk level that has been determined, the ER either signs and dates the OOHs application if works are determined to be low risk, or endorses the OOH application for Sydney Metro to formally submit the OOH application to the Planning secretary for approval.

4.2.2.5. Other Endorsements and Approval

Following the identification of risk level by the ER, the ER endorses the OOH work application and provides any conditions or comments. This endorsement represents an agreement from the ER that the OOH works have been proposed in accordance with the relevant requirements (as applicable to their respective roles) and that additional mitigation measures (including respite) have been appropriately considered and proposed for implementation.

If the ER identifies that the OOH work application is high risk, the application is forwarded to the Secretary for approval. This endorsement represents an agreement from the ER that the OOH works have been proposed in accordance with the relevant requirements and that additional mitigation measures (including respite) have been appropriately considered and proposed for implementation. Following the ER’s endorsement, the application is then formally submitted by Sydney Metro to the Secretary for approval in accordance with CoA E42.

For all other applications, the ER indicates their approval (or otherwise) on the application, including any conditions or comments, and forwards directly to Sydney Metro and the contractor.).

4.2.2.6. Approval Notification Arrangements

Community notifications for approved OOH applications (which include low risk OOHW) will be made available to the Secretary, the EPA and the community through the Sydney Metro website within five (5) days and not more than fourteen (14) days of the works commencing. The community will also be issued with hard-copy community notifications.

Table 2: Risk Level Considerations

		Risk Level Considerations
Predicted Noise Exceedance		Degree of predicted noise level exceedance above the Rating Background Level or Noise Management Level as appropriate
Certainty		Rating background levels, noise management levels or predicted noise impacts are not well understood
Past Experience		Nature of works are new, in a new location or have not been undertaken by the contractor on the project already
Negotiated Agreement with Sensitive Receivers		No negotiated agreement with sensitive receivers has been obtained in accordance with CoA E41
Exceeding residential ground-borne noise levels		Addressing potential evening and night-time exceedance levels of 40 and 35 dB (A) respectively
Potential Sleep Disturbance		Likely to generate potential sleep disturbance (Rating Background Level +15dB or greater)
Non-Residential Receivers		Impacted non-residential receivers operating during the same period of proposed OOH work
Special Events		The timing and location of special events in the area of the proposed OOH work may be scheduled at the same time or immediately before or after the special event (e.g. festivals, public gatherings, etc.)

Place Manager Feedback	Feedback from the Place Manager for the area will provide the AA and ER an understanding of the types and requirements of surrounding sensitive receivers.
Sensitive Receivers	Moderate impact sensitive receivers (e.g. standard residential, medium density receivers) or high impact sensitive receivers (e.g. residential home for the elderly, high density unit blocks, persistent complainers, residents deemed to have 'construction noise fatigue')
Timetabling noisy activities	Timetabling works with high noise levels to avoid sensitive times for receptors such as hospitals, community, religious, educational institutions and noise and vibration-sensitive businesses and critical working areas
High Impact Works	Prolonged high noise or vibration intensive activities
Other Impacts	Impacts other than noise and vibration impacts are likely to be generated (e.g. lighting, traffic, etc.)

4.3. Community Notifications

Community notifications are used as a mitigation measure for receivers of noise and vibration impacts from OOH work.

Community notifications usually comprise of letterbox-dropped or hand-distributed notification letters to identified stakeholders prior to the commencement of works. Communities are more likely to understand and accept the impacts from noise and vibration if they are provided with honest detailed information and commitments on mitigation measures to be implemented that are adhered to by the project prior to the works commencing.

Community notification requirements are included in the CNVS and outlined in the Community Communications Strategy for the SM-WSA project.

Community notification is an example of an additional mitigation measure that may be considered for implementation in accordance with the CNVS and the additional mitigation measure tables contained in SM-21-00306108 Out-of-hours work application form.

4.3.1. Negotiated Agreements with Sensitive Receivers

A negotiated agreement for particular OOH work may be formed with the potentially affected sensitive receivers in accordance with CoA E41 (c) (iii). These negotiated agreements would be undertaken and documented by either the contractor or Sydney Metro as part of an OOH application.

The negotiated agreement needs to reach a minimum 65% acceptance rate of those sensitive receivers that are contactable. 'Contactable' is defined as having received correspondence (either verbal or written) from receivers within a two week timeframe. The preparation of a DNVIS and the Place Manager will advise of potentially affected sensitive receivers to be contacted.

Upon ER approval of any OOH applications containing negotiated agreements, Sydney Metro will forward the negotiated agreement documentation to the Secretary for information at least one week prior to the OOH work commencing. In the event that community notification is required as a mitigation measure prior to the OOH work commencing, this would be undertaken at the same time (i.e. at least five days and not more than fourteen days prior to the works commencing).

4.4. Emergency Works

Occasionally there may be a need to undertake emergency works outside of standard work hours. In this situation, the works are permitted to proceed without prior approval, provided that the works were:

- Unforeseen, and
- Required to avoid injury or the loss of life, damage or loss of property or to prevent environmental harm.

Work 'over-runs' (i.e. work activities that have taken longer to complete than expected) are not emergency works, unless the continuation of the activity is required to 'avoid injury or the loss of life, damage or loss of property or to prevent environmental harm'.

Figure 2 outlines the emergency work process.

On becoming aware of the need to undertake emergency works, contractors must notify Sydney Metro, the Planning Secretary, the ER and the EPA (if it is required under an EPL if relevant) of the need to undertake the works. This notification should be in the form of a written email or text message to Sydney Metro and the ER. The requirements for notifying the EPA will be dictated in the conditions of the EPL if relevant.

As a form of mitigation, community notification is to be undertaken within two hours of the commencement of emergency works. These notifications will generally be prepared by the contractor using a small hand-written Sydney Metro template card for distribution to the immediate surrounding community. These cards will include the following details as a minimum:

- Scope;
- Location;
- Hours;
- Duration;
- Types of equipment to be used; and
- Likely impacts.

Within 24 hours of any emergency works commencing, the applicant is to provide a written emergency works report to Sydney Metro. The emergency works report is to include as a minimum:

- Date, time, duration and cause of the emergency;
- Description of emergency works undertaken;
- Mitigation measures implemented to address the impacts of the emergency works; and
- Actions/Measures taken or to be taken to prevent or mitigate recurrence of the emergency. If there are no appropriate actions/measures to be taken, explanation is to be provided as to why.

The emergency works report will be used by Sydney Metro to determine whether the works qualified as emergency works under the applicable planning approval. If Sydney Metro determines that the works did not qualify as emergency works, the works may be considered an incident and/or non-compliant dependent on the applicable planning approval conditions.

ACRONYMS	
EPA:	Environment Protection Authority (NSW)
EPL:	Environment Protection Licence
ER:	Environmental Representative
OOH:	Out of Hours

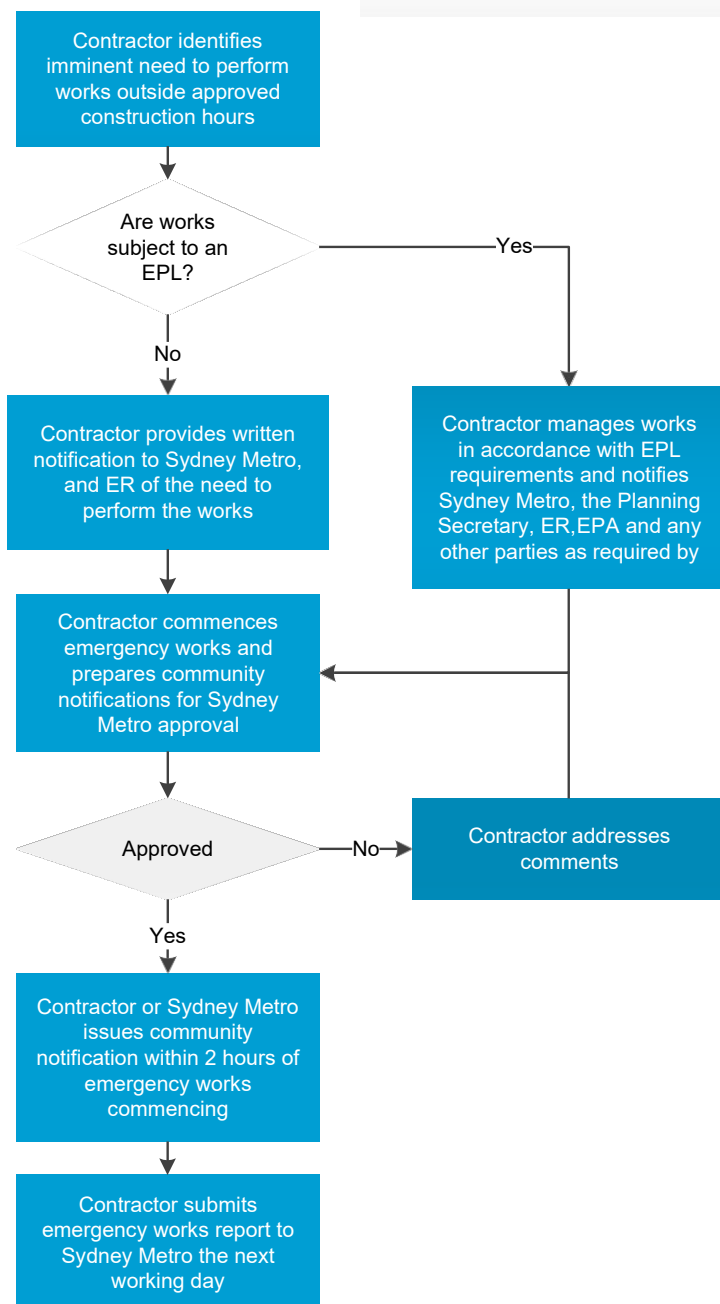


Figure 2: Emergency Works Process

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4.5. Ground-borne noise level exceedance

4.5.1. Ground-borne regenerated noise condition

All reasonable and feasible mitigation measures must be applied when the following residential ground-borne noise levels are exceeded:

- (a) evening (6:00 pm to 10:00 pm) — internal LAeq(15 minute): 40 dB(A); and
- (b) night (10:00 pm to 7:00 am) — internal LAeq(15 minute): 35 dB(A).

4.5.2. Ground-borne regenerated noise condition assessment

The evening and night-time criteria are only applicable to residential receivers.

The internal noise levels are to be assessed at the centre of the most-affected habitable room. For a limited number of discrete, ongoing ground-borne noise events, such as drilling or rock-hammering, The LAmax noise descriptor using a slow response on the sound level meter may be better than the LAeq noise descriptor (15 min) in describing the noise impacts. The level of mitigation of ground-borne noise would depend on the extent of impacts and also on the scale and duration of works. Any restriction on the days when construction work is allowed would take into account whether the community:

- Has identified times of day when they are more sensitive to noise (for example Sundays or public holidays).
- Is prepared to accept a longer construction duration in exchange for days of respite.

4.5.3. Mitigation measures

Due to the highly variable nature of construction activities and the likelihood of work outside the standard construction hours on Sydney Metro projects, some exceedances of the construction noise and vibration management levels are likely to be unavoidable. Where there is a potential exceedance of the construction noise and vibration management levels, 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 below. The additional mitigation measures to be applied are outlined in Table 3 below.

Table 3: 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.	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 are used to inform stakeholders about the impacts of high noise activities and mitigation measures that will be implemented. Communications representatives from the contractor would visit identified stakeholders at	IB

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	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	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.	RO
Phone calls and emails	Phone calls and/or emails detailing relevant information would be made to identified/affected stakeholders within 7 days of proposed work. 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 etc.	PC
Specific notifications	Specific notifications 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.	SN

4.5.4. Applying additional mitigation measures

Prior to the commencement of OOHW a detailed noise impact assessment shall be carried out. Mitigation measures shall be determined based on potential exceedances of the relevant NML.

In circumstances where following application of the standard mitigation measures, the LAeq(15minute) construction noise and vibration levels are still predicted to exceed the Noise Management Level, including ground-borne noise levels, the relevant Additional Mitigation Measures (AMM) are considered to determine any offset strategies for these impacts (Tables 4-6).

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 above the NML.

From the AMM table, identify the additional mitigation measures to be implemented (abbreviation codes are explained in Table 3).

Table 4: Additional Mitigation Measures – Airborne Construction Noise

Mitigation Measures		Predicted LAeq (15minute) noise level Above NML			
Time Period		0 to 10 dB	10 to 20 dB	20 to 30 dB	> 30 dB
		Standard	Mon-Fri (7.00 am - 6.00 pm)	-	LB
	Sat (8.00 am - 1.00 pm)				
	Sun/Pub Hol (Nil)				
OOHW (Evening)	Mon-Fri (6.00 pm - 10.00 pm)	LB	LB, M	LB, M, SN, RO	LB, M, SN, IB, PC, RO
	Sat (1.00 pm - 10.00 pm)				
	Sun/Pub Hol (8.00 am - 6.00 pm)				
OOHW (Night)	Mon-Fri (10.00 pm - 7.00 am)	LB	LB, M, SN, RO	LB, M, SN, IB, PC, RO, AA	LB, M, SN, IB, PC, RO, AA
	Sat (10.00 pm - 8.00 am)				
	Sun/Pub Hol (6.00 pm - 7.00 am)				

Table 5: Additional Mitigation Measures – Ground Borne Construction Noise

Mitigation Measures		Predicted LAeq (15minute) noise level Above NML		
Time Period		0 to 10 dB	10 to 20 dB	> 20 dB
		Standard	Mon-Fri (7.00 am - 6.00 pm)	No NML for GBN during standard hours, refer to Table 18
	Sat (8.00 am - 1.00 pm)			
	Sun/Pub Hol (Nil)			
OOHW (Evening)	Mon-Fri (6.00 pm - 10.00 pm)	LB	LB, M, SN	LB, M, SN, IB, PC, RO
	Sat (1.00 pm - 10.00 pm)			
	Sun/Pub Hol (8.00 am - 6.00 pm)			
OOHW (Night)	Mon-Fri (10.00 pm - 7.00 am)	LB, M, SN	LB, M, SN, IB, PC, RO, AA	LB, M, SN, IB, PC, RO, AA
	Sat (10.00 pm - 8.00 am)			
	Sun/Pub Hol (6.00 pm - 7.00 am)			

Table 6: Additional Mitigation Measures - Ground-borne Vibration

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

5. Related documents and references

Related documents and references

- [SM-17-0000022 Environment & Sustainability Management Manual](#)
- SM-21-00279320 Construction Environmental Management Framework
https://icentral.tdocs.transport.nsw.gov.au/otcs/cs.exe/app/nodes/272116977_
- [SM-21-00279321 Construction Noise and Vibration Standard](#)
<https://icentral.tdocs.transport.nsw.gov.au/otcs/cs.exe/app/nodes/272123288>
- [SM-21-00306108 Out-of-hours Work Application Form](#)
- [Overarching Community Communications Strategy](#)
https://www.sydneymetro.info/sites/default/files/document-library/Sydney_Metro_Overarching_Community_Communication_Strategy.pdf
- [EPA Interim Construction Noise Guideline](#)

6. Superseded documents

Superseded documents

There are no documents superseded as a result of this document.

7. Document history

Version	Date of approval	Notes
1.0	14 October 2021	New document
2.0	8 November 2021	DPIE RFI Review

5. Appendix A: OOH Work Strategy/Protocol Endorsements and Approval(s)

Out-of-hours work application form- SM-WSA

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 Sydney Metro - Western Sydney Airport out-of-hours works 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: Western Sydney Airport	
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: <ul style="list-style-type: none"> 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.
- **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 9pm 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 Detailed Noise & Vibration Impact Statement (DNVIS)? (Y/N)	
If 'N', skip this section and move to Section 4.	
State the title of the DNVIS and attach the section(s) describing the noise and vibration impacts of the proposed works as Appendix 3.	
<p>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.</p> <p>For Night Time OOH Period works, include a review of potential sleep disturbance impacts in accordance with Section 4.3 of the ICNG.</p>	<p>Worst-case predicted noise impact summary:</p> <ul style="list-style-type: none"> • • • <p>Worst-case predicted vibration impact summary:</p> <ul style="list-style-type: none"> • <p>Potential sleep disturbance summary (for night time OOH periods only):</p> <ul style="list-style-type: none"> •
<p>Using Table 4 and Table 5, indicate in Table 6:</p> <ul style="list-style-type: none"> • 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 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 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.

<p>Step 1: RBLs/NMLs</p>	<p>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.</p> <p>If no RBLs/NMLs have been established, use Table 1 to estimate and enter into Table 3.</p>
<p>Step 2: Predicted Anticipated Noise Levels</p>	<p>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.</p> <p>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.</p>
<p>Step 3: Exceedances and Mitigation Measures</p>	<p>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.</p>
<p>Step 4: Consideration of Additional Mitigation Measures</p>	<p>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.</p>

5. Standard Mitigation Measures	
<p>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):</p>	<ul style="list-style-type: none"> • • • •
<p>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):</p>	<ul style="list-style-type: none"> •

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)		
	Daytime OOH	Evening OOH	Night Time OOH
Residential			
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
<p>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) <u>Underline indicates vibratory generating plant/equipment</u></p>	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.
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)	<p>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):</p> <ul style="list-style-type: none"> - 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. <p>All notifications are emailed to all registered stakeholders on site-specific email distribution lists.</p>
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			

*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 Environmental Representative (if applicable).

7. 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?

8. 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.

9. Contractor’s Signature

Contractor’s Identification of Risk Level: If subject to Western Sydney Airport Sydney Metro planning approval and not subject to an EPL, provide Contractor’s Identification of Risk Level (refer to the <i>Western Sydney Airport Sydney Metro Protocol</i> for guidance).	Circle: LOW or HIGH
Contractor’s Signature:	
Name:	
Title:	
Contact Number:	
Date:	

10. Contractor’s Contact Details

Contractor Personnel	Name	Mobile
Manager Environment:		
Manager Communications:		
Contractor’s Representative:		
Contractor’s 24hr contact person:		

Planning Approval Determination Page

	Step 1 – Endorsement from Sydney Metro Director Project Communications or Contractor’s Communications Manager	Step 2 – Risk Identification/Endorsement from ER under the 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	<i>If not subject to an EPL, circle Risk Level as: LOW or HIGH If works are HIGH Risk Level Sydney Metro submits application to the Secretary of the NSW Department of Planning & Environment for approval.</i>	N/A
Signature:	<i>Approved Road Occupancy Licence/Road Opening Permit (if applicable) must be sighted prior to endorsement.</i>		
Name:			
Role:			
Date:			
Comments: (including ER Risk Level comments if applicable)			
Conditions:			

Generic Determination Page (i.e. not subject to SM-WSA planning approvals)

	Step 1 – Sydney Metro Director of Project Communications	Step 2 – Environmental Representative (may be optional depending on planning approval or contract requirements)	Step 3 – Sydney Metro Director of Planning, Environment & Sustainability (only required if not approved already)
Action:	Endorsement	Circle: Endorsement or Approval	Approval
Signature:	<i>Approved Road Occupancy Licence/Road Opening Permit (if applicable) must be sighted prior to endorsement.</i>		
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 C. KEY TERMS, ACRONYMS, ABBREVIATIONS, AND DEFINITIONS

Abbreviation	Title
BMS	Business Management System
CEMP	Contractor's Environmental Management Plan
EMS	Environmental Management System
DECC	Department of Environment and Climate Change
EPA	Environmental Protection Authority
EMR	Environmental Management Representative
EPA	Environmental Protection Authority
EWMS	Environmental Work Method Statement
CVMP	Construction Vibration Management Plan
OOHW	Out of Hours Works
PESCP	Progressive Erosion Sediment Control Plan
RBL	The Rating Background Level (RBL) for each period is the median value of the average background level (ABL) values for the period over all the days measured. There is therefore an RBL value for each period – daytime, evening, and night-time.
REF	Review of Environmental Factors
RMS	Roads & Maritime Services
TfNSW	Transport for New South Wales
Ward	Ward Civil & Environmental Engineering



APPENDIX K. ACHMP



APPENDIX L. ENVIRONMENTAL INSPECTION CHECKLIST (TEMPLATE)

Environmental Inspection Checklist – GWH



Date of Inspection		Time of Inspection	
Inspection Conducted By	(Name and Position)	Signature	
Inspection Site/ Area			
Activities Taking Place during the Inspection			
Weather Forecast			
Overall Site Inspection Rating			

Priority Class	Timeframe for Action	Overall Site Inspection Rating
I - Immediate	To be completed straight away, same day as identification	Poor – Immediate actions are required to bring site up to acceptable standard
H - High	To be completed within 24hrs	Satisfactory – Site does not pose a threat to the environmental however improvements can be made.
M - Medium	To be completed within 3 working days	Good – Site controls all in place and working effectively. Personnel know and practice their responsibilities
L - Low	To be completed within 5 working days	Excellent – Site controls are maintained effectively with initiatives being used to excel in environmental performance.
GP – Good practice	N/A	Site is demonstrating over and above controls and/or best practice initiatives

Environmental Inspection Checklist – GWH



No.	Item	✓	X	N/A	Comments and Actions	Priority Class (I/H/M/L)	Person Responsible	Close out
Site Access/ Egress								
1.	Stabilised driveway/cattle grids working effectively with no dirt and mud on roads?							
2.	Roads and gutters have been swept and kept free of dirt at the end of each day and prior to any rainfall event?							
Erosion and Sediment Controls								
3.	Are erosion and sediment controls on correct locations (as per relevant/ progressive ESCP) and are they working?							
4.	Have attempts been made to divert clean stormwater away from the site?							
5.	Sediment fences are maintained free of sediment deposits?							
6.	Are water treatment facilities being maintained correctly?							
Water Discharge								
7.	Is all standing water on site being tested, treated appropriately before being discharged or re-used? If dewatering - is dewatering permit in place, has it been approved by authorised personnel and is dewatering occurring in accordance with the permit?							
8.	Are on-site drains adequately protected? Are protection controls (geofabric / sediment bags etc.) in good condition?							

Environmental Inspection Checklist – GWH



No.	Item	✓	X	N/A	Comments and Actions	Priority Class (I/H/M/L)	Person Responsible	Close out
9.	Any water observed to be going off-site? If so, where? Specify quality / condition of water							
Stockpiles								
10.	Are all stockpiles located in approved, designated locations (5m away from any areas of concentrated water flows) and being maintained to ensure no sediment runoff i.e. sediment fences surrounding them?							
Concrete Wash Out								
11.	Is concrete being washed out in designated concrete washout areas and being maintained in good condition?							
Onsite Sewerage System								
12.	Are the tanks being pumped out regularly? Are all taps and fittings free from leaks?							
Hazardous Materials and Dangerous Goods								
13.	Are all hazardous materials or dangerous goods stored in bunded areas or hazardous goods containers? Are MSDS's available and current?							
14.	Is refuelling of mobile plant and equipment being undertaken in a safe manner (e.g. use of funnel, nozzle, spill kit)?							
15.	Are spill kits readily accessible on site and adequately stocked?							
16.	Are there any obvious signs of spills / leaks? If so, where?							

Environmental Inspection Checklist – GWH



No.	Item	✓	X	N/A	Comments and Actions	Priority Class (I/H/M/L)	Person Responsible	Close out
17.	Does the site contain contaminated land/soil or hazardous waste (ASS/PASS, asbestos) and is it being managed appropriately i.e. according to CEMP or specific sub-plans?							
Air Quality Controls								
18.	Is there an odour on site?							
19.	Are odour mitigation measures working effectively (i.e. deodorising system)							
20.	Is visible dust being generated by site work activities, stockpiles, internal roads or exposed surfaces?							
21.	Are dust controls in place and being performed regularly enough to be effective?							
22.	Are trucks carrying loose material entering or leaving the site covered?							
23.	Is plant and machinery on site producing visible emissions?							
Noise and Vibration Controls								
24.	Is high noise generating activities being undertaken on site? If so are necessary controls in place in accordance with approval and CEMP documents?							
25.	Are plant and site vehicles equipped with non-tonal reversing beepers							
26.	Are all works being undertaken between approved hours?							

Environmental Inspection Checklist – GWH

No.	Item	✓	X	N/A	Comments and Actions	Priority Class (I/H/M/L)	Person Responsible	Close out
27.	Are plant and site vehicles not in use switched off?							
28.	Are exclusion zones in place around the Sydney Desalination pipeline							
Flora and Fauna								
29.	No damage has occurred to retained vegetation and health maintained.							
30.	Are noxious weeds within work areas and are they being managed? Herbicide Record Form completed for weed spraying?							
31.	Have construction activities affected fauna species (e.g. kills, injuries)?							
Heritage Items								
32.	Has damage occurred to any heritage items since the last inspection?							
33.	Have any new heritage items been identified since the last inspection?							
Other Items								
34.	All equipment, materials, stockpiles etc. stored in designated areas and contained within the site boundary?							
35.	Was there any asbestos or suspected asbestos containing material on site?							
36.	Is the site left secure at the end of each day?							

Environmental Inspection Checklist – GWH



No.	Item	✓	X	N/A	Comments and Actions	Priority Class (I/H/M/L)	Person Responsible	Close out
Comments/ Description or Additional Items								



APPENDIX M. UNEXPECTED FINDS PROCEDURE

10/09/21

Procedure

UNEXPECTED FINDS PROCEDURE

St Marys – Temporary Bus Interchange

W-EN-PR-03

Version B

APPROVAL

Approver	Position	Approval Signature and Date
Patrick McMahon	Project manager	

DOCUMENT VERSION CONTROL

Version	Version Details	Author	Position	Reviewer(s)	Version Date
A	Draft for Review	Rowan Grace	Environmental coordinator	Uday Gorripatti	5/7/18
B	IFC	Rowan Grace	Environmental Manager	Patrick McMahon	24/11/21

Timeframe for review: Monthly or as required during construction period.

DOCUMENT AND RECORD CONTROL

Document control, including approval and the handling of superseded versions, shall be in accordance with the **Document Control** procedure.

REFERENCE TO SUPPORTING WARD DOCUMENTATION

Documents required to complete the tasks in this procedure are referenced in **bold** throughout the procedure. Refer to the Related Documents section for the corresponding document numbers.

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1. PURPOSE

The purpose of this document is to provide a procedure that coordinates the response to unexpected finds, regarding contamination, heritage and acid sulphate soils on Ward Civil and Environmental Engineering (Ward) projects.

2. DOCUMENT AUDIENCE

This document applies to all personnel, including managers, supervisors, casual, temporary or permanent employees, contractors, sub-contractors and visitors.

3. ROLES AND RESPONSIBILITY

Role	Responsibilities
Human Resources Manager (HR)	<ul style="list-style-type: none"> Maintenance of Business Training and Skills matrix and records Responsibility for storage of all associated medical records
Operations Manager (OM)	<ul style="list-style-type: none"> Responsibility to ensure appropriate resources are provided to implement this procedure and associated programmes.
Construction Manager (CM)	<ul style="list-style-type: none"> Responsibility to ensure this procedure is effectively implemented on an organisational level.
Project Manager (PM)	<ul style="list-style-type: none"> Ensure this procedure is effectively implemented on a project level Ensure all project staff are trained and comply with this procedure.
Superintendents/ Supervisors (S)	<ul style="list-style-type: none"> Ensure on-site activities associated with this procedure are implemented.
Health & Safety Manager (HSEQ)	<ul style="list-style-type: none"> Ensure this procedure remains current and relevant to the business operations.
Environmental Coordinator (EC)	<ul style="list-style-type: none"> Ensure this procedure is implemented effectively across Ward projects Perform inspections and audits to confirm implementation Assist in developing project specific methodologies to complement this procedure
Ward Personnel	<ul style="list-style-type: none"> Adhere to the steps described in this procedure Identify and notify the relevant manager of any potential hazards.

Environmental Officer	<ul style="list-style-type: none">• Provide advice to the business, particularly to project managers and the Operations Manager on Environmental requirements where required.
Client	<ul style="list-style-type: none">• Clients environmental representative

4. WHAT IS AN UNEXPECTED FIND

An unexpected find is a material that is foreign to the site that poses a threat to workers health and safety, poses a risk to the environment or is environmental significant (heritage).

The unexpected finds procedure is to be initiated if you see the following:

- visible soil surface staining or soils with unusual odour or appearance
- discolouration or oil sheen on surface or water or groundwater
- leachate, waste oil or drums of chemicals
- Suspected Asbestos Containing Materials
- An item that is not consistent with the soil

5. PROCEDURE: UNEXPECTED FIND

Discovery of suspected contamination/acid sulphate soils/asbestos.
 Note: if you see encounter asbestos refer to the unexpected finds procedure
 W-HS-PR-09

- **STOP WORK** in affected area,
- **Implement spill response strategies if required strategies to avoid escape into the environment**
- **Make the area safe, erect barriers and warning signs to prevent access.**
- **Call supervisor and notify all relevant staff to be informed of the find.**

- Contact the Environmental Coordinator (EC)
- EC to record incident and liaise with client environmental representative and enter an incident report
- Assessment of find by suitably qualified person to develop an action plan.

Is the area suitable for works to continue without remediation?

YES



- Measures to handle and manage the find will be developed and incorporated into the CEMP
- Works to proceed under supervision of EC

NO



Develop remediation action plan, including management of environmental risks in collaboration with client representative. This plan will outline handling, monitoring, disposal and validation requirements

Implement the action plan

Undertake site inspection by suitably qualified personnel to validate (clear) the impacted area

Only once the site is validated (cleared) can works recommence

Submit the validation report (clearance) to client, including monitoring, disposal and validation results

6. CONTINUOUS IMPROVEMENT

Following the implementation of the unexpected finds procedure, the Construction Environmental Management Plan (CEMP) and unexpected finds procedure will be reviewed with the purpose to update relevant management practices and identify opportunities for improvement.

The review is designed to:

- Identify areas of opportunity for improvement of environmental management and performance
- Determine the cause or causes of non-conformances and deficiencies
- Develop and implement a plan of corrective and preventative action to address any non-conformances and deficiencies
- Verify the effectiveness of the corrective and preventative actions
- Document any changes in procedures resulting from process improvement
- Make comparisons with objectives and targets.



END OF DOCUMENT



APPENDIX N. CONSISTENCY ASSESSMENT



Planning Approval Consistency Assessment Form

SM-17-00000111

Metro Body of Knowledge (MBoK)

Assessment name:	Roadworks on Phillip and Lethbridge Street: Alterations to bus and pedestrian facilities
Prepared by:	Cathy Lestrangle
Prepared for:	Sydney Metro, Sydney Roads
Assessment number:	SM001
Status:	Final
Version:	0.0
Planning approval:	SSI 10051 (SMWSA)
Date required:	October 2021
iCentral number:	SM-21-00400109
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For information – do not alter:

Applicable to:	Sydney Metro
Document Owner:	Director, Environment, Sustainability & Planning
System Owner:	Deputy Chief Executive, Operations, Customer & Place-making
Status:	Final
Version:	3.0
Date of issue:	27 November 2020
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The Planning Approval Consistency Assessment Form should be completed in accordance with [SM-17-00000103 Planning Approval Consistency Assessment Procedure](#).

1. Existing Approved Project

Planning approval reference details (Application/Document No. (including modifications)):

SSI_10051 Sydney Metro – Western Sydney Airport

Date of determination:

Instrument of Approval dated 23 July 2021

Type of planning approval:

Critical State Significant Infrastructure (CSSI)

Description of existing approved project you are assessing for consistency:

Roadworks on Phillip and Lethbridge Streets (assessed in the Sydney Metro – Western Sydney Airport [SMWSA] Environmental Impact Statement [EIS] and Submissions Report) includes permanent changes to on-street parking on Lethbridge Street, Queen Street and Phillip Street, St Marys, to allow for bus or construction vehicle movements along these streets.

The SMWSA EIS and Submissions Report also describes the various construction works including:

- temporary modifications to Phillip Street to facilitate egress for construction vehicles opposite Blair Avenue
- temporary removal of on-street car parking on Phillip Street (around 27 car park spaces) to facilitate bus routes to the temporary bus interchange at the Station Street car park
- temporary removal of on-street car parking on Lethbridge Street (around 16 car park spaces)
- some construction vehicles may need to temporarily use Lethbridge Street to access Phillip Street until heavy vehicle routes have been established within the construction footprint.

Relevant background information (including EIS, Submissions Report, MCoA):

- Sydney Metro – Western Sydney Airport Environmental Impact Statement, including accompanying technical papers (SMWSA EIS) (October 2020)
- Sydney Metro – Western Sydney Airport Submissions Report (April 2021)
- Instrument of Approval (SSI_10051) (dated 23 July 2021)

The above documents are available on the NSW planning portal here: <https://www.planningportal.nsw.gov.au/major-projects/project/35016>
All proposed works identified in this assessment would be undertaken in accordance with the mitigation measures identified in the SMWSA EIS, Submissions Report and the conditions of approval.

2. Description of proposed development/activity/works

Description or proposed activity/works.

The proposed works includes:

Permanent works

These works would be permanent and extend past the SMWSA construction period:

- provision of new permanent raised pedestrian crossings:
 - one on Phillip Street to the east of the intersection with Lethbridge Street including permanent removal of two car spaces
 - one on Lethbridge Street north of the intersection with Phillip Street including permanent removal of two car spaces
 - associated pedestrian fencing, installation of lighting poles, trench grates and drainage, adjustments to concrete islands and medians, pavement works, kerb adjustments and line-marking
- intersection upgrade works at the Phillip and Lethbridge Street intersection including removal of the existing islands to the north and east of the Phillip Street and Lethbridge Street and installation of new full depth pavement and chevron marking

Temporary works

These works would be temporary (about 5 years) and occur for the duration of SMWSA construction:

- provision of two new bus stops on Phillip Street for the temporary adjustment/relocation of bus services (routes and stops)
- adjustments to: kerb and gutter; line marking; concrete islands and medians, pavement works, street furniture; signage; utilities; and pedestrian paths and fencing to facilitate the works
- closure of Gidley Street pedestrian access during construction of the proposed works

The location of the works in shown in Figure 1 of Appendix A.

Describe ancillary activities, duration of work, working hours, machinery, staffing levels, impacts on utilities/authorities, wastes generated or hazardous substances/dangerous goods used

This work would be completed by Sydney Roads who are acting as a contractor for Sydney Metro. Sydney Roads will use an existing compound currently being used for their broader program of works in the area. The existing compound site is on Chesham Street. No other ancillary facilities are proposed.

The following plant and equipment may be used as part of the works:

- 5t excavator
- compactor
- two 12t Bogie tipper trucks
- concrete trucks
- asphalt paver
- bobcat and roller
- hand tools
- lighting equipment
- light utility vehicles

Up to 20 workers could be working onsite at any one time.

The works would require utility adjustments to allow for new lights to be installed over the pedestrian crossings, and some permanent drainage work may also be required to allow for kerb and gutter adjustments.

Waste generated during construction would primarily be from the demolition of the existing road to accommodate the works, for example removal of existing pavement, adjustments of medians, utilities works, and construction of road infrastructure. Waste materials would likely include: asphalt pavement; surplus construction and finishing materials such as fencing, concrete and paint; general office wastes such as paper, packaging, and food wastes; and sewage waste generated through the use of personnel facilities.

Fuel and paint would be used onsite.

3. Timeframe

When will the proposed change take place? For how long?

Works are estimated to commence late November – early December 2021 and take approximately four to five months to complete. The works would occur mostly as night shifts Mon – Fri 7:00pm – 5:00am to ensure the ongoing operation of the roads, and the safety of both workers and road users. However day shifts may also be required which would occur Mon – Fri 7:00am – 6:00pm. Any out of hours works (OOHW) would implement the requirements of the Sydney Metro Out Of Hours Works Protocol for the project.

The proposal does not include any changes to the construction timeframes required for the approved project.

4. Site description

Provide a description of the site on which the proposed works are to be carried out, including, Lot and Deposited Plan details, where available. Map to be included here or as an appendix. Detail of land owner.

Works would be carried out on Phillip Street and Lethbridge Street in the suburb of St Marys in the Penrith City Council local government area (LGA). Works would occur on:

- Phillip Street between Queen Street and Lethbridge Street
- Lethbridge Street between Station Street and Phillip Street.

The works are located within the road reserve and both roads are owned and maintained by Penrith City Council. The works are located outside the indicative construction footprint as shown in the SMWSA EIS and Submissions Report.

A figure showing the location of the work is provided in Appendix A.

5. Site Environmental Characteristics

Describe the environment (i.e., vegetation, nearby waterways, land use, surrounding land use), identify likely presence of protected flora/fauna and sensitive area.

The proposed works are located on Phillip and Lethbridge Street in the suburb of St Marys within the Penrith City Council LGA. St Marys is an urban area, and the land surrounding Phillip and Lethbridge are a mixture of B4 (Mixed Use) and R4 (High Density Residential).

The environment at Phillip and Lethbridge Street can be described as typical urban street scape. The roadway is bordered by gutters, footpaths, and nearby vegetation consists of planted street trees within the road reserve. There are no natural waterways within the site and rainfall runoff from the area enters stormwater pits located within the kerb side gutter. The western end of Phillip Street is bordered by commercial buildings and businesses and the eastern end and Lethbridge Street is bordered by residential properties. There is no known protected flora or fauna or other 'sensitive area' within the site.

Phillip Street is a sealed two-lane road, with one lane in each direction and street parking available on either side of the road. This parking is timed on the western end of Phillip Street near Queen Street. Lethbridge Street is a sealed two-lane road, with one lane in each direction and untimed street parking available on either side of the road. The intersection of Phillip and Lethbridge Street is a roundabout with four arms.

6. Justification for the proposed works

Address the need for the proposed works, whether there are alternatives to the proposed works (and why these are not appropriate), and the consequences with not proceeding with the proposed work.

The proposed works are required to ensure that the road network around St Marys can operate safely and efficiently, during and following construction of the SMWSA project.

Additional bus stops are required along Phillip Street as the new temporary bus interchange (TBI) that is being built as part of the Approved Project is smaller than the existing bus interchange and the additional bus stops are required to maintain the capacity of the existing interchange. The additional bus stops would be temporary (about 5 years) and in use for the duration of SMWSA construction.

Intersection upgrade works is required to facilitate new bus stops and routes, as well as to facilitate safe construction vehicle movements as some heavy vehicles may need to use Lethbridge Street to access Phillip Street during later stages of the Approved Project.

Permanent pedestrian crossings and pedestrian paths have been included in scope to provide safe access to the new bus stops and safe crossing across Phillip and Lethbridge Street. A temporary (5 year) pedestrian crossing option was originally proposed however Council requested that the pedestrian crossings were made permanent to maintain future pedestrian safety in the area.

A 'do-nothing' option was also considered for the works. This option involves leaving the Phillip and Lethbridge Street in their current state. The 'do-nothing' option was not considered a feasible alternative as it would not meet the necessary safety requirements and would reduce the capacity of the TBI compared to the existing bus interchange.

7. Environmental Benefit

Identify whether there are environmental benefits associated with the proposed works. If so, provide details:

There are socio economic benefits to the community through the proposed changed road and traffic conditions including new pedestrian crossings and provision of adequate bus stops to maintain current services.

8. Control Measures

Will a project and site specific EMP be prepared? Are appropriate control measures already identified in an existing EMP?

A Construction Environmental Management Plan (CEMP) would be completed for the works. The works would be undertaken in accordance with relevant project environmental performance outcomes and mitigation measures, as well as relevant CSSI conditions of approval.

The conditions most relevant to the proposed works include the following:

- Condition E42: An Out-of-Hours Work Protocol
- Condition E47: Detailed Noise and Vibration Impact Statements (DNVIS)
- Condition E64: Design Guidance and Standards - Lighting and Security
- Condition E119: Road traffic and safety (Permanent road works and safety audits)

9. Climate Change Impacts

Is the site likely to be adversely affected by the impacts of climate change? If yes, what adaptation/mitigation measures will be incorporated into the design?

The site is not within a flooding zone or within bushfire prone land but is likely to be affected by increases in temperature or extreme weather events. While some of the works are permanent, they are generally minor in nature so the consideration of climate change is minimal, however, all road designs are built to have a service life of a minimum of 20 years and these designs have considered the potential for a minor increase in temperature, rainfall, storm events and bush fires as part of the design consideration during this time period.

10. Impact Assessment – Construction

Attach supporting evidence in the Appendices if required. Make reference to the relevant Appendix if used.

Aspect	Nature and extent of impacts (negative and positive) during construction (if control measures implemented) of the proposed/activity, relative to the Approved Project	Proposed Control Measures in addition to project COA and REMMs	Minimal Impact Y/N	Endorsed	
				Y/N	Comments
Flora and fauna	<p>No vegetation or trees would be removed as part of the works and trees in the vicinity of construction would be protected.</p> <p>An existing street tree on the south-western corner of the Phillip/Lethbridge roundabout would be retained but may need pruning. Any pruning works would be undertaken in accordance with AS4373-2007 Pruning of amenity trees.</p> <p>No change from the approved project.</p>	No additional measures required.	Y	Y	
Water	<p>Similar to the Approved Project, the works have the potential to cause impacts to water quality through sediment and other pollutants such as fuel or paint and garbage entering the stormwater system but will be managed in accordance with existing measures.</p> <p>No change from the approved project.</p>	No additional measures required.	Y	Y	
Air quality	<p>Similar to the Approved Project, the works have the potential to cause impacts to air quality through dust generation from excavation, pavement removal, adjustments to concrete islands and emissions from plant and machinery</p> <p>Any emissions or dust generated by the works are anticipated to be localised and minimal and will be managed in accordance with existing measures.</p> <p>No change from the approved project.</p>	No additional measures required.	Y	Y	

<p>Noise and vibration</p>	<p>There are high density residential and commercial receivers adjacent or nearby to the works. The nearest residential receiver is approximately 10 metres from the works and the nearest commercial receiver is approximately five metres from the works. As the works would primarily take place as night works, the impact to commercial receivers is expected to be minimal.</p> <p><i>Construction Noise</i></p> <p>The noise and vibration assessment for the project is detailed in Chapter 10 of the SMWSA EIS and also in Technical Paper 2: Noise and vibration. The SMWSA EIS identified that the Phillip and Lethbridge Street are located within noise catchment area (NCA03). Scenario 1 (SC01) covers enabling works including transport network adjustments.</p> <p>Exceedances of noise management levels (NMLs) were predicted at sensitive residential receivers during Scenario 1. Noise impacts from the proposed works are expected to be consistent with this assessment.</p> <p>Noise and vibration would be managed through the Sydney Metro CNVS and existing project CoA (including preparation of a Detailed Noise and Vibration Impact Statement), performance outcomes, and revised environmental mitigation measures (REMMs).</p> <p><i>Traffic Noise</i></p> <p>During construction, heavy vehicles and buses would use Phillip and Lethbridge Street. The SMWSA EIS noise assessment has considered the noise impacts from these additional vehicle movements and concluded that construction road traffic noise levels are not predicted to exceed relevant Road Noise Policy noise criteria at St Marys.</p>	<p>No additional measures required.</p>	<p>Y</p>	<p>Y</p>	
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Aspect	Nature and extent of impacts (negative and positive) during construction (if control measures implemented) of the proposed/activity, relative to the Approved Project	Proposed Control Measures in addition to project COA and REMMs	Minimal Impact Y/N	Endorsed	
				Y/N	Comments
	<p><i>Construction vibration</i></p> <p>Construction activities require the use of vibration intensive equipment that may adversely impact the nearest sensitive receivers. Minimum working distances to sensitive receivers and for human response have been identified in Table 4-29 of Technical Paper 2: Noise and vibration for vibration intensive equipment. Where works occur within minimum safe working distances, reasonable and feasible mitigation would be considered in line with the Sydney Metro CNVS.</p>				
Aboriginal heritage	<p>No known Aboriginal heritage items or areas of sensitivity are present within the area and there is low potential for any to be encountered considering the disturbed nature of the site.</p> <p>No impacts to Aboriginal heritage are anticipated. Any unexpected finds would be managed as per the Sydney Metro Unexpected Heritage Finds Procedure and Exhumation Management Procedure</p> <p>No change from the approved project.</p>	No additional measures required.	Y	Y	
Non-Aboriginal heritage	<p>No known non-Aboriginal heritage items are present within the area and there is low potential for any archaeological relics to be encountered considering the disturbed nature of the site.</p> <p>No impacts to non-Aboriginal heritage are anticipated. Any unexpected finds would be managed as per the Sydney Metro Unexpected Heritage Finds Procedure and Exhumation Management Procedure.</p> <p>No change from the approved project.</p>	No additional measures required.	Y	Y	

Aspect	Nature and extent of impacts (negative and positive) during construction (if control measures implemented) of the proposed/activity, relative to the Approved Project	Proposed Control Measures in addition to project COA and REMMs	Minimal Impact Y/N	Endorsed	
				Y/N	Comments
Community and stakeholder	<p>Temporary construction noise, vibration, dust, and traffic may contribute to reduced local amenity for sensitive receivers. These impacts are addressed in other sections of this table.</p> <p>There are benefits to the community through changed road and traffic conditions including new pedestrian crossings and provision of adequate bus stops to maintain current services. It is anticipated that some customers requiring access to the new bus stops would need to walk longer distances to these stops however, the increase in walking distances is minimal.</p> <p>Nearby residents and businesses would be informed about the nature and timing of the work and provided with project contact details prior to works commencing in accordance with the projects Overarching Community Communications Strategy (OCCS) and contractor specific CCS.</p> <p>No change from the approved project.</p>	No additional measures required.	Y	Y	
Traffic	<p>Construction activities would result in temporary road network modifications, road closures and detours, and new bus facilities as well as potential impacts to pedestrian and cycling access.</p> <p>Re-routing of traffic during road closures may cause temporary disruption to community members, particularly those that live adjacent to the works. However, access to properties would be maintained at all times.</p> <p>Temporary loss of parking on Phillip and Lethbridge Street was assessed in the SMWSA EIS and the works would not result in any additional temporary parking loss during construction.</p>	No additional measures required	Y	Y	

Aspect	Nature and extent of impacts (negative and positive) during construction (if control measures implemented) of the proposed/activity, relative to the Approved Project	Proposed Control Measures in addition to project COA and REMMs	Minimal Impact Y/N	Endorsed	
				Y/N	Comments
Waste	The proposed works would cause a minor increase in the volume of waste generated. It is expected that this minor increase in waste can be managed appropriately by the existing conditions of approval, performance outcomes, and REMMs. No change from the approved project.	No additional measures required.	Y	Y	
Social	No change from the approved project.	No additional measures required.	Y	Y	
Economic	No change from the approved project.	No additional measures required.	Y	Y	
Visual	Similar to the Approved Project, there would be minor visual impacts associated with construction works, disturbed areas, fencing, plant and equipment and temporary safety measures such as road covers. These impacts would be temporary and disturbed areas would be stabilised and turfed (where relevant) at the end of construction works. Night works may result in light spill on neighbouring properties, but construction lighting would be designed and located to minimise light spill outside the construction site. It is expected that visual impacts can be managed appropriately by the existing conditions of approval and REMMs. No change from the approved project.	No additional measures required.	Y	Y	
Urban design	No change from the approved project.	No additional measures required.	Y	Y	
Geotechnical	No change from the approved project.	No additional measures required.	Y	Y	

Aspect	Nature and extent of impacts (negative and positive) during construction (if control measures implemented) of the proposed/activity, relative to the Approved Project	Proposed Control Measures in addition to project COA and REMMs	Minimal Impact Y/N	Endorsed	
				Y/N	Comments
Land use	There would be no change to land use.	No additional measures required.	Y	Y	
Climate Change	No change from the approved project.	No additional measures required.	Y	Y	
Risk	No change from the approved project.	No additional measures required.	Y	Y	
Other	No change from the approved project.	No additional measures required.	Y	Y	
Management and mitigation measures	The relevant project CoA, performance outcomes (PO), and REMMs are appropriate to manage the potential impacts associated with these works. No changes or additions to these CoA, POs and REMMs are required.	No additional measures required.	Y	Y	

11. Impact Assessment – Operation

Attach supporting evidence in the Appendix if required. Make reference to the relevant Appendix if used.

Aspect	Nature and extent of impacts (negative and positive) during operation (if control measures implemented) of the proposed activity/works, relative to the Approved Project	Proposed Control Measures in addition to project COA and REMMs	Minimal Impact Y/N	Endorsed	
				Y/N	Comments
Flora and fauna	No change from the approved project.	No additional measures required.	Y	Y	
Water	No change from the approved project.	No additional measures required.	Y	Y	
Air quality	No change from the approved project.	No additional measures required.	Y	Y	
Noise vibration	Permanent works including the raised pedestrian crossings and intersection upgrade works are not anticipated to increase the level of traffic or decrease the distance between the road network and receivers. Operational road traffic noise levels are not anticipated to exceed relevant Road Noise Policy noise criteria as a result of the works.	No additional measures required.	Y	Y	
Aboriginal heritage	No change from the approved project.	No additional measures required.	Y	Y	
Non-Aboriginal heritage	No change from the approved project.	No additional measures required.	Y	Y	
Community and stakeholder	Operation of the proposed works would have positive community impacts by creating safe crossings for pedestrians. Operational traffic and transport impacts are discussed below.	No additional measures required.	Y	Y	

Aspect	Nature and extent of impacts (negative and positive) during operation (if control measures implemented) of the proposed activity/works, relative to the Approved Project	Proposed Control Measures in addition to project COA and REMMs	Minimal Impact Y/N	Endorsed	
				Y/N	Comments
Traffic	<p>Inclusion of permanent raised pedestrian crossings and intersection upgrade works would require the permanent removal of four untimed on-street car parking spaces. However, the works would result in improved safety of the Phillip and Lethbridge Street intersection.</p> <p>The works would also include permanent removal of pedestrian access along Gidley Street. Other pedestrian routes with similar travel times are available including routes along East Lane and Queen Street.</p>	No additional measures required.	Y	Y	
Waste	No change from the approved project.	No additional measures required.	Y	Y	
Social	No change from the approved project.	No additional measures required.	Y	Y	
Economic	No change from the approved project.	No additional measures required.	Y	Y	
Visual	<p>The proposed works would include the introduction of new road elements such as new pedestrian crossings and changes to the Phillip Street and Lethbridge Street intersection. These elements are considered consistent with the existing road environment.</p> <p>Operation would also include additional lighting of the pedestrian crossings these would be designed to minimise light spill.</p> <p>No change from the approved project.</p>	No additional measures required.	Y	Y	
Urban design	No change from the approved project.	No additional measures required.	Y	Y	
Geotechnical	No change from the approved project.	No additional measures required.	Y	Y	

Aspect	Nature and extent of impacts (negative and positive) during operation (if control measures implemented) of the proposed activity/works, relative to the Approved Project	Proposed Control Measures in addition to project COA and REMMs	Minimal Impact Y/N	Endorsed	
				Y/N	Comments
Land use	No change from the approved project.	No additional measures required.	Y	Y	
Climate Change	No change from the approved project.	No additional measures required.	Y	Y	
Risk	No change from the approved project.	No additional measures required.	Y	Y	
Other	No change from the approved project.	No additional measures required.	Y	Y	
Management and mitigation measures	The relevant project CoA, POs, and REMMs are appropriate to manage the potential impacts associated with these works. No changes or additions to these CoA, POs and REMMs are required.	No additional measures required.	Y	Y	

12. Consistency with the Approved Project

<p>Based on a review and understanding of the existing Approved Project and the proposed modifications, is there is a transformation of the Project?</p>	<p>The proposed works would not transform the existing Approved Project. The Approved Project would continue to provide a new metro rail line between St Marys and Aerotropolis Core (the area known as Bradfield).</p> <p>The Approved Project included transport network adjustments to facilitate bus routes and construction vehicle movements.</p>
<p>Is the project as modified consistent with the objectives and functions of the Approved Project as a whole?</p>	<p>The proposed works would be consistent with the objectives and functions of the Approved Project as it would allow safe vehicle and pedestrian movements in the area and maintain the capacity of the existing bus interchange which is required to be moved to facilitate construction of the Approved Project.</p>
<p>Is the project as modified consistent with the objectives and functions of elements of the Approved Project?</p>	<p>The changes identified in this assessment are consistent with the objectives and functions of the elements of the Approved Project.</p> <p>One of the performance outcomes for the Approved Project is: <i>'safe and efficient routes are provided for pedestrians, cyclists and road users at/near construction sites'</i>.</p>
<p>Are there any new environmental impacts as a result of the proposed works/modifications?</p>	<p>There would be impacts along Phillip and Lethbridge Street however these impacts are consistent with those assessed as part of the Approved Project and all impacts can be adequately addressed through the application of the relevant project CoA, POs, procedures, and REMMs.</p> <p>There would be no new impacts as a result of the proposed works.</p>
<p>Is the project as modified consistent with the conditions of approval?</p>	<p>The proposed works would be consistent with the CoA and does not require additional conditions or any existing conditions to be changed.</p>
<p>Are the impacts of the proposed activity/works known and understood?</p>	<p>The impacts of the proposed works are known and understood.</p>
<p>Are the impacts of the proposed activity/works able to be managed so as not to have an adverse impact?</p>	<p>The impacts of the proposed works would be managed so as to avoid an adverse impact by implementing the project CoA, POs, procedures, and REMMs.</p>

13. Other Environmental Approvals

Identify all other approvals required for the project:

OOHW application

Author certification

To be completed by person preparing checklist.

I certify that to the best of my knowledge this Consistency Checklist:

- Examines and takes into account the fullest extent possible all matters affecting or likely to affect the environment as a result of activities associated with the Proposed Revision; and
- Examines the consistency of the Proposed Revision with the Approved Project; is accurate in all material respects and does not omit any material information.

Name:	Cathy Lestrangle	Signature:	
Title:	Manager Planning Approvals		
Company:	Sydney Metro	Date:	14/10/2021

This section is for Sydney Metro only.

Application supported and submitted by

Name:	Yvette Buchli	Date:	14/10/2021
Title:	Associate Director, Planning Approvals	Comments:	
Signature:			

Based on the above assessment, are the impacts and scope of the proposed activity/modification consistent with the existing Approved Project?

- Yes The proposed activity/works are consistent and no further assessment is required.
- No The proposed works/activity is not consistent with the Approved Project. A modification or a new activity approval/ consent is required. Advise Project Manager of appropriate alternative planning approvals pathway to be undertaken.

Endorsed by			
Name:	Hugh Chapman	Date:	27/10/2021
Title:	Director ESP, Western Sydney Airport	Comments:	
Signature:			



Appendix A

Site Location



Figure 1 – Site of the proposed works, the project boundary is marked with a red dashed line (Source: SixMaps, 2020)

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