

Air Quality Management Plan

Transport for NSW

Supply, Operate, Maintain (SOM) Package

Parramatta Light Rail

October 2023

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Glossary/ Abbreviations

Abbreviations	Expanded text
AQMP	Air Quality Management Plan
BOCC	Back up Operations Control Centre
BoM	Australian Government Bureau of Meteorology
CAF	Construcciones y Auxiliar de Ferrocarriles
CBD	Central Business District
CEMP	Construction Environmental Management Plan
CoA	Conditions of Approval
CSSI	Critical State Significant Infrastructure
DPE	NSW Department of Planning and Environment
DPI	NSW Department of Primary Industries
ECM	Environmental Control Map
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EPA	NSW Environment Protection Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
GRCLR	Great River City Light Rail
LORAC	Laing O'Rourke Australia
LRV	Light Rail Vehicles
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
PLR	Parramatta Light Rail – Stage 1 (Westmead to Carlingford)
PM _{2.5}	Particulate matter (≤2.5 µm diameter)
PM ₁₀	Particulate matter (≤10 µm diameter)
Project, the	Parramatta Light Rail Supply, Operate, Maintain (Package 5)
REMMM	Revised Environmental Mitigation and Management Measure

Abbreviations	Expanded text
SaMF	Stabling and Maintenance Facility
SOM	Supply, Operate, Maintain
SPIR	Submissions and Preferred Infrastructure Report
TPS	Traction Power Substations
TSP	Total suspended particulates

1 Introduction

1.1 Context

This Air Quality Management Plan (AQMP or Plan) forms part of the Construction Environmental Management Plan (CEMP) for the Parramatta Light Rail (PLR) Supply, Operate and Maintain (SOM) Contract (Package 5).

PLR is one of the NSW Government's major infrastructure projects being delivered to serve a growing Sydney. PLR will connect Westmead to Carlingford via Parramatta Central Business District (CBD) and Camellia. PLR is expected to be operational in 2024. More detailed description of the overall PLR project is provided in Section 1.2.

The PLR project received planning approval on the 29 May 2018 (SSI 8285) and has been subsequently modified twice with approvals issued on 21 December 2018 and 25 January 2019, respectively. This AQMP has been prepared to address the requirements of the Minister's Conditions of Approval (CoA) and the revised environmental mitigation and management measures (REMMM) listed in the *Parramatta Light Rail Stage 1 Westmead to Carlingford via Parramatta CBD and Camellia Environmental Impact Statement (EIS)*, as amended by the *Parramatta Light Rail (Stage 1) Westmead to Carlingford via Parramatta CBD and Camellia Submissions Report (incorporating Preferred Infrastructure Report)* (February 2018) (SPIR), Environment Protection Licence (EPL) 21606, and all applicable legislation.

1.2 Background and project description

PLR will create new communities, connect great places and help both local residents and visitors move around and explore what the region has to offer. The route will link Parramatta's CBD and train station to a number of key locations, including the Westmead Precinct, the Parramatta North Growth Centre, the new Western Sydney Stadium, the Camellia Town Centre, the new Powerhouse Museum and Riverside Theatre arts and cultural precinct, the private and social housing redevelopment at Telopea, the Rosehill Gardens Racecourse and the three Western Sydney University campuses.

In summary, the key features of the PLR include:

- A new dual track light rail network of approximately twelve (12) kilometres in length, including approximately seven (7) kilometres within the existing road corridor and approximately five (5) kilometres within the existing Carlingford Line and Sandown Line, replacing current heavy rail services
- Sixteen (16) stops that are fully accessible and integrated into the urban environment including a terminus stop at each end of Westmead and Carlingford
- High frequency 'turn-up-and-go' services operating seven days a week from 5am to 1am. Weekday services will operate approximately every 7.5 minutes in the peak period between 7am and 7pm
- Modern and comfortable air-conditioned light rail vehicles, nominally 45 metres long and driver-operated, each carrying up to 300 passengers.
- Intermodal interchanges with existing public transport services at Westmead terminus, Parramatta CBD and the Carlingford terminus
- Creation of two light rail and pedestrian zones (no general vehicle access) within the Parramatta CBD along Church Street (generally between Market Street and Macquarie Street) and along Macquarie Street (generally between Horwood Place and Smith Street)

- A Stabling and Maintenance Facility (SaMF) located in Camellia for light rail vehicles to be stabled, cleaned and maintained
- New bridge structures along the alignment including over James Ruse Drive and Clay Cliff Creek, Parramatta River (near the Cumberland Hospital), Kissing Point Road and Vineyard Creek, Rydalmere
- Alterations to the existing road network including line marking, additional traffic lanes and turning lanes, new traffic signals, and changes to traffic flows
- Relocation and protection of existing utilities
- Public domain and urban design works along the corridor and at Stop precincts
- Closure of the heavy rail line between Carlingford and Clyde
- Active transport corridors and additional urban design features along sections of the alignment and within Stop precincts
- Integration with the Opal Electronic Ticketing System (ETS)
- Real time information in light rail vehicles and at Stops via visual displays and audio.

An overview of Parramatta Light Rail Stage 1 route is shown in Figure 1-1.

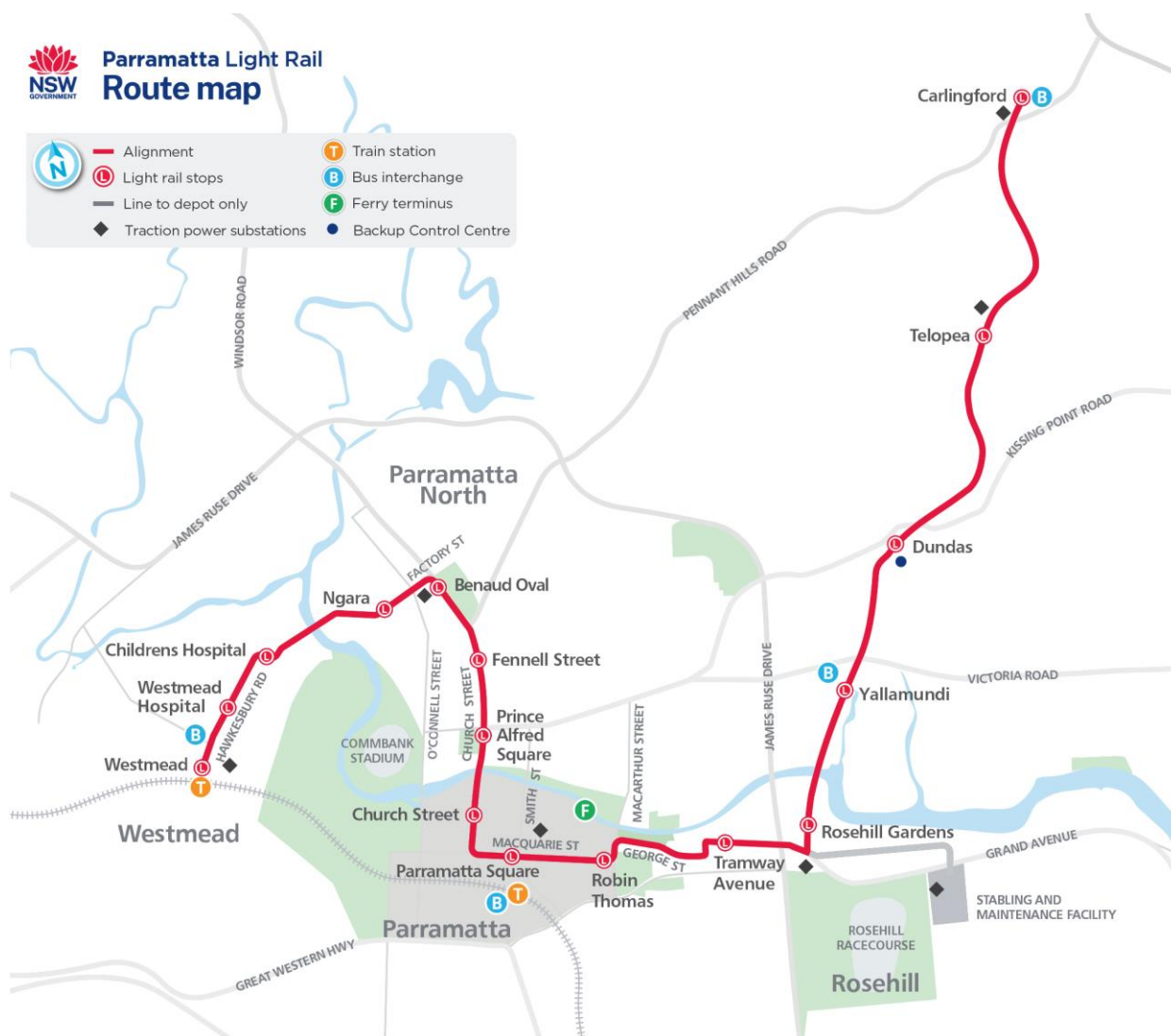


Figure 1-1: Parramatta Light Rail route

1.2.1 Statutory Context

PLR has been subject to environmental impact assessment under the *Environmental Planning and Assessment Act 1979* (EP&A Act). It is classified as Critical State Significant Infrastructure (CSSI). Detailed environmental impact assessments have been carried out and approved by the Minister for Planning.

1.2.2 PLR Planning Approval

The Parramatta Light Rail was approved by the Minister for Planning on 29 May 2018, under Section 5.19 of the *Environmental Planning and Assessment Act (EP&A Act) 1979*. An environmental impact statement (EIS) was prepared as part of the infrastructure application (SSI-8285) as a submissions and preferred infrastructure report (SPIR) following public exhibition of the EIS.

The Infrastructure Approval has subsequently been modified under Section 5.25 of the EP&A Act, with approvals issued on 21 December 2018 and 25 January 2019, respectively. The modifications related to changes to conditions of approval (CoA) not the physical description of PLR.

The Infrastructure Approval, modifications and related environmental assessment documents can be found at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=8285.

The remediation of 6 Grand Avenue, Camellia was assessed under Division 5.1 of the EP&A Act via a Review of Environmental Factors (TfNSW October 2017) with Transport for NSW the proponent and the determining authority. The REF was determined, and the remediation approved to proceed in December 2017.

1.3 Staging of the PLR works

The PLR comprises approximately 12km alignment from Westmead to Carlingford via Camellia and consists of a mix of both on-street and dedicated corridor.

PLR is being delivered under five delivery packages as detailed in the Staging Report:

- Enabling Works (Package 1) – Local road network improvements including O’Connell Street and George Street (off-alignment)
- Westmead Precinct Works (Package 2) – Hawkesbury Road widening and demolition at Cumberland Hospital (east and west Campus)
- Early Works (Package 3) – Remediation of the Stabling and Maintenance Facility (SaMF)
- Infrastructure Works (Package 4) – Design and construction of civil works, public domain and light rail infrastructure up to road level/top of rail and to the top of the concrete slab at stops, including provision of utility services (excluding high-voltage power supply and cabling for rail systems), and decommissioning of the T6 Carlingford Line
- Supply Operate and Maintain Works (Package 5) – The Project (subject of this Plan) Design and construction of the light rail systems, high-voltage power supply and stops above slab level, the supply of light rail vehicles, and the design and construction of the SaMF, including all light rail operations, customer service and asset management.

Each package of work is to be delivered under separate contracts on behalf of the proponent Transport for NSW (TfNSW). While the packages will commence at different times under separate construction approvals, there will be periods during which the packages works will overlap. The interactions between the packages are shown in Figure 1-2.

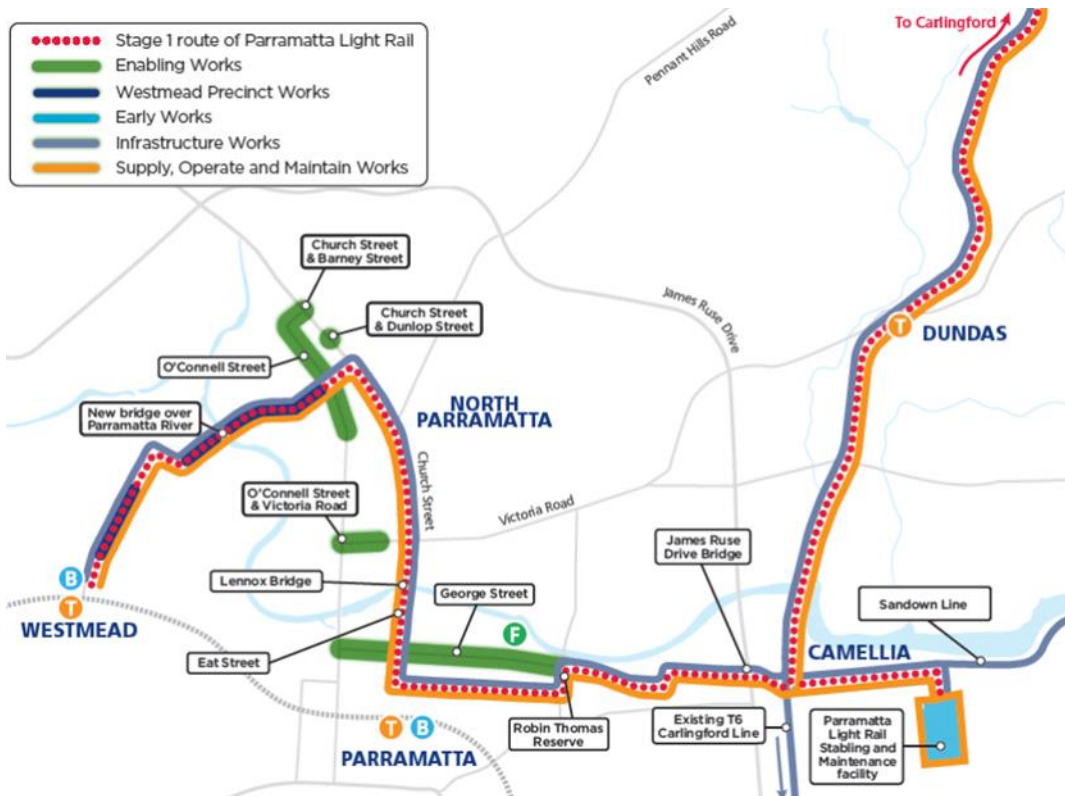


Figure 1-2: Parramatta Light Rail Delivery Package Interface

1.4 Project description for Supply, Operate and Maintain - Package 5

As System Integrator for PLR, the SOM Contractor's activities include:

- Delivery activities
- Light rail vehicle procurement
- Operation and maintenance.

The delivery activities include all investigation, selection, specification, design, approvals, construction, manufacture, installation, testing & commissioning, operational readiness and activities to transition from the delivery phase to the operations phase.

In summary the package includes the following. Figure 1-3 details these activities.

- All works above and additional to the platform concrete foundation slab at all stops
- Stabling and maintenance facility
- Central control system
- Light rail signalling system
- Elements of the road intersection signalling system
- Communications and passenger information systems
- Power Supply system
- Procurement of light rail vehicles (LRV)
- Testing and Commissioning
- Maintenance plant and machinery for the LRVs

- Earthing & bonding, electrolysis and electromagnetic compatibility
- Electronic ticketing system for top up or ticket machine and fixed location reader.

Great River City Light Rail (GRCLR) is responsible for the delivery of the SOM works for PLR. GRCLR has sub-contracted out the supply component of these works to Construcciones y Auxiliar de Ferrocarriles (CAF) who has engaged Thales, General Electric and Laing O'Rourke Australia (LORAC) to undertake the design and construction activities associated with the supply component of the works, which includes the design and construction related activities including testing and commissioning, and excludes all operational and maintenance activities.

GRCLR is the owner of the Construction Environmental Management Plan (CEMP) and Plans, and is responsible for ensuring implementation of and compliance by all subcontractors during construction works of the SOM package, which include the construction of the light rail systems (including high-voltage power supply), stops above slab level, as well as the stabling and maintenance facility. Further detail on the SOM construction works is provided below.

1.4.1 Stops

Light rail stops would be constructed after the Infrastructure Contractor has completed the stop slabs and access, with works at each stop commencing progressively after the completion of the adjacent linear segment of track infrastructure. There are sixteen stops that would be constructed. The stops will be in the following locations:

- Westmead
- Westmead Hospital
- Childrens Hospital (Westmead)
- Ngara (Cumberland Hospital)
- Benaud Oval (Factory Street)
- Fennell Street
- Prince Alfred Square
- Church Street
- Parramatta Square
- Robin Thomas (Harris Street)
- Tramway Avenue
- Rosehill Gardens (Camellia)
- Yallamundi (Rydalmere)
- Dundas
- Telopea
- Carlingford.

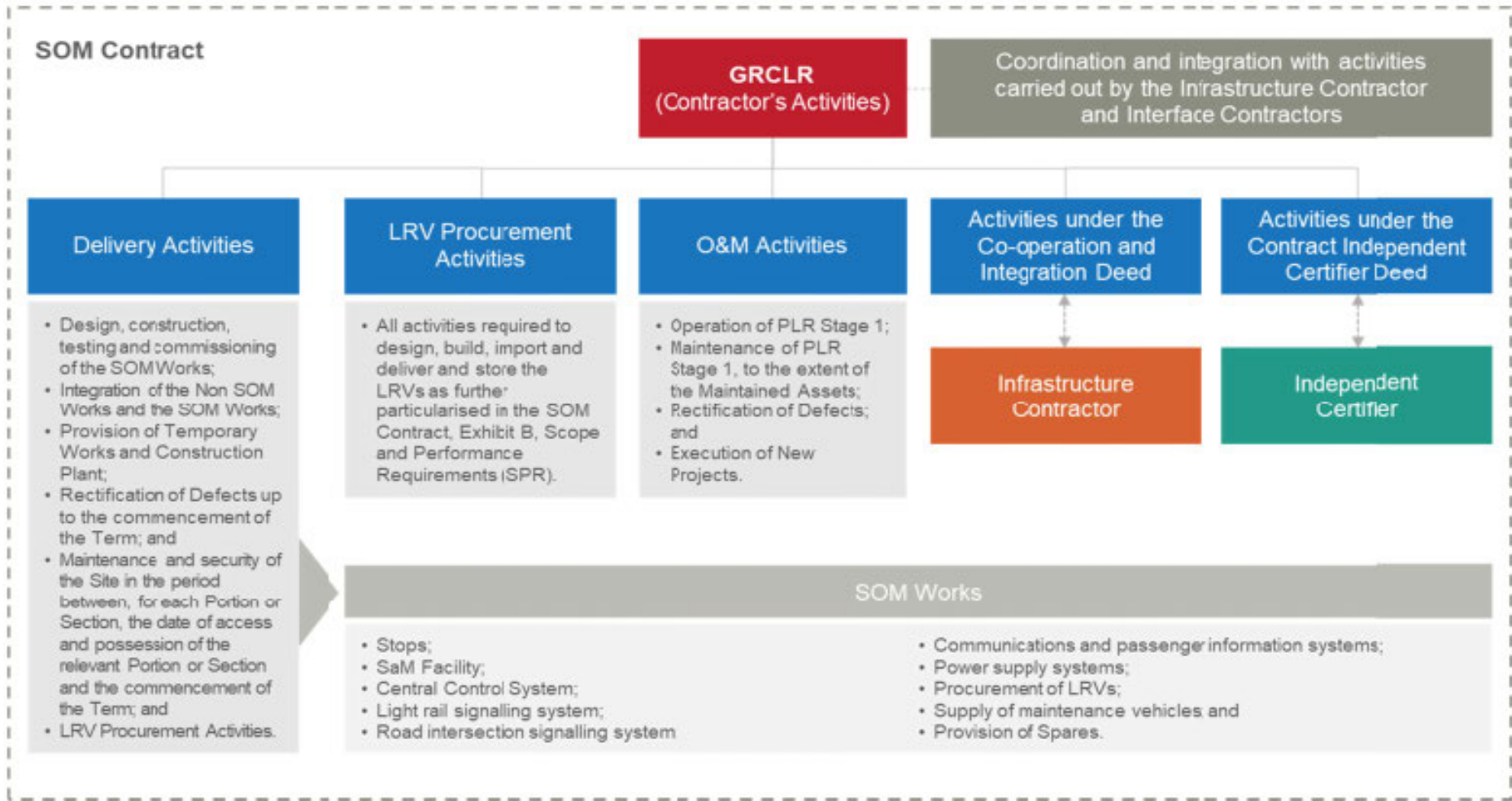


Figure 1-3: SOM contract activities for PLR

1.4.2 Stabling and maintenance facility

A stabling and maintenance facility (SaMF) will be constructed at 6 Grand Avenue, Camellia on a former industrial site adjacent to the Rosehill Gardens Racecourse. The facility will provide for maintenance, repair, refurbishing, upgrading, stabling, cleaning of light rail vehicles and a base for infrastructure maintenance activities and will operate 24 hours a day and 7 days a week.

Administration and staff facilities, as well as the operations control centre for the light rail network, will be located within the maintenance building. Parking for staff and visitors will be provided on site, including maintenance vehicle parking. An electrical substation will be located at the site to power the facility and light rail.

This site is referred to as Area of Environmental Interest (AEI) 27 in the Parramatta Light Rail (Stage 1) Westmead to Carlingford via Parramatta CBD and Camellia Environmental Impact Statement.

The site has undergone subsurface remediation works to render the site suitable for its proposed land use as a stabling and maintenance facility. This has removed all vegetation from the site. GRCLR will receive the site cleared of vegetation and with an unsealed capping layer.

The Local heritage listed tram alignment (I6) passes adjacent to the northern end of the site. Grand Avenue lies within the curtilage of the heritage tram alignment.

This site is to be used as the main SOM project compound. The facility will be established following completion of ground remediation works and capping of the site, which will be completed by others. GRCLR will receive the site along with a validation certificate from an EPA Accredited Site Auditor. Prior to establishment, the ground will be managed to minimise dust emissions.

The type and extent of works to construct the SaMF are summarised in Table 1-1.

Table 1-1 - Type and extent of works to construct the SaMF.

Type of works	Works extent
Site establishment	<ul style="list-style-type: none">• Site office and amenities during construction
Earthworks and subsurface works	<ul style="list-style-type: none">• Combined service route• Drainage• Hydraulics (sewer, water, fire)
Civil works	<ul style="list-style-type: none">• Fencing• Service roads• Footpaths• Carparks• Landscaping• Substation – TPS 8
Rail Systems	<ul style="list-style-type: none">• Track• Overhead wiring• DC feeders

Type of works	Works extent
Structures	<ul style="list-style-type: none"> Administration and Maintenance building (construction of foundation and slab, structural frame, roofing and cladding, MEP fit out, finishes) Outbuildings (fire pump house, sanding plant building, cleaners store, train wash building)
Operations Control Centre	<ul style="list-style-type: none"> Construction of foundation and slab, structural frame, roofing and cladding, MEP fit out, finishes Fire pump house, sanding plant building, cleaners store, train wash building
Rail stops	none

1.4.3 Substations

Traction Power Substations (TPS) would generally comprise prefabricated structures, which are manufactured off-site. On-site works would typically comprise excavation, foundation preparation and construction, and the installation of conduits and other in-situ works (i.e. electrical works) prior to the installation of the prefabricated substation building and security fencing surrounding the site. Note that the demolition of existing buildings and vegetation removal at TPS sites will be undertaken by the Infrastructure Contractor and is outside of the scope of this Plan.

1.4.4 Rail systems

The installation of rail systems would include the installation of overhead wiring and jewellery, rail signalling and associated infrastructure and systems. The overhead wiring structures and footings will be constructed by the Infrastructure Contractor, as will be the combined services route within which the rail systems conduits will be installed. The OHW Structures and footings within the Project will be constructed by SOM.

A Backup Operations Control Centre (BOCC) will be constructed adjacent to Dundas Station on the corner of Dudley Street and Calder Road, Dundas. Table 5.1 provides the construction activities being undertaken at the BOCC site.

1.4.5 Testing and Commissioning

The Testing and Commissioning (T&C) phase of Parramatta Light Rail – Stage 1 Supply, Operate, Maintain, Package 5 (SOM) includes the introduction of Light Rail Vehicles (LRVs) to the alignment, LRV testing and ramp-up to operational readiness, including a 28-day trial run period.

T&C is considered to be a ‘construction’ activity under the Infrastructure Approval (SSI-8285) and Environmental Protection Licence (EPL) 21606 and the subordinate management system framework. However, as T&C also incorporates movements of LRVs along the alignment, some approval conditions relating to rolling stock also apply. Therefore, T&C activities straddle ‘construction’ and ‘operation’ in a way that other SOM activities do not.

Key T&C activities (not necessarily in chronological order) include:

- A. Introduction of LRVs to the alignment:
 - i. Static testing of LRVs at the SaMF
 - ii. Localised infrastructure tests on the alignment without LRVs
 - iii. Running an LRV during the daytime from SaMF to Carlingford.
- B. Increased LRV running, incorporating:
 - i. Dynamic testing at the SaMF, including main depot interfaces

- ii. Initial dynamic testing along the alignment (SaMF to Carlingford) with traffic controls
 - iii. LRV integration testing with signalling and communications system (SaMF to Carlingford)
 - iv. Initial dynamic testing along the alignment (Westmead to Tramway Avenue) with traffic controls, including movements near Cumberland Hospital
 - v. Broader dynamic testing along the alignment without traffic controls
 - vi. Driver training.
- C. Trial running on the alignment.
- i. Full schedule trial running (28 days, 0500 to 0100).

1.5 Scope of the Plan

This AQMP applies to the scope of construction works for the construction of Package 5 Activity A (Stabling and Maintenance Facility) and Activity B (remaining SOM works), as per the PLR Staging Report. Referred to as the Project.

The AQMP applies to the construction of the stabling and maintenance facility (SaMF) and the remainder of the SOM works for the alignment, including Stops, Traction Power Stations (TPS), Back-up Operations and Control Centre (BOCC), and other sites (i.e. full SOM scope or construction works).

The AQMP is applicable to all activities during construction, including all areas where physical works will occur, or areas that may be otherwise impacted by the construction works, and which are under the control of the GRCLR. All GRCLR staff and sub-contractors are required to operate fully under the requirements of this Plan and related environmental management plans, over the full duration of the construction program.

1.6 Relationship with relevant work packages

1.6.1 Infrastructure contractor – Parramatta Connect (Package 4)

The Infrastructure Works is closely aligned to the Package 5, Supply, Operate and Maintain (SOM) Works. A graphical representation of the split in scope between the two packages is depicted in Figure 1-3. The reason for dividing this work into two packages is to ensure that suitably qualified and experienced sub-contractors are in place for each specialised component; civil infrastructure, and operational systems. The Infrastructure Works will deliver the civil infrastructure components and will not trigger the operational conditions, except for those that relate to detailed design.

An interface between the two packages has been established to monitor cumulative impacts and the coordination of environmental complaints management, site management controls, and the delineation of incident reporting and non-compliance management.

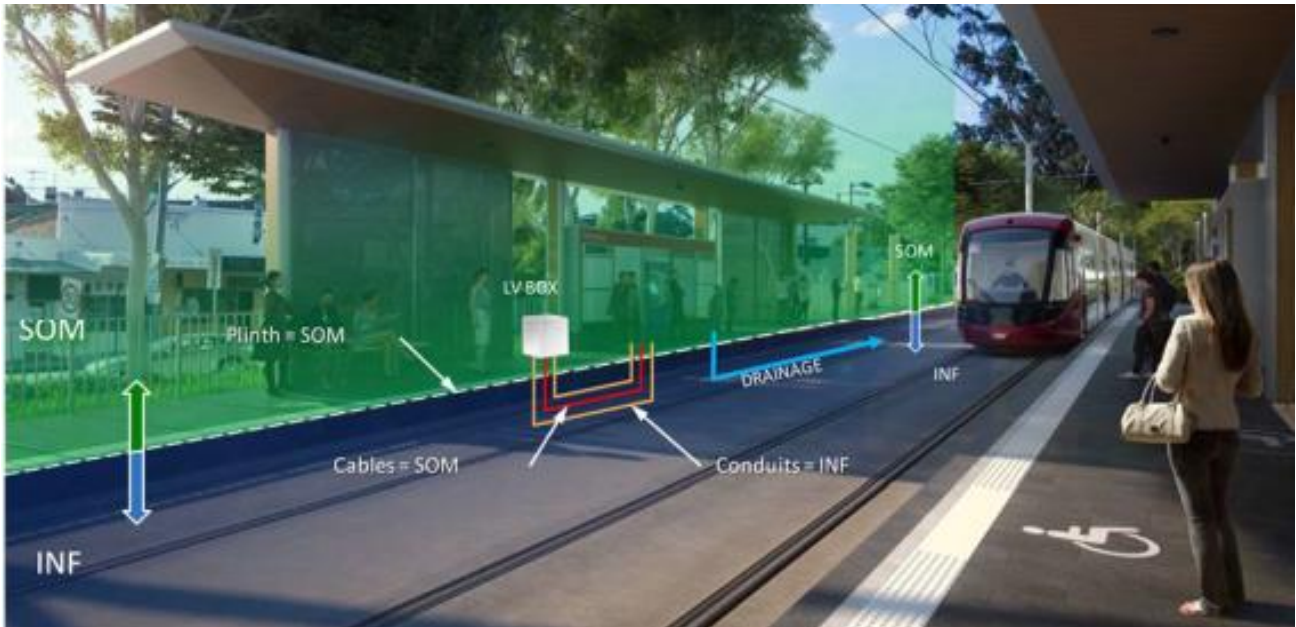


Figure 1-4: Relationship between Infrastructure Works and SOM Works

1.6.2 Early works portion 2 contractor – Ventia (Package 3)

The SOM contract is dependent on the completion of the remediation works at the stabling and maintenance facility (SaMF) site, by the Early works portion 2 contractor (referred to as the remediation contractor).

The SaMF site is subject to historical contamination and is a listed contaminated site by the Environment Protection Authority (EPA). The works have been split to ensure that appropriately qualified contractor, experienced in remediating heavily contaminated sites, is managing the remediation of the site. The remediation contractor will complete their works and provide GRCLR a remediated site, complete with a site audit statement, and supporting management documentation, fit for purpose for site establishment, construction and operational activities associated with PLR.

The remediation works will deliver the remediated site, including any details of any ongoing management requirements, and will not trigger the construction and operational conditions, except for those that relate to detailed design. The Remediation Contractor will provide GRCLR with a Long Term Environmental Management Plan (LTEMP) for the SaMF. The LTEMP will include all construction, operation, management, maintenance and monitoring requirements for the SaMF. GRCLR will implement the requirements relevant to the construction and operation of the Stabling and Maintenance facility.

Ongoing management for the remedial works on the SaMF site will be implemented through a Long Term Environmental Management Plan (LTEMP) which will be approved by the Site Auditor, as part of the issuing of the Site Audit Statement (SAS) for the site. The LTEMP will be a stand-alone document, and all monitoring and reporting will be managed through the processes and procedures in the LTEMP, and not through the SOM CEMP.

An interface between the two packages has been established to ensure the remediated site meets the design requirements for the construction, operation and maintenance of the site.

1.7 Environmental management systems overview

The construction of the Project will be managed in accordance with the GRCLR Integrated Management System (IMS) which includes an Environmental Management System (EMS). The EMS will be adopted as the guiding environmental management framework for the Project. The EMS is compliant with AS/NZS ISO 14001:2015. The EMS is integrated with the project wide IMS which includes assurance, quality and health and safety, management systems

The EMS will guide the development of the Project's governance documentation, including this SEMP, the CEMP and associated management plans, procedures and management tools to achieve the commitments and intentions established by the GRCLR Environment and Sustainability Policy, to ensure environmental performance and sustainability objectives and targets are achieved.

All works carried out on the site will be in accordance with:

- Minister's Conditions of Approval (CoA) SSI-8285
- Revised Environmental Mitigation and Management Measures (REMMMs)
- Environment Protection Licence (EPL) 21606
- Environmental Performance Outcomes (EPO's)
- AS/NZ ISO 14001
- All applicable legislation
- Project Deed
- GRCLR IMS.

1.7.1 Construction Environmental Management Plan

A CEMP will be prepared for the SOM contract (Package 5). This CEMP provides the system to manage and control the environmental aspects of the SOM contract (Package 5) during construction. 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 will be endorsed by the ER and provided to the Secretary for approval at least one month prior to the commencement of construction. In accordance with CoA C8 construction will not commence until the CEMP and the associated management plans specified in CoA C3 are approved by the Secretary or provided to the Secretary for information (as required by CoA C3).

1.7.2 Environment management plans

Subject-specific environmental management plans will be prepared to support the CEMP. These documents are prepared to identify requirements and processes applicable to specific impacts or aspects of the SOM contract (Package 5). They address the relevant requirements of the CoAs, REMMMs, EPOs and EPL. A list of construction management plans for the SOM contract (Package 5) and their approval requirements are provided in Table 1-2.

Table 1-2: Environmental management plans

Document name	Document number	Approval pathway/ requirement
Traffic, Transport and Access Management Plan	PLR1SOM-GLR-ALL-PM-PLN-000032	REMMM GEN-1 CoA C3 (a) REMMM TT-25
Flora and Fauna Management Plan	PLR1SOM-GLR-ALL-PM-PLN-000033	REMMM GEN-1 CoA C3 (e) REMMM BI-3

Noise and Vibration Management Plan	PLR1SOM-GLR-ALL-PM-PLN-000034	REMMM GEN-1 CoA C3 (b) REMMM NV-1
Soil and Water Management Plan	PLR1SOM-GLR-ALL-PM-PLN-000035	REMMM GEN-1 REMMM HY-6
Heritage Management Plan	PLR1SOM-GLR-ALL-PM-PLN-000037	REMMM GEN-1 CoA C3 (d) REMMM AB-2, REMMM HE-21
Air Quality Management Plan	PLR1SOM-GLR-ALL-PM-PLN-000038	REMMM GEN-1 REMMM AQ-1
Construction Waste and Resource Management Plan	PLR1SOM-GLR-ALL-PM-PLN-000039	REMMM GEN-1 REMMM WM-2
Contaminated Land Management Plan	PLR1SOM-GLR-ALL-PM-PLN-000040	REMMM GEN-1 REMMM CM-3
Site Establishment Management	PLR1SOM-GLR-ALL-PE-PLN-001002	REMMM GEN-1 CoA C18 REMMM GEN-2
Flood Management Plan	PLR1SOM-GLR-ALL-PM-PLN-000047	REMMM GEN-1 CoA C3 (c) REMMM HY-4

1.7.3 Sustainability Management Plan

TfNSW has prepared a Sustainability Strategy to comply with CoA E136 and EPO-SU-1 for the Project. The management of the Sustainability Strategy's requirements associated with the construction of the Project will be addressed in the Sustainability Management Plan (Ref PLR1SOM-GLR-ALL-PM-PLN-000015). Implementation of the Sustainability Management Plan will be managed by the GRCLR Environment and Sustainability Manager. The plan will demonstrate how the relevant commitments in the Sustainability Strategy (CoA 136 and EPO-SU-1) will be implemented for the construction of the Project.

1.7.4 Interaction with other management plans

Key interactions for this Plan with other management plans include:

- Sustainability Management Plan - defines the sustainability targets, addresses the tracking and reporting of air quality including greenhouse gas emissions, and provides detailed strategies to achieve targets
- Energy and Carbon Sub-plan (part of the Sustainability Management Plan) - defines the greenhouse reduction targets for the construction and operational stages of the project and addresses the Greenhouse Gas (GG-) REMMMs.

2 Purpose and objectives

2.1 Purpose

The purpose of this AQMP is to establish a set of best practice procedures for the management and protection of air quality during construction of the Project.

The Plan includes management measures to minimise impacts on air quality during the construction of the Project.

2.2 Objectives

The key objective of the AQMP is to ensure appropriate controls and procedures are implemented during construction activities to avoid or minimise air quality impacts and potential adverse impacts to sensitive receivers by complying with all CoA, REMMMs, best practice and licence/permit requirements relevant to air quality as described and outlined in:

- The environmental impact assessment prepared for Parramatta Light Rail Stage 1 (WSP & Jacobs 2017)
- Submissions Report (incorporating Preferred Infrastructure Report), February 2018
- Conditions of Approval granted to the Project on 29 May 2018
- Environment Protection Licence (EPL) 21606
- Ensure appropriate measures are implemented to comply with all relevant legislation and other requirements as described in Section 3 of this Plan
- Transport for NSW's Air Quality Management Guideline 9TP-SD-107/3.0.

2.3 Targets

The following targets have been established for the management of air quality impacts during the Project:

- Ensure full compliance with the relevant legislative requirements, CoAs, REMMMs, and EPL Conditions
- Ensure training on best practice air quality management is provided to all construction personnel through site inductions
- Ensure appropriate controls and procedures are implemented during construction activities to avoid or minimise air quality impacts and potential adverse impacts to sensitive receivers surrounding the Project
- Ensure all plant and equipment is inspected regularly and maintained in accordance with manufacturer's requirements.

3 Environmental requirements

3.1 Relevant legislation and guidelines

3.1.1 Legislation

Legislation relevant to air quality management includes:

- *Environmental Planning and Assessment Act 1979 (EP&A Act)*
- *Protection of the Environment Operations Act 1997 (POEO Act)*
- *Protection of the Environment Operations (Clean Air) Regulation 2010*
- *National Greenhouse and Energy Reporting Act 2007.*

3.1.2 Guidelines and standards

The main guidelines, specifications and policy documents relevant to this AQMP include:

- National Environment Protection Councils (NEPC) – National Environment Protection Measure (NEPM) for Ambient Air Quality Guidelines
- AS 3580.1.1:2016 Methods of Sampling Analysis of Ambient Air. Part 1.1 Guide to Siting Air Monitoring Equipment
- AS 3580.10.1:2016 Methods of Sampling Analysis of Ambient Air. Determination of Particulate Matter – Deposited Matter - Gravimetric Method
- Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (NSW EPA 2016)
- Approved Methods for the Sampling and Analysis of Air Pollutants (NSW EPA 2007).

3.2 Transport for NSW's Air Quality Management Guideline 9TP-SD-107/3.0 Air quality criteria

The NSW Environment Protection Authority (EPA) sets goals for ambient dust concentrations and dust deposition (NSW EPA, 2016). Table 3-1 sets out the impact assessment criteria published in the NSW EPA Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (2016).

Table 3-1: Impact assessment criteria for PM_{2.5}, PM₁₀, TSP and deposited dust (NSW EPA, 2016)

Pollutant	Averaging period	Unit	Concentration
PM _{2.5}	24 hours	µg/m ³	25
	Annual	µg/m ³	8
PM ₁₀	24 hours	µg/m ³	50
	Annual	µg/m ³	25
Total suspended particulates (TSP)	Annual	µg/m ³	90

Pollutant	Averaging period	Unit	Concentration
Deposited dust – maximum increase	Annual	g/m ² /month	2
Deposited dust – maximum total	Annual	g/m ² /month	4
Asbestos	1 hour	mg/m ³	0.18

3.3 Minister’s Conditions of Approval

The CoA relevant to this Plan are listed in Table 3-2. A cross reference is also included to indicate where the condition is addressed in this Plan or other Project management documents.

Table 3-2: Conditions of Approval relevant to the AQMP

CoA No.	Condition Requirements	Document Reference	How Addressed
C19	Boundary fencing that incorporates screening must be erected around all construction ancillary facilities that are adjacent to sensitive receivers for the duration of site establishment and construction of the CSSI unless otherwise agreed with relevant council(s), affected residents, business operators and/or landowners and in accordance with Condition B2(b)	Section 6 of this AQMP	Mitigation measure A3 commits to “Installation of perimeter screening around areas where there is a potential to generate emissions to air and around compound and stockpile locations, unless otherwise agreed with the relevant council, residents or business operators during consultation. Requirement is communicated through the ECM developed for the Project.

CoA No.	Condition Requirements	Document Reference	How Addressed
C20	Boundary screening required under Condition C19 of this approval must reduce visual, noise and air quality impacts on adjacent sensitive receivers.	Section 6 of this AQMP	<p>Mitigation measure A3 commits to “Installation of perimeter screening around areas where there is a potential to generate emissions to air and around compound and stockpile locations unless otherwise agreed with the relevant council, residents or business operators during consultation.</p> <p>Requirement is communicated through the ECM for the Project.</p>

3.4 Revised Environmental Mitigation and Management Measures

Relevant REMMMs are listed in Table 3-3. This includes reference to required outcomes, the timing of when the commitment applies and relevant documents or sections of the environmental assessment influencing the outcome and implementation.

Table 3-3: Revised Environmental mitigation and management measures relevant to this AQMP

Ref # REMMM	Commitment	Timing	AQMP reference	How addressed
AQ-1	An air quality and dust management plan would be developed and implemented as part of the CEMP. This plan would identify triggers and procedures for dealing with significant dust generating activities, with the aim of minimising impacts on surrounding sensitive receivers. Air quality and dust management measures that would be identified in the CEMP would include:	Pre-construction	Sections 6 and 7.3	This plan in its entirety fulfils the requirement of this commitment in relation to air quality management. Section 7.3 identifies strategies to monitor air quality. Control measures to minimise impacts to air quality are provided in Section 6.
	» Apply wheel-wash or rumble grid facilities as appropriate to remove loose material and prevent the tracking of spoil debris onto local roads.	Construction	Table 6-1	Control measure A9
	» Clean loose materials and debris from the tailgate of vehicles unloading materials to stockpiles prior to departure from site.	Construction	Table 6-1	Control measure A11
	» Conduct routine servicing and maintenance, and subsequent inspections to ensure that equipment continues to operate efficiently.	Construction	Table 6-1	Control measure A15
	» Ensure that all loads are covered when materials are being hauled to and from site.	Construction	Table 6-1	Control measure A13

Ref #	Commitment	Timing	AQMP reference	How addressed
REMMM	» Ensure that compound area surfaces are well compacted or sealed to limit the potential for dust generation.	Construction	Table 6-1	Control measure A10
	» Chemical/fuel storage tanks would be fitted with a conservation vent (to prevent air inflow and vapour escape until a pre-set vacuum or pressure develops).	Construction	Table 6-1	Control measure A20
	» Ensure that structures are inspected by a suitably qualified person to confirm that they do not contain any hazardous materials (e.g. asbestos) which could be broken and mobilised during demolition. Where such materials are identified, adhere to the requirements for removal and disposal listed in the <i>Work Health and Safety Act 2011</i> , and Work health and Safety Regulation 2011.			Not applicable to the Project; no demolition would occur
	» Impose low speeds limits around compound sites to limit the generation of dust from vehicle movements.	Construction	Table 6-1	Control measure A10 addresses this requirement
	» Install dust monitoring devices to quantify dust levels and determine whether control measures are adequate or whether further actions are required.	Construction	Table 6-1	Control measure A17 addresses this requirement
	» Installation of perimeter screening around areas where there is a potential to generate emissions to air and around long-term compound and stockpile locations.	Construction	Table 6-1	Control measure A3 addresses this requirement
	» Plan activities and avoid adversely windy conditions which may result in the generation of off-site dust impacts.	Construction	Table 6-1	Control measure A18 addresses this requirement
	» Position stockpiling areas as far as possible from surrounding receivers.	Construction	Table 6-1	Control measure A30 addresses this requirement

Ref #	Commitment	Timing	AQMP reference	How addressed
REMMM	» Regularly water exposed and disturbed areas and stockpiles especially during inclement weather conditions.	Construction	Table 6-1	Control measure A6/8 addresses this requirement
	» Water demolition areas as necessary to minimise the generation of dust.	-	-	Not applicable to the Project; no demolition would occur
	» Wherever possible and practical, limit the amount of materials stockpiled, extent of disturbed and exposed surfaces. Restoration of cleared areas to occur as soon as possible.	Construction	Table 6-1	Control measure A8/A30 addresses this requirement
	» Apply odour suppressing agents to materials as necessary to minimise related impacts should any contaminated or hazardous materials be uncovered during the works.	Construction	Table 6-1	Control measure A31 addresses this requirement
	» Construction plant and equipment would be well maintained and regularly serviced so that vehicular emissions remain within relevant air quality guidelines and standards.	Construction	Table 6-1	Control measure A15 addresses this requirement
	» All vehicles used on site, for transporting materials to or from site, or for any other activities associated with the project, shall be maintained to avoid the emission of excessive air impurities in accordance with Part 5.8 of the <i>Protection of the Environment Operations Act 1997</i> and the <i>Protection of the Environment Operations (Clean Air) Regulation 2010</i> .	Construction	Table 6-1	Control measure A15 addresses this requirement
	» All on-road trucks would comply with the relevant Australian emission standards.	Construction	Table 6-1	Control measure A15 addresses this requirement
	» All chemicals and fuels would be stored in sealed containers as per appropriate regulations and guidelines.	Construction	Table 6-1	Control measure A20 addresses this requirement

Ref #	Commitment	Timing	AQMP reference	How addressed
REMMM	» The on-site storage of fuel would be kept to a minimum.	Construction	Table 6-1	Control measure A21 addresses this requirement
	» Unloading of fuels (diesel or liquefied nitrogen gas (LNG)) would be vented via return hoses that recirculate vapours from delivery to receiver.	Construction	Table 6-1	Control measure A25 addresses this requirement
	» On dry days unsurfaced haul roads will be watered to aid dust suppression.	Construction	Table 6-1	Control measures A6/8/30 address this requirement
	» Stockpiles left for extended periods will be grassed or covered with appropriate material.	Construction	Table 6-1	Control measure A8 and A30 addresses this requirement
GEN-1	<p>A construction environmental management plan (CEMP) would be prepared for the construction phase of the project. The CEMP would provide a centralised mechanism through which all potential environmental impacts would be managed. The CEMP would document mechanisms for demonstrating compliance with the commitments made in the Environmental Impact Statement), the submissions report, as well as any other relevant statutory approvals (e.g. conditions of approval, licences and 01permits). The CEMP would outline a framework for the management of environmental impacts during construction, including further details on the following:</p> <ul style="list-style-type: none"> » Traffic, transport and access management. » Noise and vibration management. » Heritage management. 	Pre-construction	This AQMP	This AQMP manages air quality and dust impacts of construction activities for Project. Project-requirements in accordance with the REMMs and CoAs listed in Section 3 are committed to through the measures listed in Section 6 of this Plan. Monitoring of compliance is set-out in Section 7 of this AQMP.

Ref # REMMM	Commitment	Timing	AQMP reference	How addressed
	<ul style="list-style-type: none"> » Air quality and dust management. » Soil and water management. » Flora and fauna management. » Waste and resource management. » Site compound and ancillary works management. » Landscape and temporary works management. » Emergency and incident response management. 			
GEN-2	<p>A construction compounds plan would be prepared for the project as part of the overall CEMP. This sub-plan would set out details for each of the approved construction compounds, including stockpile areas, laydown areas and other ancillary activities required to construct the project. The sub-plan would supplement, in greater detail, the information provided in the main body of the CEMP. The objectives and strategies of the construction compounds and ancillary facilities management sub-plan would include the following:</p> <ul style="list-style-type: none"> » Minimise the impact of construction compounds on surrounding land uses and sensitive receivers. » Locate construction compounds away from sensitive land uses and receivers, wherever practical and feasible, or configure internal compound layouts in a manner that considers noise and light sensitive receivers (e.g. use of buildings to shield noisy activities, minimising the requirement for reversing vehicles, or locating noise intensive activities to maximise the distance to noise sensitive receivers). 	Pre-construction	Site Establishment Management Plan	A Site Establishment Management Plan has been developed in accordance with the requirements of GEN-2 to set out details for each of the construction compounds, stockpile areas, laydown areas and other ancillary activities required to construct the Project.

Ref #	Commitment	Timing	AQMP reference	How addressed
REMMM	<ul style="list-style-type: none"> » Manage stockpile areas to minimise potential pollution of watercourses, groundwater and local air quality. » Minimise the clearing of vegetation (e.g. street trees and trees within public open spaces) to the minimum amount necessary to construct the project, particularly where construction compounds are proposed in public open spaces/parkland areas. » Locate construction compounds away from (or able to be managed in such a way so as to not impact on) heritage items and high retention value trees. 			
GG-3	Management of emissions would be incorporated into site inductions, training and pre-start talks.	Pre-construction	Section 7.2 of this AQMP and Table 6.1 (A1) of this AQMP	Mitigation measures A1 commits to “All employees, contractors and utility staff working on site will undergo site induction training. The induction training will address elements related to air quality management. Targeted training in the form of toolbox talks or specific training will also be provided to personnel with a key role in air quality management.”
GG-4	The CEMP would incorporate measures to minimise the emission of greenhouse gases during construction. Activities with the potential to cause substantial emissions (such as material delivery and loading and bulk earthworks) would be identified in the energy and greenhouse gas emissions strategy. Emissions management		Table 6.1 of this AQMP	Control measure A22 states activities with the potential to cause substantial greenhouse gas emissions would be identified.

Ref #	Commitment	Timing	AQMP reference	How addressed
REMMM	<p>actions would be investigated and applied where reasonable and feasible. These would potentially include:</p> <ul style="list-style-type: none"> » The use of biodiesel and other low carbon fuels in vehicles and equipment. » The use of fuel-efficient construction equipment. » The use of energy efficient construction practices. » Use of energy efficient or solar powered lighting for temporary construction facilities. 			Emissions management actions to minimise emissions would be investigated and applied where reasonable and feasible.
GG-5	Local procurement of construction services and materials locally would be undertaken (where feasible and cost effective) to reduce fuel consumption for transport. Where practical and reasonable, construction planning would ensure that deliveries are managed in an efficient manner to minimise the number of trips required and therefore reduce the amount of emissions.		Table 6.1 (A23) of this AQMP	The requirements of GG-5 are committed to in the AQMP's mitigation measures.
GG-6	Energy efficient work practices, such as switching off construction plant, vehicles and equipment when not in use to minimise idling, would be implemented during construction.		Table 6.1 (A14) of this AQMP	Mitigation measures A14 commits to "All plant equipment and vehicles will not idle for extended periods of time; they will be switched off if not in operation. Mobile and static emission sources will be kept away from sensitive receivers, if possible."

Ref #	Commitment	Timing	AQMP reference	How addressed
REMMM				
GG-7	Regular monitoring, auditing and reporting on energy, resource use and associated greenhouse gas emissions would form part of the environmental reporting requirements specified within the CEMP and would be carried out.		Sections 7.3 and 7.6	Energy, resource use and associated greenhouse gas emissions would be monitored using utility bills and procurement records, allowing the calculation of greenhouse gas emissions (Section 7.3). Once energy, resource use and associated greenhouse gas emissions data has been received and collated it will be included in the monthly environmental report (CEMP Section 8.5).

3.5 EPL Conditions

The EPL Conditions relevant to this Plan are listed in Table 3-4. A cross reference is also included to indicate where the condition is addressed in this Plan or other project management documents.

Table 3-4: EPL Conditions relevant to this AQMP

EPL Condition	Requirement	AQMP reference	How Addressed
O3.1	Activities must be carried out in a manner which minimises the generation of dust at the premises.	Table 6-1	Various air quality management and mitigation measures detailed in Table 6-1.

EPL Condition	Requirement	AQMP reference	How Addressed
O3.2	The premises must be maintained in a condition which minimises the emission of dust from the premises.	Table 6-1	Various air quality management and mitigation measures detailed in Table 6-1.
O3.3	<p>All trucks carrying dry bulk material that enter and leave the premises must have their loads covered at all times, except during unloading and loading.</p> <p>For the purposes of this condition, 'load' is defined as material contained within the body/trailer/bin of the truck, and on the gunnels of the truck.</p>	Table 6-1 Measure A13	Haulage trucks will keep loads covered to prevent dust emission.

4 Existing environment

The following sections summarise what is known about factors influencing air quality impacts and management associated with the project, within and adjacent to the Project work areas.

The key reference documents are:

- PLR (Stage 1) – Environmental Impact Statement (WSP & Jacobs 2017)
- PLR (PLR-PAC-ENV-RPT-014) Air Quality Working Paper (Jacobs 2017)
- PLR Supply Operate and Maintain- Site Establishment Management Plan (December 2019)
- PLR (Stage 1) Construction Environmental Management Plan- Supply, Operate, Maintain (SOM)-March 2020.

4.1 Air quality records

The air quality study undertaken for the EIS (Jacobs 2017) relied on Office of Environment and Heritage air quality index values data from 2013-2016 measured at the two nearest air quality monitoring stations, Prospect and Chullora. Table 4-1 provides a summary of ambient air quality and background concentrations as reported in the two reference documents.

Table 4-1: Summary of ambient air quality and background concentrations (Jacobs 2017)

Pollutant type	Results
Particulate matter (PM ₁₀)	<p>100th percentile (maximum) 24-hour averaged PM₁₀ background concentrations were found to exceed the criterion of 50 µg/m³ at both monitoring locations in 2013, 2015 and 2016, but were below this criterion in 2014. 95th percentile values of 24-hour averaged concentrations ranged from 29 to 34 µg/m³, with the highest value recorded at Prospect in 2016.</p> <p>Annually averaged PM₁₀ background concentrations were consistently 18 to 19 µg/m³ across all years considered. These levels are below the assessment criterion (25 µg/m³).</p>
Particulate matter (PM _{2.5})	<p>100th percentile (maximum) 24 hour averaged PM Traction Power Substations (TPS) background concentrations were generally measured above the criterion of 25 µg/m³, but 95th percentile 24 hour averaged PM_{2.5} concentrations were below this value, ranging from 14 to 18 µg/m³.</p> <p>Annually averaged PM_{2.5} background concentrations (8.0 ug/m³ to 9.0 ug/m³) were measured to already be at or exceeding the assessment criterion of 8 µg/m³.</p>

Pollutant type	Results
Nitrogen dioxide (NO ₂)	<p>100th percentile one-hour averaged NO₂ background concentrations were measured to be well below the assessment criterion (246 µg/m³) with a maximum value of 120 µg/m³ recorded at Chullora in 2014.</p> <p>Annually averaged NO₂ background concentrations were recorded below the assessment criterion (62 µg/m³) during all measurements considered.</p>
Sulphur dioxide (SO ₂)	<p>100th percentile one-hour averaged SO₂ background concentrations were found to be well below the criterion of 570 µg/m³, with the highest recorded value being 71 µg/m³ at Prospect in 2015.</p> <p>Annually averaged SO₂ background concentrations were measured well below the 60 µg/m³ criterion.</p>
Carbon monoxide (CO)	<p>100th percentile eight-hour averaged CO concentrations were well below the assessment criterion (10 µg/m³) during all measurements considered.</p>
Volatile organic compounds (VOCs)	<p>VOCs are not presently measured at any NSW air quality monitoring stations. Two historical studies have previously been completed by the NSW EPA to investigate baseline concentrations of air toxics:</p> <p>Air Toxics Monitoring Program involving the collection of 24-hour averaged measurements at the Sydney CBD, Rozelle, St Marys and Blacktown from 1996 to 2001.</p> <p>Ambient Air Quality Monitoring and Fuel Quality Testing Project where 24-hour averaged measurements were collected from October 2008 to October 2009 at Turrella and Rozelle.</p> <p>During the Air Toxics Monitoring Program study, annual and 24-hour averaged benzene concentrations of 1.4 µg/m³ and 4.2 µg/m³ were measured at St Marys respectively. Annual benzene concentrations of 1.4 µg/m³ were measured at Turrella during the Ambient Air Quality Monitoring and Fuel Quality Testing Project.</p> <p>Using the formula provided in the AUSPLUME Gaussian Plume Dispersion Model Technical User Manual, (Victorian Environment Protection Authority 2000) for estimating sub-hourly concentrations from hourly data, an approximate one-hour averaged background concentration of 7.9 µg/m³ was estimated. This is well below the criterion of 29 µg/m³.</p>

4.2 Rainfall, soil dryness and wind

Meteorological conditions are important for determining the direction and rate at which emissions from a source will disperse. The air quality study undertaken for the EIS (Jacobs 2017) used the Australian Government Bureau of Meteorology Parramatta North automatic weather station (AWS) (station number 066124) to get historic weather data for the Project area. Table 4-2 displays long-term temperature and rainfall averages recorded at this station from its date of commission in 1967 to December 2016.

Table 4-2: Long-term temperature and rainfall data (Jacobs 2017).

Month	Mean maximum temperature (°C)	Mean minimum temperature (°C)	Mean rainfall (mm)	Mean number of rain days (>1mm)
January	28.4	17.6	105.7	9.1
February	27.8	17.6	121.2	9.1
March	26.3	15.8	106.7	9.5
April	23.8	12.9	93.6	7.3
May	20.6	9.9	69.5	7.1
June	17.8	7.6	91.2	7.5
July	17.4	6.3	46.2	5.5
August	19.1	7.1	56.9	5.3
September	21.7	9.4	52.5	5.9
October	24	12	66.7	7.5
November	25.5	14.1	85.5	8.8
December	27.4	16.2	73.6	7.7
Annual	23.3	12.2	973.5	90.3

The air quality study (Jacobs 2017) used wind data from 2013 to 2015 from the nearby Sydney Olympic Park AWS (no. 066212) to understand the typical wind characteristics in the Project area. The study concluded:

Annual and seasonal trends were generally consistent over the three years, with winds blowing from the west and northwest most common in autumn and winter, and winds from the east most prevalent in summer and spring. Calm conditions (wind speeds less than 0.5m/second) were most common in autumn and winter; occurring around 26% of the time during these seasons.

4.3 Soil characteristics

Soils landscapes along the Project are varied (Figure 10.6 of the EIS), reflecting the influence of the diverse underlying geologies and topography of the study area. A review of the Soil Landscape

Series Sheets (Penrith and Sydney) covering the Project indicates that soil zones are likely to be highly erodible when exposed.

The historic heavy industrial uses of land along Grand Avenue, Camellia, have resulted in the contamination of soils and groundwater. The Camellia precinct is also prone to flooding. The SaMF site has undergone subsurface remediation works subject to a separate environmental impact assessment under Part 5 of the *Environmental Planning and Assessment Act 1979* to render the site suitable for its proposed land use. The SaMF site has been sealed using a sediment binder to minimise dust emissions. Reapplication of the binder will continue throughout the construction and operation of the SaMF, as required.

All Project sites have been cleared of all vegetation since the EIS was prepared.

4.4 Sensitive land uses and receivers

The SaMF site is located at 6 Grand Avenue, Camellia. The Rosehill and Camellia precinct can be separated into two distinct areas (divided by James Ruse Drive) with a residential and retail area to the west and a predominantly industrial and large-scale logistical area to the east. The land uses around the SaMF are shown in Figure 4-1. Key roads located within the Rosehill and Camellia precinct include Alfred Street, Tramway Avenue and Grand Avenue North. There are no key intersections located within the Rosehill and Camellia precinct. The closest sensitive receivers to 6 Grand Avenue and 8 Colquhoun Street are over 500m away (child-care centre), and the nearest residential receiver is approximately 900m away, precluding potential for an air quality impact to them during construction activities at the SaMF site. Rosehill Gardens racecourse is adjacent to the SaMF site, which could be impacted by poor air quality (dust and odours) during events.



Parramatta Light Rail Key Sensitive Land Uses			GDA 1994 MGA Zone 56
6 Grand Avenue	Commercial	Industrial	
Land Use Childcare	Educational	Outdoor Passive	
Hotel	Residential		

Figure 4-1: SaMF site and surrounding land-use

The remainder of the Project area is predominantly surrounded by residential sensitive receivers between Westmead Station and Factory Street light rail stops, which transitions into a mix of residential and industrial land uses between Fennel Street and Camellia light rail stop. The Dundas light rail stop, BOCC, TPS 6, Telopea light rail stop and TPS 7 are within a primarily residential setting. There are educational facilities within 500 metres of Westmead Station, Fennel Street, Prince Alfred Square, Rydalmere and Parramatta Square light rail stops. There are medical facilities within 500 metres of Westmead Hospital and Cumberland Hospital light rail stops. These residential, educational and medical sensitive receivers have the potential to be impacted by poor air quality due to construction works (see Figure 4-2, Figure 4-3, Figure 4-4 and Figure 4-5).

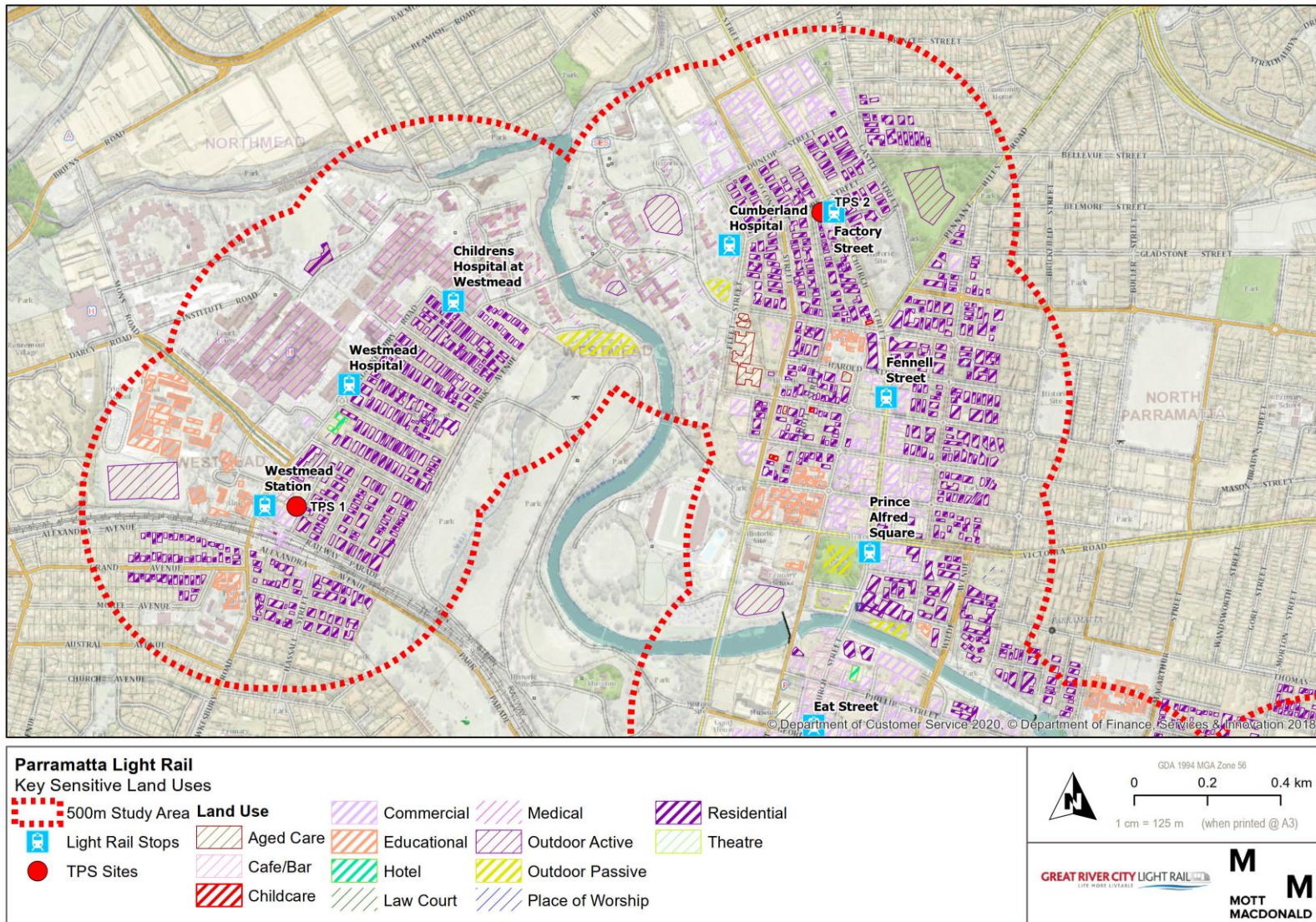


Figure 4-2: Key sensitive land uses (Westmead Station to Prince Alfred Square light rail stops)

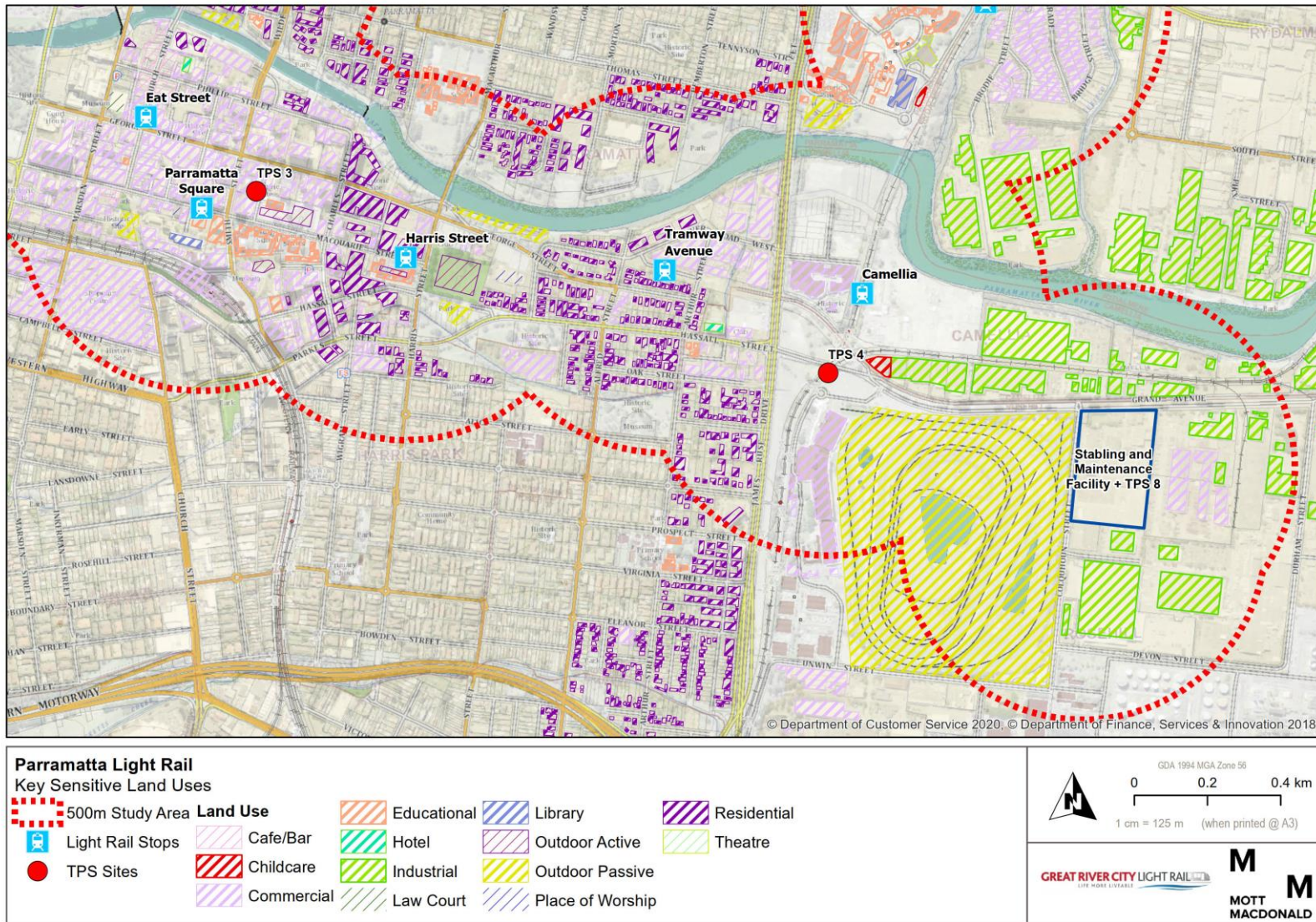


Figure 4-3: Key sensitive land uses (Eat Street light rail stop to the SaMF + TPS 8 site)

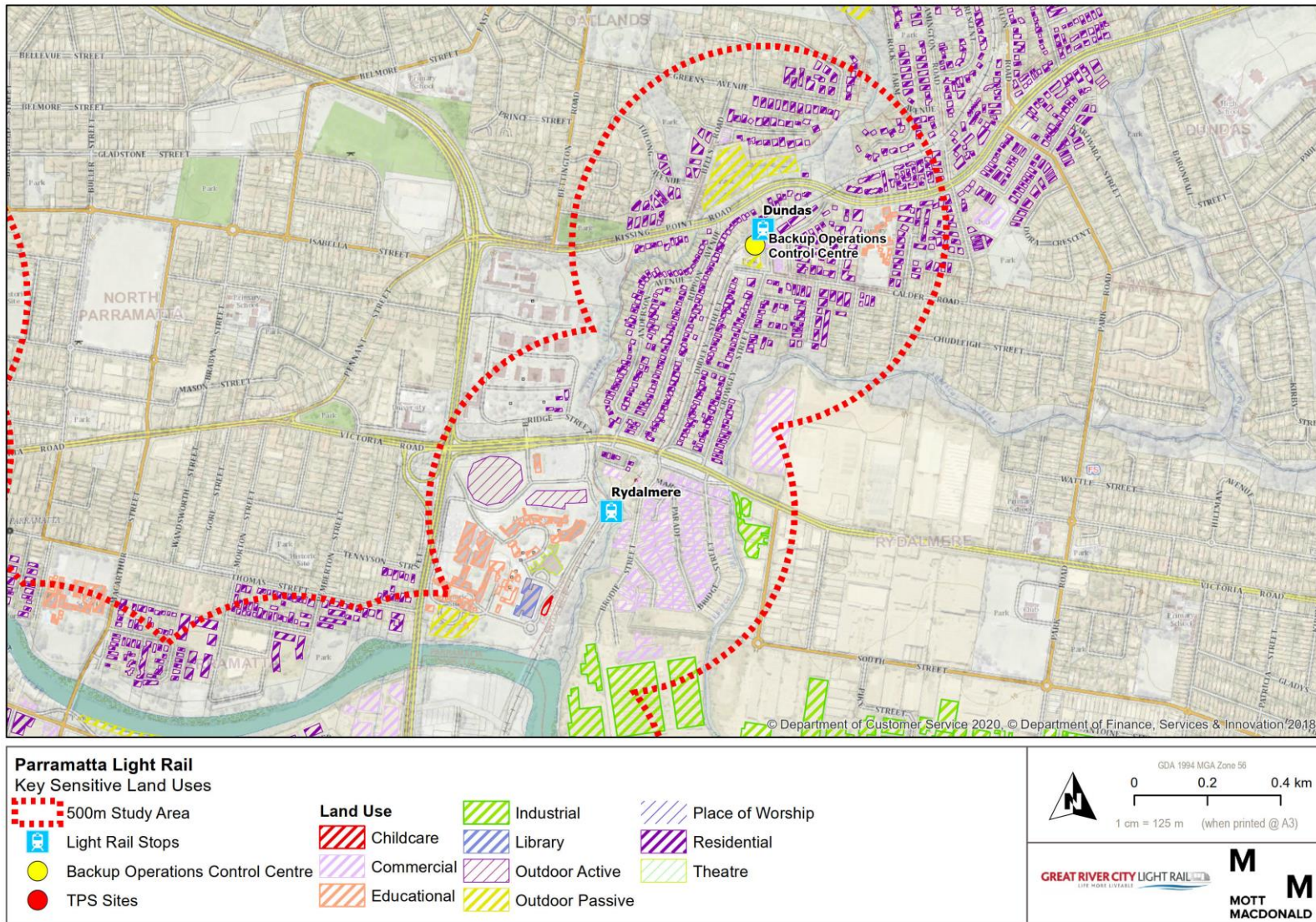


Figure 4-4: Key sensitive land uses (Rydalmere to Dundas light rail stops)

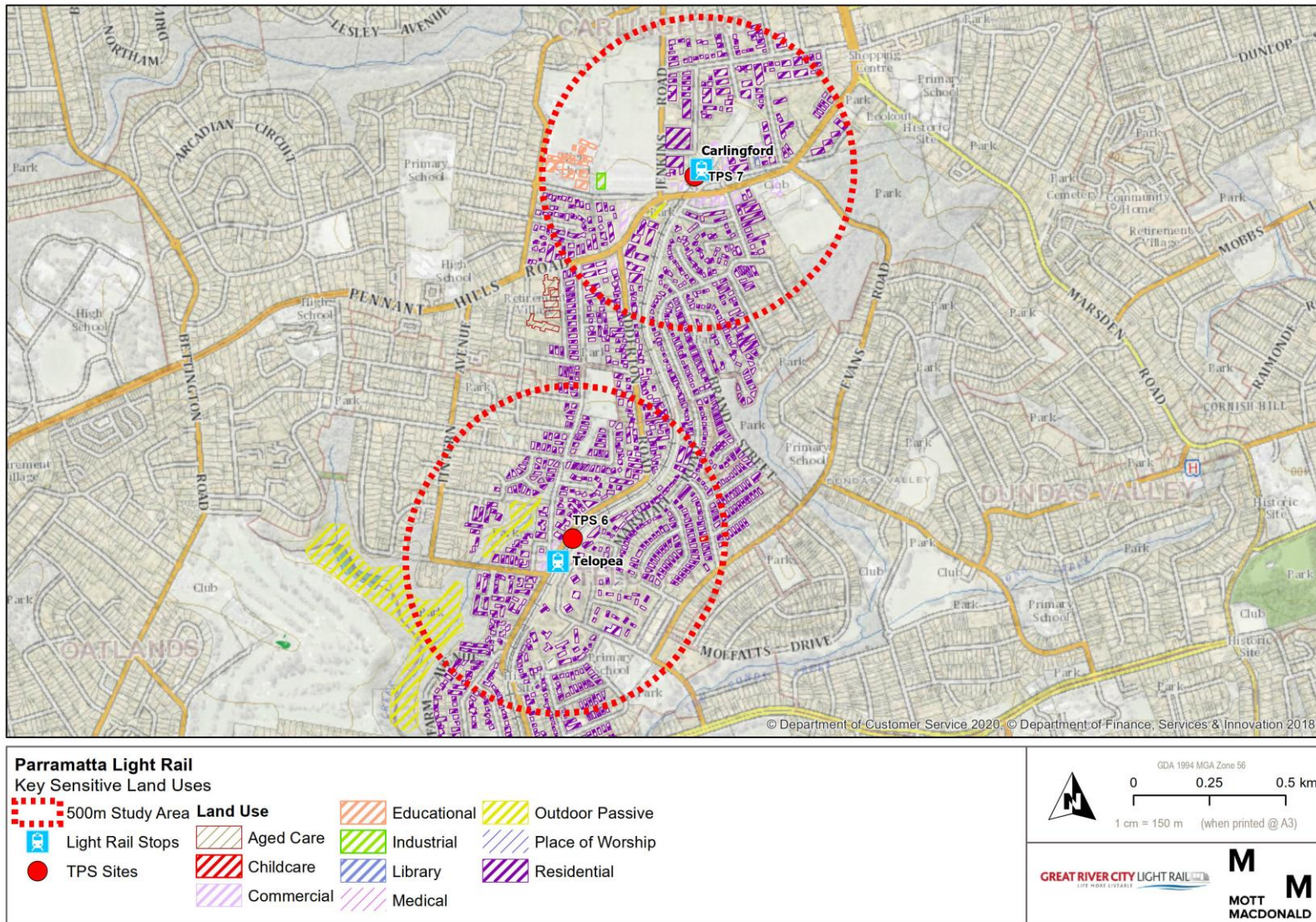


Figure 4-5: Key sensitive land uses (Telopea to Carlingford light rail stops)

5 Environmental aspects and impacts

5.1 Construction activities

The Project (subject of this Plan) includes the construction of the following:

- Stabling and Maintenance Facility (SaMF)
- Traction Power Substations (TPS)
- Light rail stops above slab level
- Back Up Operations Centre (BOCC).

Testing and Commissioning (T&C) activities are also considered ‘construction’ but is unlikely to have significant impacts on air quality.

Chapter 2 of the CEMP provides a description of the Project features and construction activities. Table 5-1 provides a summary of the construction activities for the Project.

Table 5-1: Construction Activity Summary

SaMF	TPS	Light rail stops	BOCC
<ul style="list-style-type: none"> • Site establishment • Shallow earthworks and subsurface works • Hydraulics (sewer, water, fire, drainage) • Rail systems • Operational Control Centre • Development of structures • Fencing • Landscaping • Carpark and footpaths • LRV Testing and driver training. 	<ul style="list-style-type: none"> • Construction site establishment • Surface clearing and grubbing at some sites • Substructure construction • Installation of utilities and services • Installation of architectural screening, security fencing and lighting • Landscaping • Roadworks 	<ul style="list-style-type: none"> • Prefabricated column and canopy placement • Installation of wind break screens and, lighting • Connection to previously constructed or existing utilities • Stop fit out • LRV Testing and driver training. 	<ul style="list-style-type: none"> • Construction site establishment • Surface clearing and grubbing • Substructure construction • Installation of utilities and services • Superstructure building works

Emissions to the atmosphere during construction activities that could result in adverse impacts to air quality are typically divided into two categories. These are:

- Dust and particulates
- Gaseous.

Key aspects of the Project that could result in dust emissions include:

- Shallow earthworks (less than 1 metre) for the track slab, building slab, road pavement at the SaMF etc – these works are on top of the capping layer
- Shallow (less than 1 metre) excavation & trenching for new drainage network, utilities network for fresh and non-potable water for fire and sewer systems
- Shallow (less than 1 metre) excavation for combined service route (CSR) to be installed at SaMF
- Shallow (less than 1 metre) excavation operations for new fencing, gates, road and carpark installation
- Earthwork and excavations of foundations and services for Maintenance and Ancillary buildings
- Movement of heavy vehicles on unstable ground
- Breaking and cutting activities for rail track and foundations for overhead wire masts
- Material handling including stockpiling, material loading and material haulage
- Stockpiles of material and waste
- Wind erosion of exposed areas and temporary stockpiles
- Driving across unsealed surfaces.

Air emissions, other than dust, which may be generated by construction activities include:

- Vehicle, equipment and plant exhaust emissions
- Odours/gases released during:
 - Excavations of organic or contaminated materials
 - Laying of pavement (e.g. asphalt)
 - Fuel and chemical stores
 - Refuelling.

5.2 Factors likely to affect dust generation and impacts

In addition to the inherent risks of specific construction activities generating dust, a number of other environment factors also affect the likelihood of dust emissions. These include:

- Wind direction – determines whether dust and suspended particles are transported in the direction of sensitive receivers
- Wind speed – governs the potential suspension and drift resistance of particles
- Soil type – more erodible soil types have an increased soil or dust erosion potential
- Soil moisture – increased soil moisture reduces soil or dust erosion potential
- Rainfall or dew – rainfall or heavy dew that wets the surface of the soil and reduces the risk of dust generation.

5.3 Impacts

The potential for impacts on air quality will depend on a number of factors. Primarily impacts will be dependent on the nature, extent and magnitude of construction activities and their interaction with the natural environment. Potential impacts attributable to construction might include:

- Deposition of dust on surfaces where it may cause damage and/or lead to a need for increased cleaning or repair
- Aesthetic effects that arise from visible airborne dust plumes and from deposits of dust on surfaces
- Need for increased maintenance of air filtering systems (e.g. air conditioners etc)
- Potential adverse health effects including eye, nose and throat irritation from excessive inhalation of fine particles
- Impacts on sensitive land uses and receivers
- Complaints from the public relating to dust or odours
- Dust deposition impacts on threatened flora species or habitat for threatened fauna species.

Relevant aspects and the potential for related impacts have been considered in a risk assessment found in Appendix A2 of the CEMP. Some impacts on air quality attributable to the Project are anticipated and have been described in Section 10.8.2 of the EIS (WSP & Jacobs, 2017). Section 6 of this AQMP provides a suite of mitigation measures that will be implemented at Project construction sites to avoid or minimise those impacts.

6 Environmental control measures

Specific measures and requirements to meet the objectives of this AQMP and to address impacts on air quality are outlined in Table 6-1. Best practice strategies are directed by the Transport for NSW Air Quality Management Guidelines (2015).

Table 6-1: Air quality management and mitigation measures

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference
A1	Training will be provided to all project personnel on air quality control practices, the reduction of greenhouse gases and the requirements from this Plan through inductions, toolboxes and targeted training.		Pre-construction / Construction	D&C Environment Manager	REMMM GG-3
A2	Air quality control measures from this Plan will be included in relevant environmental control maps. Sensitive receivers and locations of stockpiles and compound sites (with screening refer to A3) would be identified on the map.		Pre-construction / Construction	D&C Environment Manager	Best practice
A3	Installation of perimeter screening around areas where there is a potential to generate emissions to air, and around long-term compound and stockpile locations.	Perimeter screening	Pre-construction / Construction	Senior Construction and Staging Manager	REMMM AQ-1, CoA C20
A4	Ensure sufficient dust control measures (water carts, dust suppressants, stockpile covers, etc) are available to allow quick mobilisation in case of dust emissions occurring.	Dust emission mitigation equipment	Construction	Senior Construction and Staging Manager	REMMM AQ-1
A5	Visually monitor works in high wind conditions. Construction activities will be modified, reduced, controlled or stopped to prevent significant visible airborne dust.	Sprinklers/sheeting/binding fluid/water cart/etc	Construction	D&C Environment Manager	REMMM AQ-1

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference
	Dust emitting works that result in dust leaving the site will be stopped until mitigation measures can be applied to prevent the escape.				
A6	Unsealed ground will be managed to minimise dust emissions as appropriate e.g. by being compacted, wetted, or sealed.	Water/bitumen	Construction	Senior Construction and Staging Manager	REMMM AQ-1
A7	Odour emissions from waste will be minimised through effective segregation and regular removal of stored waste.	Bins	Construction	Senior Construction and Staging Manager	REMMM AQ-1
A8	Dust suppression techniques will be applied to stockpiles to prevent dust emission (e.g. as described in A4). Choice of technique would depend on material, weather and length of time material would be stockpiled. Stockpiling will be minimised as much as possible to avoid dust emission. Stockpiles left for extended periods will be grassed or covered with appropriate material	Sprinklers/sheeting/binding fluid/water cart/etc.	Pre-construction / Construction	Senior Construction and Staging Manager	REMMM AQ-1
A9	Wheel-wash or rumble grid facilities would be located at access points for 6 Grand Avenue (SaMF site) and as required at other Ancillary Facilities		Construction	Senior Construction and Staging Manager	Best practice REMMM AQ1

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference
A10	Compounds, ancillary facilities, haul roads and standing areas will be sealed or compacted to prevent dust emission. Speed limits will be set within compounds to restrict emission of dust.		Pre-construction / Construction	Senior Construction and Staging Manager	REMMM AQ-1
A11	Deposition of soil on to public roads will be prevented through the use of controls measures such as rumble grids at entry/exit points of the site compound, cleaning of loose material and debris from vehicles and equipment (including tailgates), and wheel washes, as required.		Pre-construction / Construction	Senior Construction and Staging Manager	REMMM AQ-1
A12	Public roads and sealed areas will be kept free of soil/dust through sweeping.	Sweeper trucks	Construction	Senior Construction and Staging Manager	Best practice
A13	Haulage trucks will keep loads covered to prevent dust emission.		Construction	Senior Construction and Staging Manager	Best practice, EPL O3.3
A14	All plant equipment and vehicles will not idle for extended periods of time; they will be switched off if not in operation. Mobile and static emission sources will be kept away from sensitive receivers, if possible.		Construction	Senior Construction and Staging Manager	REMMM GG-6
A15	Vehicles and equipment will be maintained in accordance with manufacturers'		Construction	Senior Construction and Staging Manager	REMMM AQ-1

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference
	<p>specifications to ensure emissions comply with EPA emission limits.</p> <p>Road vehicles must also comply with Australian emission standards</p>				
A16	<p>Observation of visible smoke being emitted for longer than 10 seconds will lead to the equipment/vehicle being tested for compliance against EPA emission limits. Maintenance/replacement of equipment/vehicle will be undertaken if the emissions are found to exceed EPA limits.</p>		Construction	D&C Environment Manager	REMMM AQ-1
A17	<p>Dust monitoring devices will be installed at the site boundary of spoil stockpiling areas where adjacent to sensitive receivers (e.g. pedestrians and residents) to quantify dust levels, check compliance against EPA impact levels and determine whether control measures are adequate, or whether further control actions are required.</p> <p>Further details of monitoring are provided in Section 7.3 of this sub-plan.</p>	Dust monitoring devices	Pre-construction / Construction	D&C Environment Manager	REMMM AQ-1
A18	<p>The weather forecast will be reviewed on a daily basis and appropriate measures implemented where unfavourable weather conditions (dry weather, wind speed >30km/h) are anticipated.</p>	Sprinklers/sheeting/binding fluid/water cart/etc	Construction	D&C Environment Manager	REMMM AQ-1

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference
A19	Dust control and construction activities will be reviewed and modified if air quality results exceed the air quality criteria and are attributable to construction activities.		Construction	D&C Environment Manager	Best practice
A20	All chemicals and fuels will be stored in appropriate containers in accordance with regulations and guidelines to avoid emissions. For example: chemical/fuel storage tanks would be fitted with a conservation vent.		Pre-construction / Construction	Senior Construction and Staging Manager	REMMM AQ-1
A21	On-site storage of fuel will be kept to a minimum		Construction	Senior Construction and Staging Manager	REMMM AQ-1
A22	<p>Activities with the potential to cause substantial greenhouse gas emissions would be identified. Emissions management actions to minimise emissions would be investigated and applied where reasonable and feasible. This includes:</p> <ul style="list-style-type: none"> • Turning plant and machinery off when not in use • Implement plant and machinery maintenance in accordance with manufacturer specifications 		Pre-construction	D&C Environment and	REMMM GG-4

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference
	<ul style="list-style-type: none"> Investigate the use of solar powered lighting towers and any other low emissions plant and machinery 				
A23	<p>Local procurement of construction services and materials would be undertaken where feasible and cost effective.</p> <p>Construction planning of haulage trips to and from site would look to minimise the number of trips required by combining loads when possible.</p>		Pre-construction / Construction	Senior Construction and Staging Manager	REMMM GG-5
A24	Complete the TfNSW Air Emission Data Collection Workbook to assist meeting the GREP requirements		Construction	D&C Environment Manager	TfNSW Standard Requirements
A25	Unloading of fuels (diesel or liquefied nitrogen gas (LNG)) would be vented via return hoses that recirculate vapours from delivery to receiver		Construction	Senior Construction and Staging Manager	REMMM AQ-1 Best practice
A26	Erosion and sediment control plans to be developed and in place prior to the commencement of works, and regular inspection of work areas.		Pre-construction	Senior Construction and Staging Manager	Best practice
A27	Dust suppression will be implemented within the Project construction sites. This will include watering or stabilising unsealed surfaces.		Construction	Senior Construction and Staging Manager	Best practice

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference
A28	Recycled water should be used for dust suppression		Construction	Senior Construction and Staging Manager	Best Practice
A29	Exposed surfaces, including unsealed haul roads, will be stabilised to prevent dust emission using the most practical site-specific methods, such as watering, sheeting, mulch and geo-fabrics for short term exposure and emulsion spray, spray grass, soil compaction and revegetation for longer term exposed areas or final finishes.	Dust emission mitigation equipment	Construction	Senior Construction and Staging Manager	REMMM AQ-1
A30	Stockpiles will be positioned as far as possible from surrounding receivers. Wherever possible and practical, limit the amount of materials stockpiled, extent of disturbed and exposed surfaces. .		Construction	Senior Construction and Staging Manager	REMMM AQ-1
A31	Apply odour suppressing agents to materials as necessary to minimise related impacts should any contaminated or hazardous materials be uncovered during construction works.		Construction	Senior Construction and Staging Manager	

7 Compliance management

7.1 Roles and responsibilities

The roles and responsibilities for the construction of the Project are outlined in Section 4.2 of the CEMP. Specific responsibilities for the implementation of environmental controls are detailed in Section 6 of this Plan. The GRCLR Environment and Sustainability Manager will provide environmental oversight, direction and leadership regarding the environmental management of the Project. The Design and Construction Environment Manager is responsible for the on site environmental management and reports to the GRCLR Environment and Sustainability Manager.

7.2 Training

All employees, contractors and utility staff working on site will undergo site induction training. The induction training will address elements related to air quality management including:

- Requirements of this Plan
- Relevant legislation
- Roles and responsibilities for air quality management
- Air quality mitigation and management measures
- Procedure to be implemented in the event of an incident (e.g. release of dust or gaseous emissions from the site).

Targeted training in the form of toolbox talks or specific training will also be provided to personnel with a key role in air quality management. Examples of training topics include:

- Mitigation for high wind/dust periods
- Minimisation of emissions from vehicles/equipment
- Lessons learnt.

Further details regarding staff induction and training are outlined in Section 5 of the CEMP.

7.3 Monitoring and inspection

Regular monitoring and inspections will be undertaken during construction. Monitoring and inspections are documented in Table 7-1 of this Plan and Section 4.2 and Table 4-1 of the CEMP.

Asbestos Air monitoring involves sampling airborne asbestos fibres to assist in assessing exposure to asbestos and the effectiveness of implemented control measures. It must be conducted in accordance with the Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Dust, 2nd Edition [NOHSC: 3003 (2005)]. Asbestos air monitoring will be undertaken by an Occupational Hygienist when any form of asbestos disturbance works is undertaken.

Table 7-1 Inspection and monitoring requirements

Item	Scope	Timing	Frequency	Responsibility	Records/ Reporting
Weather Forecasts	Monitoring of weather forecasts to determine when adverse weather conditions are predicted. Specific notifications will be made if: <ul style="list-style-type: none"> • Winds >30 km/hr and/or • Temperatures >30C are forecast. 	Construction	Weekly forecast Daily updates when adverse weather is predicted	D&C Environment Manager	Email alerts Pre-starts
Weather observations	Weather observations from the Parramatta BoM Parramatta North AWS. A wind speed gauge that can provide wind velocity alerts will be kept on site to identify periods when activities may need to be restricted or additional mitigation implemented.	Construction	Continual	D&C Environment Manager	Monthly Environmental Monitoring Report
Daily visual observations	Site observations to check that: <ul style="list-style-type: none"> • No visible dust emissions from site • No continuous visible vehicle/plant/equipment 	Construction	During any works	D&C Environment Manager	Report by exception in Daily Diary. Notification of issues / incidents / non-compliance to Senior Construction and Staging Manager

Item	Scope	Timing	Frequency	Responsibility	Records/ Reporting
	<p>emissions for longer than 10 seconds.</p> <ul style="list-style-type: none"> No mud tracking off-site Dust controls are being implemented and are working effectively 				
Weekly Inspections	Inspection of the environmental controls and implementation of the air quality mitigation measures outlined in Table 6-1.	Construction	Weekly	D&C Environment Manager	Weekly Environmental Inspection Checklist ER Inspection Report
Monthly Review of Dust Control Measures	Review of application of soil polymers, stockpile grass cover and other broad scale preventative measures.	Construction	Monthly	D&C Environment Manager	Dust Control Inspection Checklist
Daily Plant Inspections	Inspections to ensure that plant and equipment is operating efficiently. No continuous visible vehicle / plant / equipment emissions for longer than 10 seconds	Commencement of each shift	Daily	D&C Environment Manager	Plant and vehicle inspection logs
Dust Deposition	Dust Deposition Gauges (DDGs) will be temporarily	Pre-construction baseline (data collected	Monthly	D&C Environment Manager	Monthly Environmental Monitoring Report

Item	Scope	Timing	Frequency	Responsibility	Records/ Reporting
Monitoring (SaMF site boundaries only)	<p>placed onsite to assess the deposited matter on a continuous, monthly basis. These will be located proximal to the SaMF site only as it is the only location where significant earthworks are proposed as part of the SOM scope. DDGs will be exposed for 30 days (± 2 days) and will be analysed for Total Insoluble Matter (Solids) (TIM). Monitoring will be in accordance with Approved Methods for Modelling and Assessment of Air Pollutants in NSW (EPA, 2016), AS 3580.1.1-2007 and AS 3580.10.1-2003.</p> <p>AS 3580.1.1-2007 and AS 3580.10.1-2003 require the following:</p> <ul style="list-style-type: none"> • Sampling sites should not be affected by extraneous local emissions. • Ground level sampling sites (sample inlet less than five metres above ground level) are 	<p>by the Remediation and Infrastructure Contractors will be used)</p> <p>Construction</p>			

Item	Scope	Timing	Frequency	Responsibility	Records/ Reporting
	<p>generally preferable in low or scarcely built up areas.</p> <ul style="list-style-type: none"> • The sampling inlet is to be located at least 5 m from the source. • There should be unrestricted airflow of 360° around the sampling site. • There should be a minimum clear sky angle of 120° above the sampling inlet. • The height of the funnel aperture above ground level shall be approximately 2 m (± 0.2 m) and the funnel aperture plane should be horizontal. • Located at least 10 m from dripline of trees. • In general, the period of exposure shall be 30 (± 2) days. 				

Item	Scope	Timing	Frequency	Responsibility	Records/ Reporting
Asbestos fibre air monitoring	Portable battery-operated air monitors to demonstrate that asbestos fibres are not present in detectable concentrations, and that there is no risk of exposure to employees or the general public within the area and neighbouring properties during removal works.	During any works involving disturbance of asbestos	Daily	Occupational hygienist	Daily reports from the previous day
Greenhouse gas emissions	Energy, resource use and associated greenhouse gas emissions would be monitored using utility bills and procurement records, allowing the calculation of greenhouse gas emissions	Construction	Once energy, resource use and associated greenhouse gas emissions data has been received and collated it will be included in the monthly environmental report (CEMP Section 8.5).	D&C Environment Manager	Monthly Environmental Monitoring Report

7.4 Licences and permits

The Project is carried out in accordance with Environment Protection Licence (EPL) 21606, which was granted in December 2021, authorising the Scheduled Activity of Railway activities – railway infrastructure construction.

This AQMP has been updated (as Revision 3) to reflect the requirements of the EPL, which was issued post-development of the original AQMP.

7.5 Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of environmental controls, compliance with this Plan, CoA, EPL and other relevant approvals, licences and guidelines.

Audit requirements are detailed in Section 8.3 of the CEMP and will be undertaken in accordance with the projects audit program.

7.6 Reporting

General project environmental reporting is set out in Table 7-3 of this Plan and Section 8 of the CEMP.

Table 7-2 Reporting requirements

Report	Scope	Timing	Frequency	Responsibility	Submission
Monthly Environmental Monitoring Report	Summary of month: <ul style="list-style-type: none"> • Weather observations • Key dust control measures and actions • Asbestos fibre air monitoring (if required) • Issues / incidents / non-compliances 	Within 7 days of the month's end	Monthly	GRCLR Environment and Sustainability Manager	TfNSW IC ER EPA Made publicly available upon request
Quarterly Environment Report (Compliance Tracking Program)	Compliance reporting against the Planning Approval and CEMP including the requirements identified in this Plan	Within seven Business Days after the relevant quarter end	Quarterly	GRCLR Environment and Sustainability Manager	TfNSW IC
Annual Environment Report	Annual review of the monitoring and reporting requirements of the CEMP management plans including this Plan	Within ten Business Days after the end of the relevant calendar year	Annually	GRCLR Environment and Sustainability Manager	TfNSW IC
Asbestos fibre air monitoring report	Daily reports from the previous day to be displayed on site safety notice boards	During any works involving disturbance of asbestos	Daily Reporting to be provided within 24hrs	Occupational Hygienist	Site safety notice boards

8 Review and improvement

8.1 Continuous improvement

Continuous improvement of this Plan will be achieved by the ongoing evaluation of environmental management performance against environmental policies, objectives and targets for the purpose of identifying opportunities for improvement.

The continuous improvement process will be 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.

8.2 AQMP update and amendment

The processes described in Section 9.1 to Section 9.2 of the CEMP may result in the need to update or revise this Plan. This will occur as needed.

Modifications to the CEMP or management sub plans must be submitted to the ER for endorsement. Minor amendments and administrative changes to CEMP may be approved by the ER. These amendments will be included in the six monthly Construction Compliance Report in accordance with CoA A37. A copy of the updated plan and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure – refer to Section 10.2 of the CEMP.

Appendices

Appendix A: ER Endorsement

REF: AQ1148.05 PLR GLR AQMP rev4 endorsement 231120

Monday 20th November 2023

██████████
Senior Manager Environment
Transport for NSW
Parramatta Light Rail

Re: Parramatta Light Rail, Air Quality Management Plan. Supply, Operate, Maintain (SOM) Package

Pursuant to SSI8285 Condition of Approval A23 (d) ii), as the approved Environmental Representative, I confirm that I have reviewed the updated Air Quality Management Plan, Supply, Operate, Maintain (SOM) Package - Parramatta Light Rail (PLR1SOM-GLR-ALL-PM-PLN-000038 Rev 4), dated 18/10/2023, updated by Great River City Light Rail, for consistency with the requirements of the Conditions of Approval.

In my opinion the aforementioned updated document is consistent with the requirements included in or required under the terms of the Conditions of Approval for the Parramatta Light Rail (Stage 1) development.

This management plan has been updated to include the testing and commissioning scope of works associated with the SOM package.

Yours sincerely,



██████████
██████████ Representative
The APP Group

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