



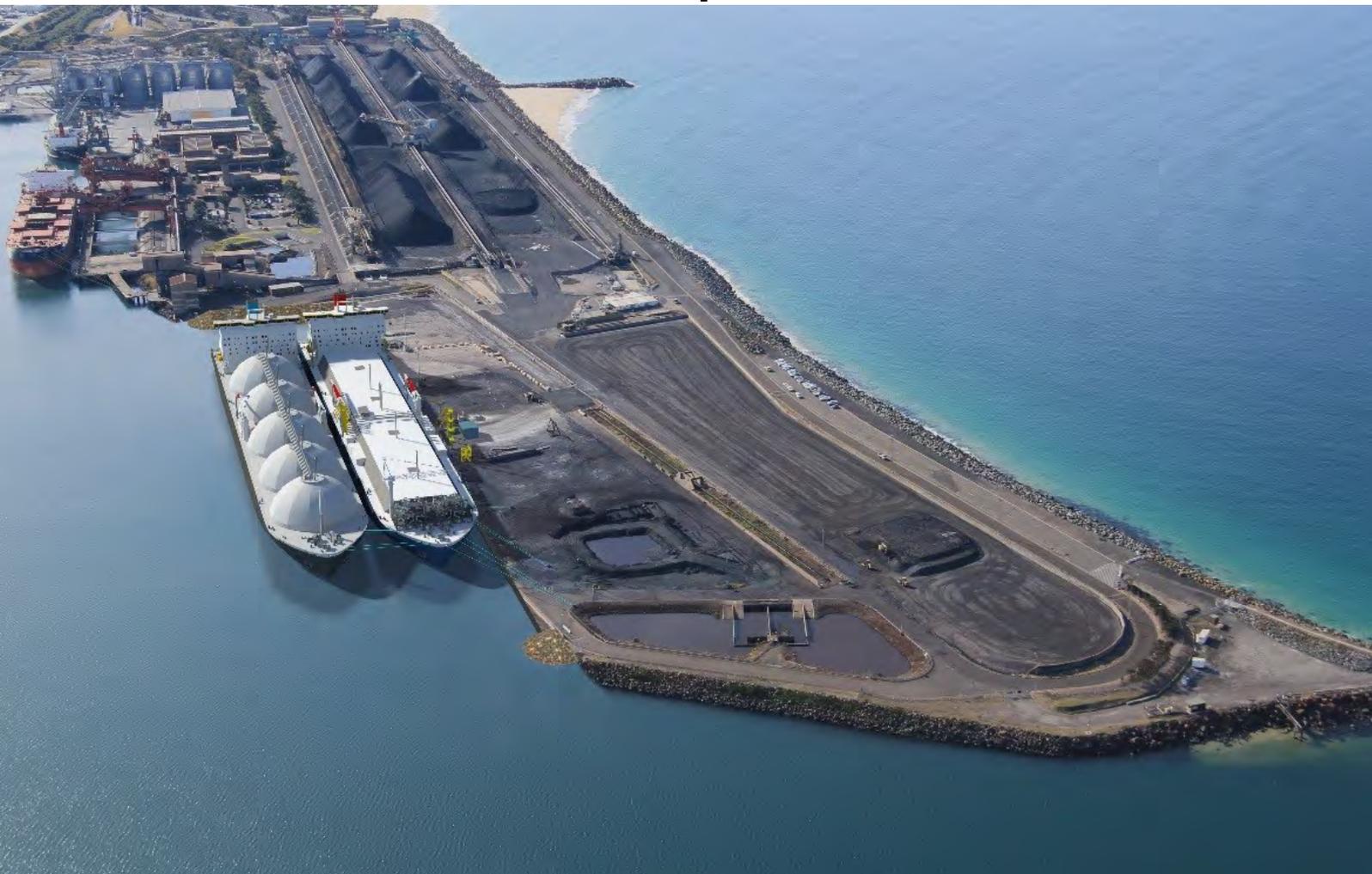
Port Kembla Gas Terminal

Air Quality Management Plan Stage 2A Marine Berth Construction and Onshore Receiving Facilities

Australian Industrial Energy

22 December 2021

→ The Power of Commitment



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Printed date	
Last saved date	22 December 2021
File name	\\ghdnet\ghd\AU\Sydney\Projects\21\27477\Tech\MP update\Stage 2A\Air Quality Management Plan\PKGT-AIE-AQMP-Stage-2A_Rev0.docx
Author	Emily Kate Marsh
Project manager	Karl Rosen
Client name	Australian Industrial Energy
Project name	East Coast Gas Project
Document title	Port Kembla Gas Terminal Air Quality Management Plan
Revision version	Rev 0
Project number	2127477
AIE document number	PKGT-AIE-PLN-020

Document status

Status Code	Author	Reviewer		Approved for issue		
		Name	Signature	Name	Signature	Date
A	Emily Kate Marsh	Sophy Townsend		Karl Rosen		20.10.2021
0	Emily Kate Marsh	Sophy Townsend		Karl Rosen		22.12.2021

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Acronyms

Acronym	Definition
AIE	Australian Industrial Energy
Air NEPM	<i>National Environment Protection (Ambient Air Quality) Measure</i>
AQMP	Air Quality Management Plan
Approved Methods	<i>The Approved Methods for the Modelling and Assessment of Air Pollutants in NSW</i>
AS	Australian Standards
Berth 101	MBD Site Compound
Clean Air Regulation	<i>Protection of the Environment Operations (Clean Air) Regulation 2021</i>
CSSI	Critical State Significant Infrastructure
CTMP	Construction Traffic Management Plan
DPIE	Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
EMS	Environmental Management Strategy
EPA	NSW Environment Protection Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPL No 21529	Environment Protection Licence
EWN	Early Warning Network
FSRU	Floating Storage and Re-gasification Unit
GHD	GHD Pty Ltd
GHG	Greenhouse gas
HSE	Health, Safety and Environment
HVAS	High Volume Air Samples
LNG	liquefied natural gas
KPI	Key Performance Indicators
MBD	Marine Berth Construction and Dredging
MLA	Marine Loading Arms
NEPC	National Environment Protection Council
NZS	New Zealand Standards
ORF	Onshore Receiving Facilities
PIRMP	Pollution Incident Response Management Plan
PKCT	Port Kembla Coal Terminal
PKGT	Port Kembla Gas Terminal
PKGT EIS	Port Kembla Gas Terminal Environmental Impact Statement
PM ₁₀	Particulate matter
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
SRD SEPP	State Environmental Planning Policy State and Regional Development
The Project	Port Kembla Gas Terminal Project
µg	microgram

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Appendix C	Dust Master Pro product datasheet

1. Introduction

1.1 Overview

This Air Quality Management Plan (AQMP) has been developed as a sub-plan to the Port Kembla Gas Terminal Project (the Project) Environmental Management Strategy (EMS). This AQMP has been prepared by GHD Pty Ltd (GHD) on behalf of Australian Industrial Energy (AIE) to apply to construction activities associated with Stage 2A construction of the Project.

This AQMP interfaces with the other associated sub-plans, which together describe the proposed structure for environmental management and monitoring requirements for the Project. This AQMP addresses the requirements of the Port Kembla Gas Terminal Environmental Impact Statement (PKGT EIS) and associated Infrastructure Approval (SSI 9471), the Environmental Protection Licence (EPL) No. 21529 and has been prepared in consultation with the NSW Environment Protection Authority (EPA).

1.2 Background

AIE is developing the Project which involves the development of a liquefied natural gas (LNG) import terminal at Port Kembla, south of Wollongong, NSW. The Project will be the first of its kind in NSW and will provide a simple and flexible solution to the state's gas supply challenges.

NSW currently imports more than 95 percent of the natural gas it uses from other eastern states. In recent years, gas supplies to the Australian east coast market have tightened, resulting in increased natural gas prices for both industrial and domestic users.

The Project provides an immediate solution to address the predicted shortages and will result in significant economic benefits for both the Illawarra region and NSW. The Project will have a capacity to deliver more than 100 petajoules of natural gas, equivalent to more than 70 percent of NSW gas needs and will provide between 10 to 12 days of natural gas storage in case of interstate supply interruption. LNG will be sourced from worldwide suppliers and transported by LNG carriers to the gas terminal at Port Kembla where it will be re-gasified for input into the NSW gas transmission network.

The Project has been declared Critical State Significant Infrastructure (CSSI) in accordance with Section 5.13 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) (NSW) and Schedule 5 of the State Environmental Planning Policy State and Regional Development (SRD SEPP). The Project received Infrastructure Approval from the Minister for Planning and Public Spaces on 29 April 2019.

The construction of the Project is primarily associated with the establishment of a new berth facility at Port Kembla to enable an LNG carrier to berth alongside the Floating Storage and Re-gasification Unit (FSRU) and new infrastructure to connect the terminal to the existing gas network. Excavation and dredging would be required to establish the new berth facility, with spoil deposited in a cell (referred to as the 'Emplacement Cell') in the Outer Harbour.

The development has progressed to Stage 2A works located at Berth 101 (referred to as 'the site' or 'MBD Site Compound'). The Stage 2A works include land-based construction works associated with the Marine Berth Construction and Dredging (MBD) and Onshore Receiving Facilities (ORF). The Stage 2A works include:

- Completion of excavation works undertaken during Stage 1 (including transport of spoil materials to Emplacement Cell Construction Site).
- Construction of the quay wall at the MBD Site Compound.
- Construction of ORF at the MBD Site Compound (including construction of Wharf Topside Area, Utility Area, and Common Area).
- Installation and commissioning of power, communications, and potable water line.
- Installation of gas pipeline within the MBD Site Compound as part of ORF.

1.3 Purpose

This AQMP has been prepared in accordance with the PKGT EIS and associated Infrastructure Approval (SSI 9471) and EPL No. 21529. It describes how the management measures and commitments in the PKGT EIS, Infrastructure Approval (SSI 9471) and EPL No. 21529 relating to air quality are to be implemented by the Principal Contractor during Stage 2A construction of the Project. Specifically, this plan includes requirements to manage and minimise potential construction air quality impacts.

This plan addresses the above requirements and includes, but is not limited to:

- Performance criteria for air quality mitigation.
- Mitigation strategies to minimise impacts on air quality.
- Monitoring plans and reporting demonstrating the performance during Stage 2A.

AIE and its contractors acknowledge that maintaining air quality in the vicinity of the MBD Site Compound is paramount to the successful delivery of the construction phase of the Project. AIE is committed to ensuring this AQMP is reviewed and updated regularly to ensure its objectives are met and that the approval conditions outlined in the Infrastructure Approval (SSI 9471) and EPL No. 21529 are achieved.

This AQMP is applicable to all staff, employees, subcontractors, and any statutory service authorities undertaking the Stage 2A works described in Section 2 of this AQMP. The AQMP implementation and on-going development will be managed by the Project Team (refer to Section 3).

2. Project overview

2.1 Site description

The site of the Project is situated at Port Kembla within the Illawarra region of NSW, about 80 kilometres south of Sydney. Port Kembla is mainly characterised by an existing import and export terminal and multiple other business, cargo, logistics, bulk goods, and heavy industrial facilities in the vicinity.

Port Kembla is situated about two kilometres south of the centre of Wollongong. Other localities surrounding Port Kembla and the Project site include Mangerton, Mount St. Thomas and Figtree to the north-west; Unanderra to the west; Berkeley to the south-west; and Cringila, Lake Heights, Warrawong and the residential region of Port Kembla to the south.

The zoned land use in the region includes special use and industrial use at Port Kembla and a mix of primarily residential and commercial uses at the surrounding localities. Major infrastructure in the region of Port Kembla includes the Princes Highway, which is a major state and regional highway connecting Sydney and Wollongong and regional areas further south. Princes Highway provides access to Port Kembla through turnoffs at Masters Road, Five Islands Road and Northcliffe Drive and is broadly utilised including by heavy vehicles from the port.

The South Coast railway line runs along the periphery of Port Kembla including the stations Port Kembla, Port Kembla North, Cringila and Lysaghts. The rail line services commuters and is also used to transport bulk solid goods like coal, grain, copper and steel from Port Kembla. The environmental features of Port Kembla and the surrounding region are limited given the extensive industrial, commercial and residential development. Waterways in the region include the Gurungaty Waterway, Allans Creek, American Creek and Byarong Creek. Green space includes JJ Kelly Park and Wollongong Golf Club to the north and a larger open area to the south-west.

The Project will be predominantly located within land zoned for dedicated port and industrial uses. Berth and wharf facilities, as well as the FSRU, would be situated at Berth 101 at the Inner Harbour, while the gas pipeline would extend around the periphery of port operations from Berth 101 to a tie-in point at Cringila. The Emplacement Cell will be located in the Outer Harbour. A site overview is provided as Figure 2.1.



Figure 2.1 Site overview

2.2 Project construction scope of works

2.2.1 Overview

The Project construction scope of work has been divided into the three main packages (with associated activities), as outlined in Table 2.1. Construction staging of the Project has been approved in accordance with Condition 3 of Schedule 4 of Infrastructure Approval SSI-9471 as per correspondence from DPIE dated 27 October 2021. This AQMP applies only to the works associated with Stage 2A.

Table 2.1 Construction stages/work packages

Stage	Package	Proposed commencement	Activities
1	Early Enabling Works	May 2021	Demolition of Berth 101, removal of structures and land-based excavation works, and Cone Penetration Testing (CPT) in the Outer Harbour to inform Emplacement Cell design and relocation of Bunker Oil Pipeline.
2A	Marine Berth Construction – Land Based	January 2022	Completion of excavation works undertaken during Stage 1. Transport of spoil materials for storage at the Emplacement Cell Construction Site. Quay wall construction.
		February 2022	Installation of communications conduit, potable water line, and 11kV power cable and Padmount Substation within MBD Site Compound.
		April 2022	Construction of the ORF, which comprises three areas: Wharf Topside Area; Utility Area; and Common Area.
		June 2022	Pipeline construction and associated ancillary infrastructure within MBD Site Compound delivered as part of ORF scope.
2B	Marine Berth Construction and Dredging – Land and Marine Based	March 2022	Continuation of Stage 2A with addition of the following activities: Excavation/dredging and construction of the Emplacement Cell in the Outer Harbour. Marine based construction activities including installation of navigational aids and revetment shore protection.
3	Pipeline Installation including tie-ins (NGP)	June 2022	Construction of an 18" onshore natural gas pipeline approximately 6.3km in length from the Berth 101 site boundary to Tie-in Facility at Cringila for connection to the Eastern Gas Pipeline. Pipeline construction to occur concurrently with Jemena, subject to separate set of management plans.

The construction of Stage 2A works is located within the former Port Kembla Coal Terminal (PKCT) Bulk Products Berth (Berth 101). As part of the Early Enabling works the removal of existing structures and services and excavation was undertaken to facilitate subsequent development stages of the Project.

The following will be undertaken as part of the Stage 2A land-based works:

- Construction of the quay wall at MBD Site Compound incorporating finalisation of excavation works undertaken during Stage 1 (including transport of spoil materials to Emplacement Cell Construction Site).
- Installation of and commissioning of power, communications, and potable water line.
- Construction of ORF at MBD Site Compound (including construction of Wharf Topside Area, Utility Area, and Common Area).
- Installation of gas pipeline within the MBD Compound site.

An outline of the tasks associated with Stage 2A is provided in Section 2.3 through Section 2.5. The site of the works includes the MBD Site Compound with materials being transported to the Emplacement Cell Construction Site. The location of the Stage 2A works, MBD Site Compound, and the Emplacement Cell Construction Site is shown in Figure 2.2.



Figure 2.2 Stage 2A works and location of MBD Site Compound and Emplacement Cell Construction Site

2.2.2 Traffic

Traffic generated by Stage 2A will be controlled through the gate on Sea Wall Road. Heavy vehicle movements will be generated by the delivery of materials, equipment, and plant to the MBD Site Compound and transport of stockpiled material to the Emplacement Cell Construction Site.

There may be a requirement to transport and tip up to 8000m³ of crushed concrete and up to 2000m³ of crushed heavily bound base course to the Emplacement Cell Construction Site via road to increase the storage footprint area within the East Stockyard and to facilitate for later use during the construction of the Emplacement Cell.

The activities associated with this task will involve loading, road transportation via truck and trailer (approximately 30-tonne capacity), unloading, stockpiling, and management of the stockpiles.

Light vehicle movements will be generated from construction workers accessing the MBD Site Compound. Parking will be provided for up to 76 workers on the MBD Site Compound (refer to Figure 2.3).

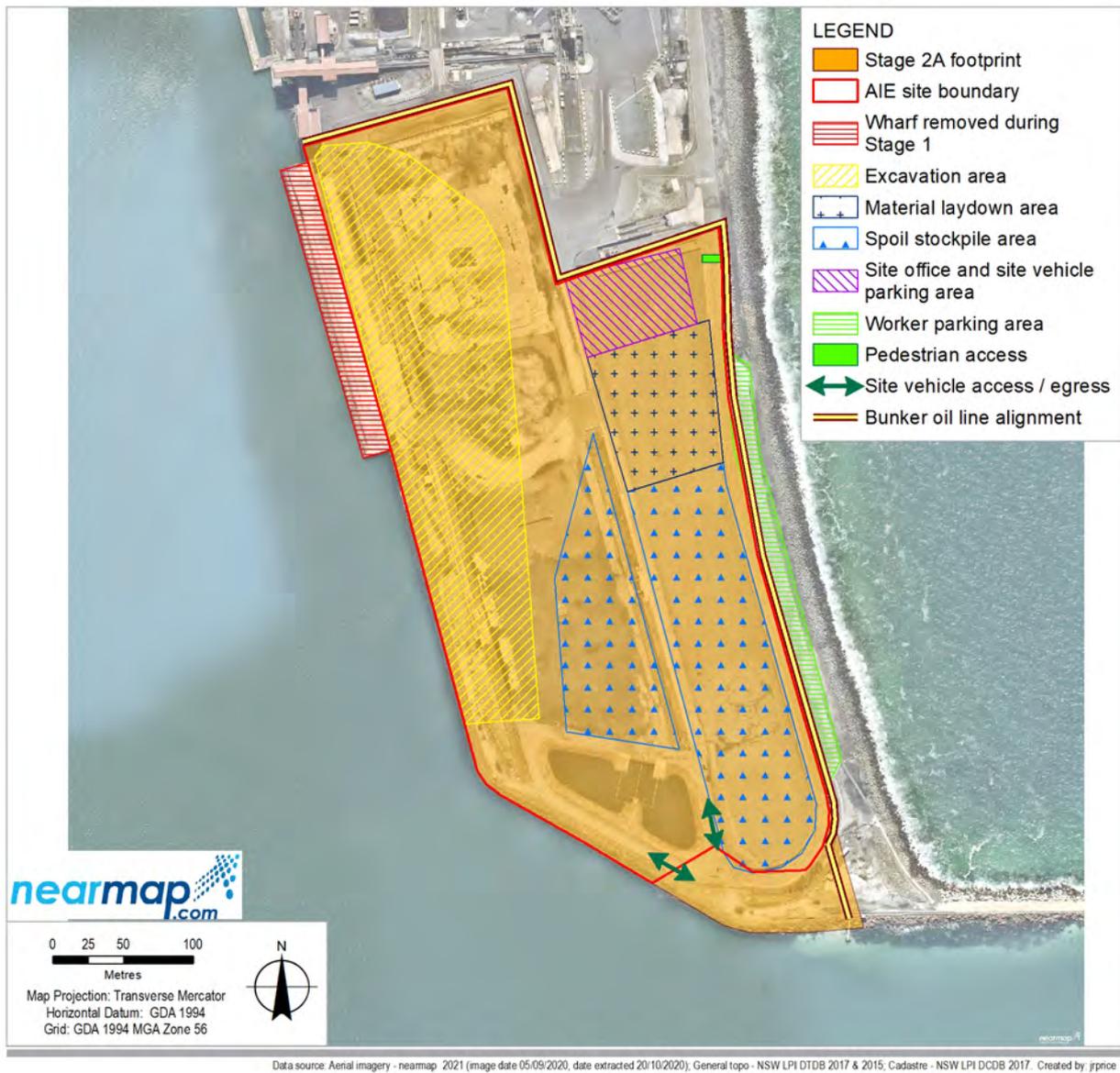


Figure 2.3 Layout of MBD Site Compound

2.2.3 Program

The Stage 2A works are anticipated to commence in January 2022. Stage 2B which includes the continuation of land-based construction and water-based works) are then anticipated to commence in March 2022 (refer to Table 2.1).

2.3 Construction of quay wall (MBD – Land Based)

A number of structures will be constructed within the MBD Site Compound to accommodate the FSRU and LNG carrier for the Project. Excavation and stockpiling activities from the Stage 1 Early Enabling Works will continue on-site during Stage 2A to lay the platform for ongoing construction activities at the MBD Site Compound.

The new structures that will commence construction during Stage 2A are summarised in Table 2.2. The location of the quay wall and layout of the marine berth and wharf facilities is shown in Figure 2.4.

Table 2.2 Marine berth and wharf structures to be constructed during Stage 2A

Component	Works required
Earthworks and stockpiles	<ul style="list-style-type: none"> – Completion of excavation and backfilling works from Stage 1 Early Enabling Works. – A nominal 15-metre-wide section on the northern end and a circa 60-metre 'wedge' at the south- west corner of the excavation zone was left to facilitate contractor access and will required completion at commencement of Stage 2A. – Excavated materials from the Early Enabling Works have been stockpiled within the Eastern and Western Stockyards of the MBD Site Compound and the Emplacement Cell Construction Site. – The excavated materials stockpiled include: <ul style="list-style-type: none"> • Approximately 15,000m³ of demolished concrete crushed to nominal 70mm minus. • Approximately 30,000m³ of heavily bound base course crushed to nominal -150mm minus. • Approximately 25,000³ of mixed slag, general fill, and coal nominally < 150mm in size. • Approximately 10,000m³ of predominantly sand with some slag and coal. – The excavated materials will be used/reused for quay wall construction and to backfill the landside area of the quay wall or transported to the Emplacement Cell Construction Site for storage and use in construction of the Emplacement Cell.
Quay wall	<ul style="list-style-type: none"> – Construction of a new piled quay wall keyed into bedrock complete with sheet pile anchor wall, capping beam and tie rods to the south of the existing coal terminal. – Excavated and processed materials from the Stage 1 Early Enabling Works are stockpiled within the MBD Site Compound and will be used during construction of the quay wall and to backfill on landside area of the wall. – Installation of a marine fender system attached to the capping beam along the quay wall to protect the quay wall from berthing and mooring loads. – Installation of a cathodic protection system to the quay wall and associated elements, including assessment of the potential impacts the FSRU and pipeline cathodic protection will have on quay wall. – Backfilling and compaction on landside area of wall utilising the site stockpiled materials.
Mooring dolphins	<ul style="list-style-type: none"> – Installation of landside mooring dolphin structures on reinforced concrete platforms supported by steel piles. – Mooring equipment will be installed and comprise the following: <ul style="list-style-type: none"> • 20 load sensing quick release hooks. • Up to four land-based mooring winches on mooring dolphins may be required. • Up to four swivel fairleads may be required to enable each mooring line to land-based winches to be fed in a horizontal alignment.
Marine Loading Arm foundations	Construction of a new reinforced concrete foundation supported on steel piles, located behind the new quay wall.
Gangway tower foundation	Construction of foundation for Gangway tower.
Fire monitor foundation	Fire monitor foundations, subject to risk studies.

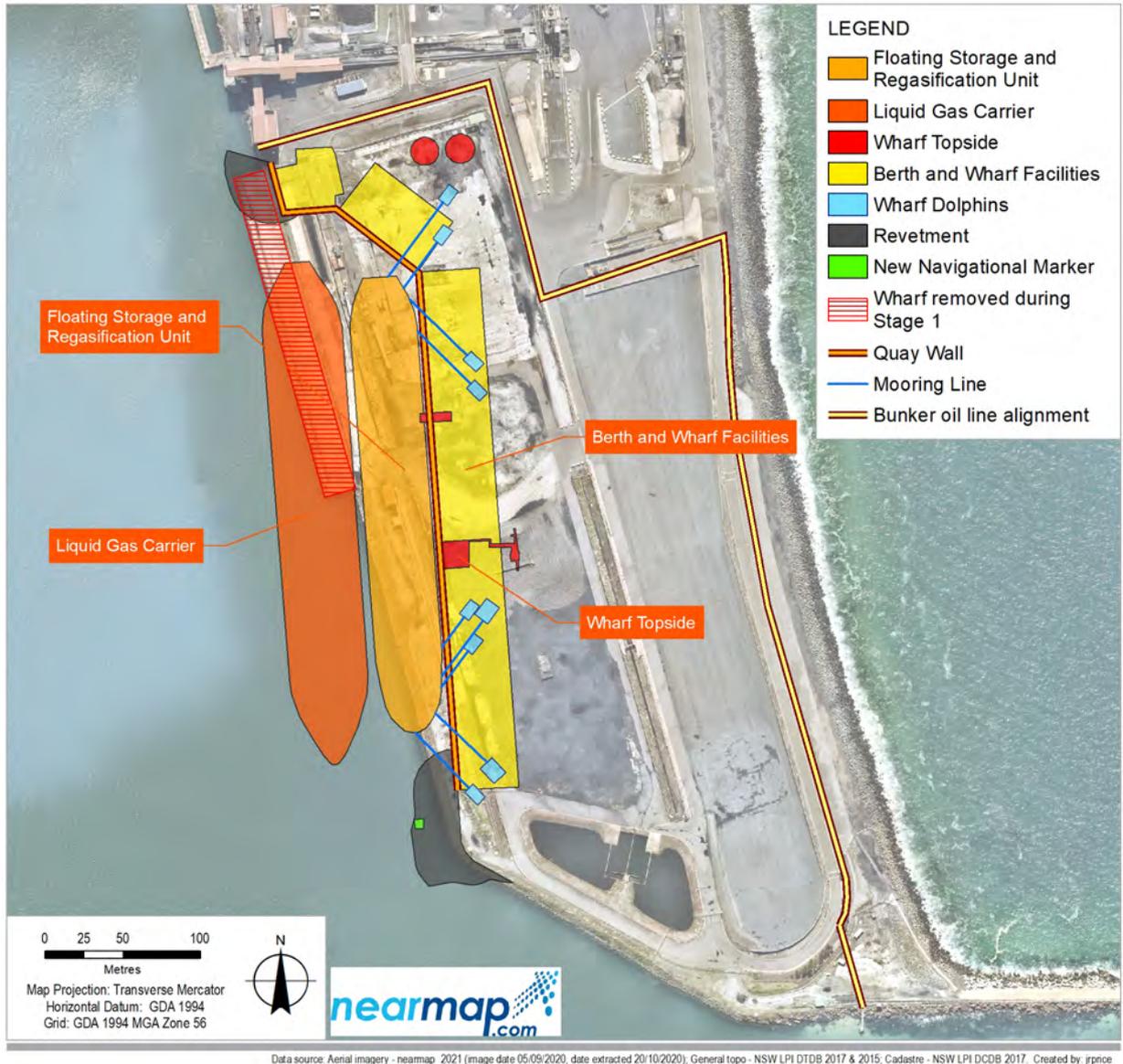


Figure 2.4 Location of quay wall and layout of MBD and ORF

2.4 Power, communications, and water connections

Works required for power, communications, and water connections are summarised in Table 2.3.

Table 2.3 Construction of power connections for Stage 2A

Component	Works required
Power and communications	<ul style="list-style-type: none"> – Construction and installation of a new 11kV power cable in a buried conduit and Substation. – Energisation of the Padmount Substation and 415kV Temporary Building Supply. – Installation of communication conduit and pits.
Potable water	<ul style="list-style-type: none"> – Extension of existing potable water line within MBD Site Compound.

2.5 Construction of ORF

The general layout of the ORF areas is shown in Figure 2.4. Works required for the three ORF areas are summarised in Table 2.4.

Table 2.4 Structures to be constructed for ORF during Stage 2A

Component	Works required
Wharf Topside Area	
Marine Loading Arms (MLAs)	Installation of MLAs, including: <ul style="list-style-type: none"> – Civils and structures. – Associated works such as piping, hydraulics, electrical, instrumentation, and auxiliary systems.
Piping and valving	<ul style="list-style-type: none"> – All necessary piping and valving. – Odorant injection facilities. – Pig launcher, downstream of the MLAs to tie-in to the Natural Gas Pipeline.
Gangway	<ul style="list-style-type: none"> – Gangway access tower to provide connection between the wharf and FSRU.
Utility connections	FSRU utilities connections for: <ul style="list-style-type: none"> – Communications. – Marine Diesel Oil. – Freshwater. – Sewage, bilge, and grey water.
Utility Area	
Site Utilities	Site utilities including: <ul style="list-style-type: none"> – Potable water and sewerage. – Instrument air and bottled nitrogen. – Diesel storage. – Electrical distribution (including UPS and emergency diesel generators). – Control and instrumentation. – Telecommunications.
Common Areas	
Firefighting systems and equipment	Firefighting equipment including: <ul style="list-style-type: none"> – Firewater storage. – Pumps – Firewater monitors.
Security systems and equipment	<ul style="list-style-type: none"> – CCTV. – Fencing and gates. – Security access and monitoring systems.
Equipment housing	Equipment shelters and buildings to house:

Component	Works required
	<ul style="list-style-type: none"> <li data-bbox="496 210 1501 264">– Electrical, control, and operating equipment, critical spares, emergency response and site monitoring facilities. <li data-bbox="496 271 1501 324">– Buildings will include appropriate building services e.g., HVAC, potable water, amenities, sewerage etc.
Site roadways, lighting and drainage	<ul style="list-style-type: none"> <li data-bbox="496 338 847 369">– Roads and car parking areas. <li data-bbox="496 376 991 407">– General lighting, earthing, lightning system. <li data-bbox="496 414 1278 445">– Drainage system to tie into the existing Port Kembla drainage system.
Gas Pipeline	<p data-bbox="496 456 1501 566">A section of gas pipeline will be installed within the MBD Compound site as part of the Stage 2A works. Final safety studies will be prepared prior to the construction of the gas pipeline and prior to commencement of operation as per Schedule 3, Condition 21 of Infrastructure Approval (SSI 9471).</p>

3. Roles and responsibilities

The Project Team is responsible for all activities associated with Stage 2A, including the implementation and maintenance of the various air quality mitigation/management measures. Relevant roles and responsibilities of the Project Team for air quality mitigation are outlined in Table 3.1.

Table 3.1 Roles and responsibilities of Project Team

Project Role	Responsibility
AIE Project Director	<ul style="list-style-type: none"> – Responsible for the overall funding and direction of civil and environmental works associated with Stage 2A. – Ensuring provision of adequate resources to achieve the environmental objectives for the project including ensuring sufficient resourcing for the Environmental Team, Engineering and Construction Teams.
AIE Construction Manager	<ul style="list-style-type: none"> – Proactively stewards the effective implementation of Stage 2A in accordance with requirements of the Infrastructure Approval (SSI 9471), this AQMP, EMS, and all related Sub-Plans. – Demonstrate proactive support for environmental requirements.
AIE HSE Manager	<ul style="list-style-type: none"> – Develops and update all Health, Safety and Environmental (HSE) Management Strategies and Sub-Plans. – Ongoing liaison and engagement with government agencies and point of escalation for any environmental incidents. – Identifying environmental issues as they arise and proposing solutions. – Coordinate and facilitate weekly environmental inspections with the key contractors. – Environmental Reporting.
Principal Contractor Project Manager	<ul style="list-style-type: none"> – On-site Project management and control. – Decision-making authority relating to environmental performance of the construction program. – Authority over Project construction and site activities in accordance with the EMS. – Ensure relevant training is provided to all Project staff prior to commencing individual activities. – Reports to AIE Construction Manager on environmental matters. – Ensures appropriate Contractor resources are allocated to implement the environmental requirements. – Responsible for planning and scheduling of construction, and to ensure operations are conducted in accordance with statutory requirements and the EMS. – Monitors performance against environmental Key Performance Indicators (KPI's). – Ensures that all environmental objectives associated with the Project are achieved. – Day-to-day decision-making authority relating to environmental performance of construction activities and direct site activities and construction. – To provide resources to ensure environmental compliance and continuous improvement. – Ensure all personnel are aware of any changes to EMS, this AQMP and improved procedures. – Ensure this AQMP is implemented for the duration of Stage 2A.
Principal Contractor Construction Foreman	<ul style="list-style-type: none"> – Implement requirements contained in the EMS and Sub-Plans, work procedures and standard drawings. – Maintaining open and transparent communication with other Project discipline managers and other areas of the Project. – Reporting of hazards and incidents and implementing any rectification measures. – Ensures appropriate contractor resources are allocated. – Orders STOP WORK for any environmental breaches and reports incidents to the Project Manager. – Ensure this AQMP is implemented for the duration of Stage 2A.

Project Role	Responsibility
Principal Contractor Environmental Representative	<ul style="list-style-type: none"> – Delivers environmentally focussed toolbox talks and provides applicable site inductions. – Provides environmental advice, assistance, and direction to Project Manager to ensure construction activities are conducted in accordance with regulatory legislation and this EMS. – Participate and cooperate with AIE HSE Manager with regards to undertaking of joint weekly environmental site inspections. – Coordinate / undertake wet-weather inspections as per EPL No. 21529 and report accordingly to the AIE HSE Manager. – Develop strong working relationships with the AIE team and Consultants. – Ensure environmental risks are appropriately identified, communicated, and effectively managed. – Ensure communication of relevant environmental information to Project personnel. – Provide specialist advice and input as required. – Ensure construction manager, superintendents and field supervisors fully understand the environmental constraints and how construction practices must ensure any such constraints are considered and mitigated against during construction. – Orders STOP WORK for any environmental breaches and immediately reports incidents to Principal Contractor Project Manager and AIE HSE Manager.
AIE Environmental Representative	<ul style="list-style-type: none"> – Develop strong working relationships with the Principal Contractor Team and Consultants. – Ensure environmental risks are appropriately identified, communicated, and effectively managed. – Instruct and advise management team on compliance issues. – Provide specialist advice and input as required. – Co-ordinate internal audits of this AQMP. – Conduct audit review as required. – Reports on the performance of this AQMP and recommends changes or improvements to Project Manager. – Orders STOP WORK for any environmental breaches and immediately reports incidents to the AIE Construction Manager and AIE HSE Manager. – Conducts investigation and response to environmental complaints and inquiries, where required.
Subcontractors and construction personnel	<ul style="list-style-type: none"> – Undertake an environmental induction prior to accessing to site. – Comply with legislative requirements. – Participate in weekly inspections and audits. – Follow environmental procedures. – Report all environmental incidents and hazards. – Introduce environmental topics to prestart meetings. – Ensure that all relevant permits and clearances are in place prior to commencing work.

4. Legislative requirements

The legislative requirements applicable to Stage 2A are listed in Table 4.1.

Table 4.1 Legislation and relevant policy applicable to this AQMP

Legislation and Regulation	Description	Applicability
Federal		
<i>National Environment Protection (Ambient Air Quality) Measure</i>	<p>The National Environment Protection Council (NEPC) set uniform national standards for ambient air quality in February 2016. These are known as the <i>National Environment Protection (Ambient Air Quality) Measure</i> (the Air NEPM). The Air NEPM outlines the monitoring procedures, assessment, and reporting measures that participating jurisdictions must undertake in regard to pollutants such as:</p> <ul style="list-style-type: none"> – PM₁₀ and PM_{2.5}. – toxic pollutants including carbon monoxide (CO), nitrogen dioxide (NO₂), and sulfur dioxide (SO₂). <p>The Air NEPM outlines national environmental protection goals and standards for ambient air quality protection for human health and well-being.</p>	<p>NSW is a participating jurisdiction to the Air NEPM. The NSW EPA and the Department of Planning, Industry and Environment (DPIE) are the agencies responsible for implementing how the Air NEPM is implemented. The <i>Approved Methods for the Modelling and Assessment of Air Pollutants in NSW</i> (NSW EPA, 2016) (Approved Methods) guidelines have been consulted for this AQMP, as outlined below.</p>
State		
<i>Protection of the Environment Operations Act 1997 (POEO Act)</i>	<p>The objectives of the POEO Act are to protect and enhance the environment of NSW with regard to the need for ecologically sustainable development. The Act provides mechanisms to reduce risks to human health and the degradation of the environment. The POEO also outlines the Scheduled Activities that require an EPL in order to be carried out.</p>	<p>An EPL has been issued for the Project (EPL No. 21529) which outlines the monitoring requirements related to air quality that must be implemented for the construction and operational phases of the Project. Conditions related to monitoring requirements for Stage 2A construction works regarding air quality as addressed within this AQMP. Activities undertaken onsite must not contribute to environmental degradation, and pollution and air emissions must not exceed the standards.</p>
<i>Protection of the Environment Operations (Clean Air) Regulation 2021</i> The Clean Air Regulation	<p>The Clean Air Regulation is made under the POEO Act and provides regulatory measures to control emissions from motor vehicles, fuels, and industry.</p>	<p>Part 5 Division 2 outlines the standards for Scheduled premises applicable to the Project (being Group 6) regarding variations to EPL No. 21529 regarding air impurity emissions and determining if standards have been exceeded. Scheduled 3 of the Clean Air Regulation outlines the standard of concentration applicable to the Project.</p>
<i>The Approved Methods for the Modelling and Assessment of Air Pollutants in NSW</i> (EPA, 2016)	<p>The Approved Methods lists the statutory methods for modelling and assessing emissions of air pollutants from stationary sources in NSW. It considers the above legislation to construct relevant pollutant assessment criteria.</p>	<p>The Approved Methods assess the cumulative (background plus incremental site emissions) pollutant impact at the site boundary or the nearest existing or likely future off-site sensitive receptor depending on pollutant. Background concentrations of air pollutants are ideally obtained from ambient monitoring data collected at a proposal site in accordance with the Approved Methods.</p> <p>The Approved Methods recognises that this data is rare, and that data is typically obtained from monitoring sites as close as possible to a proposal site, where sources of air pollution resemble the existing sources at the Project site.</p>

5. Planning requirements

5.1 Conditions of approval

The planning requirements and the corresponding air quality management measures applicable to Stage 2A are listed in Table 5.1 and Table 5.2. Management measures are detailed in Section 6 through Section 9.

The planning requirements include the conditions set out in the Infrastructure Approval (SSI 9471) dated 24 April 2019, the EPL No. 21529 conditions and the mitigation/management measures outlined in the PKGT EIS.

Table 5.1 Planning requirements

Requirement	Reference	Responsibility	Evidence	Applicability to this AQMP
Infrastructure Approval Requirements (SSI 9471)				
The proponent must ensure that no offensive odours are emitted from the development, as defined under the POEO Act.	Schedule 3, Condition 30	<ul style="list-style-type: none"> – AIE HSE Manager – Principal Contractor Project Manager 	Section 6.2 Section 11.2	Applicable
The proponent must minimise and/or prevent the: <ul style="list-style-type: none"> – dust emissions of the development, including wind-blown and traffic generated dust. – surface disturbance of the development. – greenhouse gas emissions of the development. 	Schedule 3, Condition 31	<ul style="list-style-type: none"> – AIE HSE Manager – Principal Contractor Project Manager 	Section 7	Applicable
The proponent must ensure that air emissions from the development comply with the requirements of any EPL issued for the development.	Schedule 3, Condition 32	<ul style="list-style-type: none"> – AIE HSE Manager – Principal Contractor Project Manager 	Section 5.2	Applicable
<p>Air Quality Verification Program</p> <p>Prior to the commencement of operations, the Proponent must prepare an air quality verification program plan in consultation with the EPA and to the satisfaction of the Planning Secretary.</p>	Schedule 3, Condition 32A			Not applicable
The Proponent must implement the approved Air Quality Verification Program.	Schedule 3, Condition 32B			Not applicable
<p>Air Quality Management Plan</p> <p>Prior to commencement of construction, unless otherwise agreed by the Secretary, the Proponent must prepare an AQMP for the development to the satisfaction of the Secretary. This plan must:</p> <ul style="list-style-type: none"> – be prepared in consultation with the EPA. – describe the measures that would be implemented to ensure compliance with the conditions of this approval and EPL including: <ul style="list-style-type: none"> • objectives and performance criteria, including trigger levels for investigating any potential or actual adverse impacts associated with air emissions. • proactive and reactive management measures for air emissions. • a plan to respond to any exceedances of the trigger levels and/or performance criteria and minimise any adverse air quality impacts of the development. – include an air quality monitoring program that includes: <ul style="list-style-type: none"> • a detailed description of the air quality monitoring that would be undertaken. 	Schedule 3, Condition 33	<ul style="list-style-type: none"> – AIE HSE Manager – Principal Contractor Project Manager – Principal Contractor Environment Rep 	This AQMP Section 6 Section 7	Applicable

Requirement	Reference	Responsibility	Evidence	Applicability to this AQMP
<ul style="list-style-type: none"> real-time dust monitoring during construction and point source discharge monitoring from the FSRU during operations. a gas leak detection and repair program. reporting procedures for the results of the monitoring program. 				
The proponent must implement the approved AQMP for the development.	Schedule 3, Condition 34	<ul style="list-style-type: none"> AIE HSE Manager Principal Contractor Project Manager 	This AQMP	Applicable
<p>Meteorology</p> <p>Prior to commencement of construction, the proponent must ensure that there is a suitable meteorological station operating in the vicinity of the site. The meteorological station must be maintained so as to be capable of continuously monitoring the following parameters: air temperature, wind direction, wind speed, rainfall, relative humidity, and any requirement specified in an EPL.</p> <p>Unless a suitable alternative is approved by the Secretary following consultation with the EPA, the meteorological station must be capable of monitoring weather conditions in accordance with:</p> <ul style="list-style-type: none"> AM-1 Guide to Siting of Sampling Units (Australian Standards (AS) 2922- 1987). AM-2 Guide for Horizontal Measurement of Wind for Air Quality Applications (AS 2923-1987). AM-4 On-Site Meteorological Monitoring Program Guidance for Regulatory Modelling Applications. 	Schedule 3, Condition 35	<ul style="list-style-type: none"> AIE HSE Manager Principal Contractor Project Manager 	Section 9	Applicable
PKGT EIS Management Measures				
Water material prior to it being loaded for on-site haulage, where appropriate.	EIS Measure AQ1	<ul style="list-style-type: none"> Principal Contractor Construction Foreman 	Section 7	Applicable
Aim to minimise the size of storage piles where possible.	EIS Measure AQ2	<ul style="list-style-type: none"> Principal Contractor Construction Foreman 	Section 7	Applicable
Limit cleared areas of land and clear only when necessary to reduce fugitive dust emissions.	EIS Measure AQ3	<ul style="list-style-type: none"> Principal Contractor Construction Foreman 	Section 7	Applicable
Control on-site traffic by designating specific routes for haulage and access and limiting vehicle speeds to below 25 km/hr	EIS Measure AQ4	<ul style="list-style-type: none"> Principal Contractor Construction Foreman 	Section 7 Also refer to Construction Traffic Management Plan (CTMP)	Applicable

Requirement	Reference	Responsibility	Evidence	Applicability to this AQMP
All trucks hauling material will be covered on the way to the site and maintain a reasonable amount of vertical space between the top of the load and top of the trailer.	EIS Measure AQ5	– Principal Contractor Construction Foreman	Section 7 Also refer to CTMP	Applicable
Operations conducted in areas of low moisture content material should be suspended during high wind speed events or water sprays should be used.	EIS Measure AQ6	– Principal Contractor Construction Foreman	Section 7	Applicable
All plant and equipment used during the construction works shall be regularly maintained to comply with the relevant exhaust emission guidelines	EIS Measure G1	– AIE HSE Manager – Principal Contractor Environment Rep – Principal Contractor Project Manager – Principal Contractor Construction Foreman	Section 7.4	Applicable
Sustainable procurement practices will be adopted where feasible.	EIS Measure G2	– Principal Contractor Environment Rep – Principal Contractor Project Manager – Principal Contractor Construction Foreman	Section 7.4	Applicable
The following measures will be considered by contractor(s): – Construction materials sourced locally where possible. – Construction materials that have minimal embodied energy be selected. – Use of PVC plastic minimised. – Construction materials that are low maintenance and durable. – Plant and equipment will be switched off when not in constant use and not left idling. – Plant and equipment brought onsite will be regularly serviced and energy efficient vehicles or equipment will be selected where available. – Any plant and equipment that is not working efficiently (i.e., emitting excessive smoke) will be removed from site and replaced as soon as possible. – Construction works will be planned to ensure minimal movement of plant and equipment, including barges.	EIS Measure G3	– AIE HSE Manager – Principal Contractor Environment Rep – Principal Contractor Project Manager – Principal Contractor Construction Foreman	Section 7.4	Applicable

5.2 Environmental Protection Licence

The NSW EPA has issued an EPL (EPL No. 21529) for the Project, with the relevant monitoring and reporting conditions incorporated in this plan. Conditions applicable to air quality and monitoring requirements are outlined in Table 5.2.

Furthermore, it is anticipated that limits, monitoring, and reporting requirements will be updated at the completion of the construction phase of the Project. Prior to the commencement of the Projects operations, an Operational AQMP will be developed by AIE and replace this Construction AQMP.

Table 5.2 EPL No. 21529 conditions

Condition	Reference	Evidence
<p>Location of monitoring/discharge points and areas</p> <p>The following points referred to in the table below are identified in this licence for the purposes of monitoring and/or the setting of limits for the emission of pollutants to the air from the point (refer to Figure 2.2).</p>	Condition P1.1	Section 8
<p>The following points referred to in the table below are identified in this licence for the purposes of weather and/or noise monitoring and/or setting limits for the emission of noise from the premises (refer to Figure 2.2).</p>	Condition P1.3	Section 9
<p>Potentially offensive odour</p> <p>The licensee must not cause or permit the emission of offensive odour beyond the premises boundary.</p> <p>Note: Section 129 of the POEO Act, provides that the licensee must not cause or permit the emission of any offensive odour from the premises but provides a defence if the emission is identified in the relevant environment protection licence as a potentially offensive odour and the odour was emitted in accordance with the conditions of a licence directed at minimising odour.</p>	Condition L4.1	Section 6.2 Section 11.2
<p>Dust</p> <p>The premises must be maintained in a condition that minimises and/or prevents the emission of dust from the premises at all times.</p>	Condition O3.1	Section 7
<p>Trucks entering and leaving the premises (including travelling between non-contiguous areas of the premises) that are carrying loads of dust generating materials must have their loads covered at all times, except during loading and unloading.</p>	Condition O3.2	Section 7.1
<p>Any material that is proposed to be crushed or grinded or screened at the premises must not contain any asbestos.</p>	Condition O6.1	Section 7.1
<p>Excavated material will need an asbestos clearance certificate from a third party licensed asbestos assessor prior to being crushed or grinded or screened.</p> <p>For the purposes of the condition above, 'excavated material' excludes raw slag, concrete or basecourse.</p>	Condition O6.2	Table 7.1
<p>Monitoring records</p> <p>The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.</p>	Condition M1.1	Section 11.2
<p>All records required to be kept by this licence must be:</p> <ol style="list-style-type: none"> in a legible form, or in a form that can readily be reduced to a legible form kept for at least 4 years after the monitoring or event to which they relate took place; and produced in a legible form to any authorised officer of the EPA who asks to see them. 	Condition M1.2	Section 11.2
<p>Requirement to monitor concentration of pollutants discharged</p> <p>For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns (refer to Table 6.1 and Table 8.1).</p>	Condition M2.1 Condition M2.2	Table 6.1 Section 8 Table 8.1

Condition	Reference	Evidence
<p>Weather monitoring</p> <p>At the point(s) identified below, the licensee must monitor (by sampling and obtaining results by analysis) the parameters specified in Column 1 of the table below, using the corresponding sampling method, units of measure, averaging period and sampling frequency, specified opposite in the Columns 2, 3, 4 and 5 respectively (refer to Figure 2.2 and Table 9.1).</p>	Condition M6	Section 9
<p>The licensee must monitor and record temperature, humidity, wind direction, wind velocity and rainfall at either the project weather station, or through analysis of equivalent weather information obtained from the Australian Bureau of Meteorology.</p> <p>Monitoring must:</p> <ol style="list-style-type: none"> a. be representative of the catchment, b. be undertaken prior to any works that may cause sediment or dust to leave the premises; and c. continue to be operated until soil disturbance activities cease at the premises and the site has been stabilised. 	Condition M6.2	Section 9
<p>Recording of pollution complaints</p> <p>The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.</p>	Condition M7.1	Section 10
<p>The record must include details of the following:</p> <ol style="list-style-type: none"> a. the date and time of the complaint b. the method by which the complaint was made c. any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect d. the nature of the complaint e. the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and f. if no action was taken by the licensee, the reasons why no action was taken. 	Condition M7.2	Section 10 Section 13.1
<p>The record of a complaint must be kept for at least 4 years after the complaint was made.</p> <p>The record must be produced to any authorised officer of the EPA who asks to see them.</p>	Condition 7.3 Condition 7.4	Section 10
<p>Telephone complaints line</p> <p>The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.</p> <p>The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.</p>	Condition M8.1 Condition M8.2	Section 10
<p>Notification of environmental harm</p> <p>Notifications must be made by telephoning the Environment Line service on 131 555. Note: The licensee or its employees must notify all relevant authorities of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.</p> <p>The licensee must provide written details of the notification to the EPA within 7 days of the date on which they became aware of the incident.</p>	Condition R2.1 Condition R2.2	Section 12.1.2
<p>The Licensee must prepare a 'Pollution Incident Response Management Plan' (PIRMP) that complies with Part 5.7A of the POEO Act (1997) in relation to the activity to which the licence relates. The PIRMP must be in the form required by the 'Regulations' and include the following:</p> <ul style="list-style-type: none"> - the procedures to be followed by the holder of the relevant environment protection licence, or the occupier of the relevant premises, in notifying a pollution incident to: <ul style="list-style-type: none"> (i) the owners or occupiers of premises in the vicinity of the premises to which the environment protection licence or the direction under section 153B relates, and 	Condition E2.1	Section 12.2 Section 13.3

Condition	Reference	Evidence
<p>(ii) the local authority for the area in which the premises to which the environment protection licence or the direction under section 153B relates are located and any area affected, or potentially affected, by the pollution, and</p> <p>(iii) any persons or authorities required to be notified by Part 5.7.</p> <ul style="list-style-type: none"> - a detailed description of the action to be taken, immediately after a pollution incident, by the holder of the relevant environment protection licence, or the occupier of the relevant premises, to reduce or control any pollution, - the procedures to be followed for co-ordinating, with the authorities or persons that have been notified, any action taken in combating the pollution caused by the incident and, in particular, the persons through whom all communications are to be made, - any other matter required by the regulations, including 'Keeping of Plan', 'Testing of Plan', 'Making Plan Readily Available' and 'Implementation of Plan'. 		

6. Air quality monitoring criteria

6.1 Overview

Based on the Air Quality Impact Assessment for the Project (GHDb, 2018), dust and particulate matter were identified as the primary emission to air during the construction phase of the Project, including Stage 2A described in Section 2.2, with PM₁₀ as the primary pollutant of concern. The predicted daily and annual maximum PM₁₀ concentration in the ambient air (including background concentration) during the construction phase within the Project footprint would be 360ug/m³ and 130ug/m³ respectively, with no expected exceedance of the 24-hour and annual averages criteria of the Approved Methods (NSW EPA, 2016) at sensitive receptors. This is consistent with the air quality data obtained from surrounding land uses in Port Kembla, which demonstrates results indicative of the heavily industrialised surrounds of the Project.

6.2 Performance criteria

Based on the impact assessment, the adopted performance criteria for the construction phase of the Project are summarised in Table 6.1, which have been set at more conservative levels to enable intervention and management prior to exceedance of the maximum predicted levels (i.e. those predicted in the Air Quality Impact Assessment). Performance criteria are applicable to all monitoring locations.

The performance criteria for odour management is to not generate offensive odours which have potential to adversely affect nearby land and port users, or sensitive receptors for the full span of the construction activities.

The objectives of air quality monitoring are the following:

- To continue monitoring at monitoring locations described in Table 8.1 which is in accordance with the current EPL No. 21529.
- To ensure that there will be no elevated dust measurements exceeding the performance criteria provided in Table 6.1.

Stage 2A is not expected to generate materials with offensive odours. If unknown unexpected materials with offensive odours are encountered during these works, the Unexpected Finds Protocol developed for the Stage 2A Spoil Management Plan will be implemented and the materials assessed accordingly.

Table 6.1 Air quality performance criteria

Parameter	Averaging Period	Performance criteria
PM ₁₀	24-hour	200ug/m ³
PM ₁₀	Annual	90ug/m ³
Visible Dust	Visual Observation	Dust generation (with potential migration from site)
Offensive Odour	Olfactory Observation	N/A

7. Impact of works and mitigation

7.1 Overview of air quality management during Stage 2A

The risks to air quality and associated mitigation/management measures that will be implemented during Stage 2A are outlined in Table 7.1. Further details are provided in Section 8 through Section 9. Compliance and reporting requirements are addressed in Section 11.

Table 7.1 Risk and mitigation measures for Stage 2A works

Risk	Mitigation/management measures	Implementation/trigger level	Responsibility	Approval conditions requirement
Dust	<ul style="list-style-type: none"> – Dust suppression system such as fill dampening prior to and during excavation via watercarts (preferable recycled water from pond or water treatment plant) and sprays in stockpiling areas. – Appropriate dust mitigation equipment will be used including water sprays onto stockpiles and water carts. – Low elevation stockpiles where possible. – Travel speeds of vehicles on site to be kept below 25km/h as per site signage. – Strategic excavation plan to reduce size of excavation face and loose material that is most susceptible to erosion. – Permanent roads to be sealed and well maintained. – Wheel wash and/or shaker grid to be used to prevent sediment migration onto sealed roads via tired vehicles and the creation of dust. – Real time dust monitoring. – All trucks hauling material will be covered on the way to the site and maintain a reasonable amount of vertical space between the top of the load and top of the trailer. Loads will undergo periodic inspections to ensure loads are properly covered. Additional information is provided in the Stage 2A Construction Traffic Management Plan. – Potential dust from construction works shall be managed, if required, through a range of methods which may include wet suppression (water sprays), wind breaks, and reducing or ceasing associated activities during high wind events. – Weather forecasts are to be reviewed daily to assess associated risks with the following day’s programmed activities, modifying the activities where appropriate and ensure appropriate controls are available. – Erosion and sedimentation controls will be checked and maintained regularly during construction. 	Established prior to works and maintained full time	<ul style="list-style-type: none"> – AIE HSE Manager – Principal Contractor Project Manager 	<ul style="list-style-type: none"> – EIS AQ 1 – EIS AQ 2 – EIS AQ 3 – EIS AQ 4 – EIS AQ 5 – EIS AQ 6 – IA Schedule 3, Condition 7 – IA Schedule 3, Condition 31
	<ul style="list-style-type: none"> – Seal off stockpile surfaces as they are constructed, the final surface is to be compressed and smoothed with flush face of excavator buckets. – Access roads to be kept dampened, regularly inspected, and cleaned. 	Daily	<ul style="list-style-type: none"> – AIE HSE Manager – Principal Contractor Project Manager 	<ul style="list-style-type: none"> – IA Schedule 3, Condition 30 – IA Schedule 3, Condition 31 – IA Schedule 3, Condition 32

Risk	Mitigation/management measures	Implementation/trigger level	Responsibility	Approval conditions requirement
	<ul style="list-style-type: none"> Excavation faces and stockpiling works to be maintained free of visible dust generation using truck mounted water carts. On completion of stockpiling, stabilise erodible stockpiles with polymer, such as Vital Stone (refer to Section 7.2). 	At completion of stockpile; or in response to Amber or Red Trigger Level Alert	<ul style="list-style-type: none"> AIE HSE Manager Principal Contractor Project Manager 	<ul style="list-style-type: none"> IA Schedule 3, Condition 31
Combustion engine emissions	<ul style="list-style-type: none"> Well maintained modern fleet of machines to be used during Stage 2A. Modern exhaust system to meet Australian standard/ best practice. Where available hybrid machines used to reduce the dependence on diesel powered engines. Switch off plant and equipment when not in constant use and do not leave idling. Regularly service and maintain all plant and equipment, including dust suppression equipment. All plant and equipment to be operated in a proper and efficient manner in accordance with the equipment specifications. Ensure energy efficient vehicles or equipment are used, where available. Any plant and equipment that is not working efficiently (i.e., emitting excessive smoke) will be removed from site and replaced as soon as possible. 	Established prior to works and maintained full time	<ul style="list-style-type: none"> AIE HSE Manager Principal Contractor Project Manager 	<ul style="list-style-type: none"> IA Schedule 3, Condition 30 IA Schedule 3, Condition 31 IA Schedule 3, Condition 32
Extreme weather	<ul style="list-style-type: none"> Customised alerts will be provided by the Early Warning Network (EWN) to the Stage 2A construction and environmental management team which will allow for maximum preparation of mitigation measures to minimise impacts of high wind, storm, or bushfire events. If extreme wind conditions result in large amounts of dust that cannot be mitigated by watercart, works are to cease until the time that dust is suitably controlled. Weather forecasts and observations will be used as a tool to determine the need and frequency of dust suppression activities such as via water cart spraying and spray canons. 	Per event	<ul style="list-style-type: none"> AIE HSE Manager Principal Contractor Project Manager 	<ul style="list-style-type: none"> EIS AQ 6 IA Schedule 3, Condition 31
Surface disturbance	<ul style="list-style-type: none"> Surface disturbance is to only occur within the approved Project development boundary. Construction area will be delineated on drawings and on site (e.g., installation of fencing or flagging where appropriate). 	Established prior to works and maintained full time	<ul style="list-style-type: none"> AIE HSE Manager Principal Contractor Project Manager 	<ul style="list-style-type: none"> IA Schedule 3, Condition 31

Risk	Mitigation/management measures	Implementation/trigger level	Responsibility	Approval conditions requirement
	<ul style="list-style-type: none"> – Surface stabilisation i.e., concreting or soil binders will be utilised progressively throughout the Project as applicable to the stage of works. 			
Materials to be crushed/ grinded contains asbestos	<ul style="list-style-type: none"> – Material to be crushed shall be checked to ensure it does not contain any asbestos. – If the material contains asbestos and still needs to be crushed, the asbestos will be removed first and validated prior to crushing/ grinding. Additional information is provided in the Stage 2A Contaminated Spoil Protocol. 	Established prior to works and maintained full time	<ul style="list-style-type: none"> – AIE HSE Manager – Principal Contractor Project Manager – Principal Contractor Construction Foreman 	<ul style="list-style-type: none"> – EPL No. 21529 Condition O6.2

7.2 Stockpiling

Excavated material will be stockpiled within the MBD Site Compound during Stage 2A. Stockpiled materials suitable for placement in the Emplacement Cell will be transported to the Emplacement Cell Construction Site for later use in the construction of the Emplacement Cell for Stage 2B. Stockpile mitigation measures are outlined above in Table 7.1 and include:

- Polymer application:
 - Vital Stonewall is a single use polymer, when applied to a completed stockpile will reduce dust generation and sediment run off for up to six months. Polymer will be reapplied if the stockpile life is longer than six months. Vital Stonewall is suitable for use adjacent to marine environments. Further details regarding Vital Stonewall are included in Appendix A. An equivalent product to Vital Stonewall may also be used.
 - Additional polymer may be applied to stockpiles prior to completion in response to elevated dust measurements where dust plumes are observed to be coming from stockpiles, or if visual inspections reveal deterioration of surface sealing.
- Bucket sealing of stockpiles, as they are formed.
- Minimising active stockpiling surface area. Stockpiling will be minimised, where possible. Land-based excavations will be directly loaded to trucks and transported to the Emplacement Cell Site or offsite disposal, without stockpiling, to reduce handling and potential dust generation. Stockpiling will be required when storage of material is required prior to the Emplacement Cell being ready to receive material.
- Active stockpiles will be dampened via spray canon or the likes, where necessary (e.g., during windy conditions).

7.3 Dust and mud control

All sites will implement controls to minimise mud tracked on to roads and subsequent dust generation. Controls include:

- Use of existing hard stand roads, where possible.
- Construction of stable haul roads.
- Utilisation of wheel wash at the MBD Site Compound and Emplacement Cell Construction Site.
- Scheduling of regular road sweeping, once per week on an as-needed basis across site access points at the MBD Site Compound and Emplacement Cell Construction Site.
- All road-going loads secured, soil and sediment loads covered and wheels free of dirt.
- Road going trucks to have sealed tailgates to minimise spillage on public roads.
- Soil and sediment to be wetted down prior to transport where necessary.
- Road sweeping to be available in response to an observation of mud being tracked onto roads.
- Utilising water cart to spray water onto haul roads during dry and windy conditions.

7.4 Greenhouse gas emissions

The PKGT Greenhouse Gas Assessment (GHDc, 2018) estimated Scope 1 greenhouse gas (GHG) emissions predicted to be generated as a result of construction activities. One tonne of carbon dioxide is the standard unit used to quantify GHG emissions (tCO₂-e). GHG emissions estimated for Stage 2A activities are outlined in Table 7.2. No Scope 2 emissions are anticipated.

Table 7.2 Stage 2A construction GHG emissions

Activity	Scope 1 emissions (tCO ₂ -e)
Diesel combustion (stationary) - Construction	4065
Generators	542
Diesel combustion - transport	1
TOTAL	4608

GHG mitigation measures for the Stage 2A works will include:

- All plant and equipment used during the Stage 2A construction works shall be regularly maintained to comply with the relevant exhaust emission guidelines.
- Sustainable procurement practices will be adopted, where feasible. Additional information is also captured in the Principal Contractor’s procurement strategy.
- The following measures will be implemented by the Principal Contractor as far as reasonably practicable:
 - Construction materials sourced locally, where possible.
 - Construction materials that have minimal embodied energy be selected.
 - Use of PVC plastic minimised.
 - Use of construction materials that are low maintenance and durable.
 - Plant and equipment will be switched off when not in constant use and not left idling.
 - Plant and equipment brought onsite will be regularly serviced.
 - Energy efficient vehicles or equipment will be selected, where available.
 - Any plant and equipment that is not working efficiently (i.e., emitting excessive smoke) will be removed from site and replaced as soon as possible.
 - Construction works will be planned to ensure minimal movement of plant and equipment.

8. Air quality monitoring program

AIE is required to undertake air quality monitoring during the Stage 2A works in accordance with Infrastructure Approval (SSI 9471) Schedule 3, Condition 33(c) and the issued EPL No. 21529 Condition P1.1 and Condition M2.2, as summarised in Table 8.1. Reporting of results for all monitoring point locations will be published in the monthly environmental monitoring report made available on the AIE Project website. Additional monitoring details are included in Section 11.4.2.

Locations of monitoring points outlined in EPL No. 21529 are shown in Figure 2.2.

Table 8.1 Air Monitoring Program

EPA ID number	Monitoring location	Monitoring point type	Pollutant	Units of measure	Monitoring frequency	Sampling method
8	Northern boundary of the premises, adjacent the southern boundary of Port Kembla Coal Terminal	Ambient Air Monitoring – High Volume Air Sampler & Dust Deposition	Particulates – Deposited Matter	Gram per square metre per month	Monthly	AS/New Zealand Standards (NZS) 3580.10.1:2016
10	Southern boundary of Berth 101					
12	Southern side of emplacement area, Outer Harbour		Total Suspended Particles	Micrograms per cubic metre	Special Frequency 1*	AM-15
14	Eastern side of emplacement area, Outer Harbour					
22	Northern side of emplacement area, Outer Harbour					
9	Northern boundary of the premises, adjacent the southern boundary of PKCT	Real time dust monitoring**	PM ₁₀	Micrograms per cubic metre	Continuous	Continuously
11	Southern boundary of Berth 101					
13	Southern side of emplacement area, Outer Harbour					
15	Eastern side of emplacement area, Outer Harbour					
23	Northern side of emplacement area, Outer Harbour					

* Special Frequency 1 means for a 24-hour period every 6 days.

** Such as Dust Trak monitoring or equivalent.

8.1 Real-time sampling

The Project is using real-time monitors such as the EBAM Plus and DustMaster Pro in the locations described in Figure 2.2 and Table 6.1. The dust monitors at the MBD Site Compound and the Emplacement Cell Construction Site were established at least one month prior to works commencing. A copy of each unit's specifications is in Appendix B and Appendix C, respectively.

Each unit continuously monitors PM₁₀ over the construction period (24 hours a day), and enables hourly, daily, and yearly averaging of data for comparison with trigger levels and ambient air quality criteria.

Each monitor will be established with solar power and battery back-up tripods and telemetry for web-accessible data and mobile phone SMS alerts to key Project personnel.

8.2 High Volume Air Samples

High Volume Air Samples (HVAS) have been issued to monitor total suspended particulates at the five fixed locations described in Table 8.1. HVAS samplers are sited in general accordance with AS/NZS 3580.10.1:2016 methods for sampling and analysis for ambient air including:

- Clear sky angle of 120-degrees around sample inlet.
- Ten metres clear of nearest object or dripline of trees that are higher than two metres above the inlet.
- No extraneous sources nearby.
- More than 50 metres from a road.

The HVAS unit specification is provided in Appendix D.

8.3 Dust deposition gauges

Dust deposition gauges are installed at locations described in Table 8.1 to monitor for Particulates – Deposited Matter, assessed as Total Insoluble Dust based on the Approved Methods (NSW EPA, 2016).

8.4 Visual monitoring

Daily observations for visible dust generation will be undertaken by the Principal Contractor Environmental Representative at the MBD Site Compound and the Emplacement Cell Construction Site. Visual monitoring would include the presence of any dust plumes from construction activities, a review of dust control measures and will be recorded in the Environmental Inspection Checklist.

Dust detection trigger values and triggered response procedures for visible dust are provided in Table 8.2. Trigger values are applicable to all monitoring locations.

Table 8.2 Air Monitoring Trigger Action Response Plan

Parameter	Trigger Level 1 ¹	Trigger Level 2 ¹
PM ₁₀	>200µg/m ³ and/or	Frequent elevated readings (>3 events above 200µg/m ³ within 24h) and/or
Visible Dust	Prolonged dust generation	Prolonged dust generation (with potential to leave site boundary)
	Action <ul style="list-style-type: none"> – Responsive intervention required. – Comparison of the concentration at the upwind monitor to the downwind monitor to determine the site contribution. – Check of dust prevention controls (i.e., water carts or irrigation system) are sufficient, operational, and allocated correctly to high-risk areas. – Check to ensure dust prevention mechanisms such as polymer or tarps are still in place and functional. – Return to normal operations can only take place if dust generating activities are reduced by implementing one or more appropriate adaptive management options, and real time reading is below the criteria level. 	Action <ul style="list-style-type: none"> – Contingency and preventive intervention required. – Principal Contractor to investigate and identify the source of the exceedance. – Immediately temporarily suspend construction operations local and/or specific to identified area of concern until such it can be demonstrated that the operation is “environmentally secure”, and all controls are functioning and in place. – Cessation of dust generating activity at all or parts of the site when the elevated PM₁₀ concentrations are not caused by an external regional event such as a bushfire or neighbouring site. – Return to normal operations can only take place if dust generating activities are reduced by implementing one or more appropriate adaptive management options, and real time reading is below the criteria level and if investigation identified improvements, it should be implemented, and measures communicated to involved personnel.
	Records and Documentation <ul style="list-style-type: none"> – Principal Contractor Environmental Checklist and Records. 	Records and Documentation <ul style="list-style-type: none"> – Principal Contractor Environmental Checklist and Records. – Event/ Incident Report (if captured as an incident). – Pre-start and Toolbox Records where appropriate.

Upwind dust levels may also be monitored using metropolitan air quality monitoring stations located at Wollongong, Albion Park and Kembla Grange. The data is publicly available at: <https://www.environment.nsw.gov.au/AQMS/hourlydata.htm>.

¹ The real time data for PM₁₀ (i.e., 15minute average individual reading) to be compared against this Trigger Level

8.5 Trigger monitoring response system

The Principal Contractor will employ a trigger alert and response system for the levels of dust and particulate matter measured in real time onsite and at sensitive receptors, which are summarised in Table 8.2. The trigger levels are designed to ensure that no excessive dust or particulate matter are being generated on site that are not consistent with the impact assessment undertaken for the construction phase of the Project. Alternatively, no elevated readings arising from activities that may not be consistent with the proposed construction activities outlined in Section 2.2 of this AQMP.

Response and mitigation measures to be employed if each criteria level is triggered. The mitigation measures should be implemented by the Principal Contractor. The trigger levels apply to both the MBD Site Compound and the Emplacement Cell Construction Site.

8.6 Program review

The monitoring program will be reviewed prior to commencement of Stage 2B works to ensure monitoring locations are targeting the impacts of works associated with the Project.

9. Meteorology

As part of best practice programming and works management, weather conditions are monitored regularly. Weather predictions are used when planning works to ensure suitable conditions will exist for work activities and resources are available to ensure environmental management protocols are adhered to.

Condition 35 of the Infrastructure Approval (SSI 9471) further requires meteorological conditions are monitored via a suitably maintained weather station capable of monitoring via the following details:

1. AM-1 Guide to Siting of Sampling Units (AS 2922-1987).
2. AM-2 Guide for Horizontal Measurement of Wind for Air Quality Applications (AS 2923-1987).
3. AM-4 On-Site Meteorological Monitoring Program Guidance for Regulatory Modelling Applications.

A site-based metrological station is established at the southern end of the MBD Site Compound, as shown in Figure 2.2 and in accordance with Condition 35 of Infrastructure Approval (SSI 9471) and the standards listed above. In accordance with EPL No. 21529 Condition M5.2, the following parameters must be monitored and recorded at the station:

- Temperature.
- Humidity.
- Wind direction.
- Wind velocity.
- Rainfall.

The monitoring will be representative of the Port Kembla harbour catchment. Monitoring will be undertaken prior to Stage 2A works commencing and continue for the duration of activities and site has been stabilised post activities conclusion.

In accordance with EPL No. 21529 Condition M5.1 AIE is required to undertake weather monitoring at Point 21 (refer to Figure 2.2) in accordance with the criteria outlined in Table 9.1.

Table 9.1 Weather monitoring criteria for Point 21

Parameter	Sampling method	Units of measure	Averaging period	Frequency
Wind speed	AM-2 & AM-4	metres per second	15 minutes	Continuous
Rainfall	AM-1 & AM-4	millimetres per hour	1 hour	Continuous
Wind Direction at 10 metres	AM-2 & AM-4	degrees in a clockwise direction from True North	1 hour	Wind Direction

10. Communication and complaints

Effective communication between the Principal Contractor and construction personnel, AIE project team, sub-contractors and external stakeholders will be undertaken throughout the Project to ensure effective implementation of this AQMP.

Project communication can be categorised into internal and external communications, as well as communications specifically dealing with complaints. The specific communication methods for each category are discussed below.

10.1 Internal communications

Communication on environmental issues related to air quality within the Project team will be maintained, as a minimum, through the following forums (organiser as noted):

- Weekly project construction team meetings (AIE Construction Manager or delegate).
- Weekly Environmental management team meetings with relevant contractors (AIE HSE Manager or Delegate).
- Toolbox talks and daily pre-start briefings (Principal Contractor Project Manager or delegate).
- Minutes of formal meetings will be taken and distributed to record issues raised and actions required, with action status established at subsequent meetings.
- Monthly review of the internal AIE Environmental Compliance Tracking register (AIE HSE Manager or delegate).

All internal meetings include appropriate documentation in the form of agenda and formal distribution via the Project's document system.

In addition to the above, the AIE Environment Team will also undertake informal planning sessions and resource review meetings to plan and forecast for upcoming key construction dates, critical issues and other relevant matters associated with environmental planning and approvals.

10.2 External communications

AIE is committed to keeping the local community and relevant agencies informed about the development of the Project. The principal external communication objectives are, therefore, to:

- Continue to maintain open communication with relevant stakeholders.
- Minimise environmental impacts.
- Be proactive in addressing any concerns that the community / external stakeholder may express.

AIE will build upon the stakeholder and community engagement phase undertaken during project development including multiple group or one on one briefings. A project website (www.ausindenergy.com) has been developed and provides comprehensive, clear, and accessible information that is updated on a regular basis.

As well as the local Port Kembla and broader community of the Wollongong region, extensive engagement was also undertaken with a range of other interested key stakeholders, such as local commerce organisations, the Port Authority of NSW and local and state government.

Consultation with key stakeholders and the wider community on the Project will continue throughout Stage 2A and subsequent construction phases. These measures will ensure the stakeholders, including the wider community, remain informed of the project's progress.

Key methods of engagement are provided in the Stage 2A EMS.

10.3 Complaints management

All complaints where a third party has identified a construction activity as being unsatisfactory or unacceptable will be dealt with promptly and efficiently in accordance with the complaint and dispute response outlined in the Project's Stage 2A EMS.

AIE will operate a free 24-hour Community Information Line (1800 789 177) where members of the community can leave details about an inquiry, they may have regarding construction activities related to air quality. This message will be passed on to site personnel and/or the Stakeholder Engagement Team, as appropriate.

Initial responses to complaints will be provided within 24 hours of the complaint being received. As part of the response, a review of the activity will be undertaken. If required and possible, immediate changes will be made to reduce any impact on the community. In some cases, the issues cannot be resolved immediately, and ongoing actions might be required to resolve the issue.

All complaints related to air quality will be recorded in a Complaints and Disputes Register. The following information will be recorded for each complaint:

1. The date and time of the complaint.
2. The method by which the complaint was made.
3. Any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect.
4. The nature of the complaint.
5. The action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant.
6. If no action was taken by the licensee, the reasons why no action was taken.

The Complaints and Disputes Register will be maintained by the Project's HSE Manager or delegate, and will detail what the issue was, initial response provided, how and when the issue was resolved, and by whom.

Where resolving a complaint with a third party is protracted or develops into a dispute, the AIE HSE Manager shall escalate proactively to Senior Project Leadership (e.g., AIE Project Manager and/or Project Director) to assist with resolution. AIE will work proactively with the complainant to resolve the dispute including having face to face meetings, site familiarisation sessions and agreeing on actions to resolve the dispute. All communications and agreed actions shall be documented.

Records will be kept for at least four years after the complaint was made and will be produced on request by any authorised officer of the EPA. The phone number is listed on the AIE website (<https://ausindenergy.com/contact-us/>) and will be provided on all community newsletters. The AIE HSE Manager has notified the Port Kembla Harbour Environment Group of the Community Information Line.

For the management and reporting of corrective actions (which may be required in response to a complaint), refer to the Project's Stage 2A EMS.

11. Inspections, monitoring and audits

Monitoring and auditing will be undertaken to determine the impact on the environment and identify opportunities for improvement. Monitoring to be implemented for specific actions or environmental issues (e.g., water quality monitoring, air quality monitoring) will be detailed in their relevant sub-plan and will specifically address the monitoring requirements for those issues.

11.1 Environmental inspections

11.1.1 AIE and Principal Contractor joint environmental weekly inspection

As a minimum, the AIE HSE Manager (or nominated delegate) will undertake weekly inspection of the work sites with the relevant Principal Contractor's environmental personnel (Environmental Representative or similar) to evaluate the effectiveness of environmental controls (inclusive of erosion and sediment control measures) and general compliance with the implementation of the AQMP for site-based activities.

If any maintenance and/or deficiencies in environmental controls or in the standard of environmental performance are observed, they will be recorded on the checklist form. Records will also include details of any maintenance required, the nature of the deficiency, any actions required and an implementation priority.

Actions raised during inspections will be documented on the *Weekly Environmental Site Checklist* and will be issued formally through the Project's document management system to the relevant Contractor for action. If they represent an actual or potential significant environmental risk, these issues shall be reviewed at the Project Planning meetings and will have non-conformances raised if not closed out in the nominated timeframe (Nonconformance Report).

11.1.1 Contractor environmental inspections

In addition to the joint weekly environmental site inspection with AIE, the Principal Contractor will be required to undertake daily site environmental inspections, targeting key environmental risks commensurate with the activity being undertaken. The daily environmental site inspection will be documented on a checklist, or similar, to be prepared and completed by the Principal Contractor.

Copies of the daily environmental site inspection records are to be provide to AIE on request.

The HSE Manager is responsible for the initial reporting of significant non-compliances with the AQMP or relevant legislation to the AIE Project Director and government authorities (refer to Section 12).

11.2 Monitoring

Monitoring will be undertaken to validate the impacts predicted for the work, to measure the effectiveness of management plans, environmental controls, and implementation of this AQMP, and to address approval requirements.

As part of the daily monitoring, the Principal Contractor Environmental Representative will conduct visual and olfactory inspections for dust and odour on works in the areas including, but not limited to:

- MBD Site Compound:
 - Excavation faces.
 - Stockpiling locations.
 - Internal and external roads.
- Emplacement Cell Construction Site:
 - Stockpiling locations.
 - Internal and external roads.

All air quality monitoring records will be retained as per Condition M1.1 of EPL No. 21529. Records to be kept include:

- In a legible form, or in a form that can readily be reduced to a legible form.
- Kept for at least four years after the monitoring or event to which they relate took place.
- Produced in a legible form to any authorised officer of the EPA who asks to see them.

11.3 Auditing

AIE will conduct internal audits at frequencies as determined in the risk-based auditing schedule. The purpose of auditing is to verify compliance with:

- The EMS and this AQMP.
- Compliance with the requirements of relevant components outlined within the EMS and AQMP, including but not limited to, site inspection compliance, document control / management, non-compliance, and incident management etc.
- Monitoring and reporting requirements as set out under EPL No. 21529.

Additional details regarding the auditing process are detailed in the Project's Stage 2A EMS.

11.4 Environmental reporting

11.4.1 DPIE reporting

Regular reports on compliance and other matters will be provided during the construction phase of the Project. This will include reporting to the DPIE in accordance with Schedule 4, Conditions 7 and 8 of the Infrastructure Approval (SSI 9471), with specific reference to the *Compliance Reporting Post Approval Requirements (2020)*.

In addition, DPIE will be notified in writing of the date of commencement of each of the relevant phases of the Project in accordance with Schedule 2, Condition 8 of the Infrastructure Approval (SSI 9471).

Reporting applicable to this AQMP will consist of:

- Air quality monitoring results, compared to trigger levels and monitoring limits.
- Requirements of EPL No. 21529.
- Construction works progress and appraisal of air quality controls.
- Environmental Incident Report(s), as required.
- Annual returns, as required by EPL No. 21529.

11.4.2 Other reporting requirements

A monthly environmental monitoring report will be developed for each calendar month which will include details of the monitoring results and frequencies and inclusion of any exceedance of EPL No. 21529 air monitoring limits / criteria. A copy of the monthly environmental monitoring report will be made available on the AIE Project website.

Further reporting requirements are provided in Section 12.

11.5 Compliance tracking register

A Compliance Tracking Register has been developed as a monitoring tool to assist with the compliance reporting requirement as set out under Condition 7, Schedule 4 of the Infrastructure Approval (SSI 9471) as follows:

Compliance Reporting

The proponent must provide regular compliance reports to the Department on the development in accordance with the relevant requirements of the Department's guideline Compliance Reporting Post Approval Requirements (2020), or its most recent edition.

The compliance tracking register includes a breakdown of the requirements from the following key approval and Project documents:

- Infrastructure Approval (SSI 9471).
- EPL No. 21529.
- Requirements of this AQMP.

The Compliance Tracking Register includes tabulation of reference conditions, the requirements, responsibility, status (i.e., ongoing, close-out, not triggered, etc.) and supporting evidence where required.

A routine review of the Compliance Tracking Register is undertaken by the AIE HSE Manager (or delegate) with input sought from the relevant contractors as required. The Compliance Tracking is a live document which is kept up to date for each stage of the construction works.

11.6 Non-conformance, corrective, and preventative actions

Non-conformances or potential non-conformances are situations or events that do not comply with the safeguards and procedures stipulated in the EMS or this AQMP:

- As part of site inspections, supervision or monitoring of construction activities.
- During internal audits.
- Following justified / supported verbal or written third party complaints.

All non-conformances related to air quality will be managed and reported using the non-conformance function of the Project's document management system. Each non-conformance event and follow-up action will be documented and traceable, including identification of key dates and responsible personnel.

Additional details regarding corrective and preventative actions are outlined in the Project's Stage 2A EMS.

The Department must be notified in writing to compliance@planning.nsw.gov.au within 7 days after the identification of any non-compliance issue. The notification must identify the development, including the application number, set out the condition of approval that the development is non-compliant with, the way in which it does not comply, the reasons for the non-compliance (if known) and what actions have been taken, or will be taken, to address the non-compliance.

12. Incident management and emergency response

12.1 Incident management

12.1.1 Overview

Incidents are defined 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. The consequences of such incidents may result in material environmental harm, damage, or asset loss. 'Near misses' are extraordinary events that could have reasonably resulted in an incident.

All incidents related to air quality, including those of the Principal Contractor, its subcontractors, and visitors that occur during the undertaking of the construction works for the Project will be managed to satisfy the requirements of AIE's Incident Reporting and Investigation System Requirements. Whilst it is noted that key Contractors will be implementing their own environmental management system procedures and processes, AIE will be responsible for ensuring that these systems and processes satisfy the requirements of the AIE EMS, including the incident management components. The Contractor will be responsible for providing all necessary documentation with regards to the incident investigation and close-out actions where required. The timing of the provision of this documentation is to align with the AIE requirements.

The AIE HSE Manager must be notified immediately of any environmental incident or near miss related to air quality. These may include, but are not limited to the following:

- Spill of any dangerous goods or hazardous substance to ground or water.
- Substantiated complaints received from members of the community or regulatory authorities.
- Regulatory breaches such as fines, prosecutions, improvement notices, breaches of licence conditions.
- All incidents of third-party property damage or loss.
- Incidents involving impact or potential damage to items or places of cultural heritage significance.
- Land-based off-site sediment loss to the environment, including sediment tracking onto the roadway.

The AIE HSE Manager will be responsible for regulatory notification of all notifiable environmental incidents (refer to Section 12.1.1 for notifiable incidents). All environmental incidents will be reported immediately to DPIE in writing via the Planning Portal after AIE becomes aware of the incident, as per Schedule 4 Condition 5 of the Infrastructure Approval (SSI 9471). The notification must identify the development, including the application number, and set out the location and nature of the incident.

In the event of a notifiable non-compliance incident arising, the Principal Contractor will notify the AIE HSE Manager immediately to allow the AIE HSE Manager to notify DPIE in writing (via the Planning Portal) within 7 days of AIE becoming aware of the non-compliance, as per Schedule 4 Condition 6 of the Infrastructure Approval (SSI 9471). The notification must identify the development, including the application number, set out the condition of approval that the development is non-compliant with, the way in which it does not comply, the reasons for the non-compliance (if known) and what actions have been taken, or will be taken, to address the non-compliance.

12.1.2 Notifiable incident under the POEO Act

In the event of a Notifiable Incident as defined under the POEO Act, AIE is responsible for immediately notifying the EPA, and any other relevant authority, of pollution incidents on or around the site via the EPA Environment Line (telephone 131 555) in accordance with Part 5.7 of the POEO Act. The circumstances where this will take place include:

- *If the actual or potential harm to the health or safety of human beings or ecosystems is not trivial.*
- *If actual or potential loss or property damage (including clean-up costs) associated with an environmental incident exceeds \$10,000.*

Follow-up written notification to the EPA and any other relevant authorities will be required in accordance with the POEO Act and requirements of the EPA. This includes the provision of written details of the notification to the EPA within 7 days of the date on which the incident occurred.

All notifiable incidents will also be managed, documented, and reported in accordance with the AIE *Incident Reporting and Investigation System Requirement*.

In addition, an authorised officer of the EPA has the right to request a written report (in accordance with Condition R3 of the EPL (No. 21529)) if they suspect on reasonable grounds that an event has occurred at the licensed premises which has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies). The written report is to address all the requirements under Condition R3 of the EPL.

12.1.3 Notifiable incident under the Infrastructure Approval (SSI-9471)

In accordance with Condition 5 of Schedule 4, DPIE must be notified in writing to compliance@planning.nsw.gov.au immediately after AIE becomes aware of an incident on site.

Additional details regarding notifiable incidents and procedures are outlined in the Project's Stage 2A EMS.

12.2 Emergency response

Actual or potential emergency situations will vary in type and severity. The required level of response and notification will be at the discretion of the AIE Construction Manager in consultation with the AIE HSE Manager.

Any emergency situation may require only isolated containment and control or may require the complete evacuation of the site and notification of relevant emergency services. Consideration should be made of the response requirements for different situations. If at any time there is uncertainty on how to proceed, response should be for the worst possible scenario. Ultimately, the AIE Construction Manager or representative has authority and responsibility to instigate an evacuation if he/she feels it is warranted.

In the event of an emergency, the following plans shall be consulted and implemented, as relevant:

- The Principal Contractor's site-specific Emergency Response Plan.
- AIE Port Kembla Gas Terminal Emergency Spill Plan.
- Pollution Incident Response Management Plan (PIRMP).
- AIE Emergency Management Procedures.

13. Document management and review

13.1 Record management

Records and registers specified in this AQMP for Stage 2A shall be maintained. Records to be kept may include but will not be limited to the following:

- Environmental Inspection Checklist.
- Environment Reporting.
- Environmental Monitoring Reports / Records.
- Fauna and Weed Register.
- Internal Audit Reports.
- Incident Reports and Register.
- Toolbox Talk Records.
- Induction Presentation and Register.
- Environmental Activities Safe Work Method Statement (SWMS).
- Corrective Actions Register.
- Waste and Resource Register.
- Material Tracking Register.
- Training Register / Matrix.
- Complaints Register.

13.2 Review and revision of AQMP

This AQMP will be reviewed and updated, as required under Condition 3 of Schedule 4 of Infrastructure Approval (SSI 9471) to ensure the objectives of the applicable approval conditions contained within are being met throughout Stage 2A.

In addition, as required under Condition 4 of Schedule 4 of Infrastructure Approval (SSI 9471), the AQMP must be reviewed, and if necessary, revised within 3 months (unless otherwise agreed with DPIE) for any of the following:

- Following the submission of an incident report as per Condition 5, Schedule 4 of Infrastructure Approval (SSI 9471) (refer to Section 12).
- Following approval of any modification to the conditions of approval outlined in Infrastructure Approval (SSI 9471).
- At the direction of the Planning Secretary as per Condition 4, Schedule 2 of Infrastructure Approval (SSI 9471).

Where a review leads to a revision of this plan, within four weeks the revised AQMP will be submitted to the Planning Secretary for approval unless otherwise agreed with the Planning Secretary.

13.3 Access to information

AIE will make the following information publicly available on the PKGT website, as per Schedule 4, Condition 12 of the Infrastructure Approval (SSI 9471) and the requirements as set-out under the Project EPL No. 21529:

- The PKGT EIS.
- Current statutory approvals for the Project.
- Approved strategies, plans or programs required under the conditions of Infrastructure Approval (SSI 9471).
- A comprehensive summary of the monitoring results of the development, reported in accordance with the specification of any conditions, or any approved plans and programs relating to Infrastructure Approval (SSI 9471).

- A summary of complaints (updated monthly).
- Any independent environmental audit, and responses to the recommendations in any audit.
- The approved premises map (EPL No. 21259, Condition A2.4).
- PIRMP (EPL No. 21529, Condition E2).
- Any other matter required by the Planning Secretary.

This information will be kept up to date by AIE when required.

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References

- Australian Standard 2724.3-1984 *Ambient air - Particulate matter - Part 3: Determination of total suspended particulates (TSP) - High volume sampler gravimetric method (AM-15)*.
- Australian Standard 2922-1987 *Ambient Air- Guide to Siting of Sampling Units*.
- Australian Standard 2923-1987 *Guide for Horizontal Measurement of Wind for Air Quality Applications*.
- Australian Standard/New Zealand Standard 3580.10.1:2016 *Methods for sampling and analysis of ambient air Determination of particulate matter - Deposited matter - Gravimetric method*.
- DPIE (2020) *Compliance Reporting Post Approval Requirements*.
- Environmental Protection Licence No. 21529, dated 20 August 2021.
- GHD 2018a, Port Kembla Gas Terminal Environmental Impact Statement.
- GHD 2018b, Port Kembla Gas Terminal Environmental Impact Statement, Appendix M Air Quality.
- GHD 2018c, Port Kembla Gas Terminal Environmental Impact Statement, Appendix P Greenhouse gas.
- Infrastructure Approval (SSI 9471) dated 24th April 2019.
- NSW EPA 2016, *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*.
- USA Environmental Protection Agency 2000, *AM-4 On-Site Meteorological Monitoring Program Guidance for Regulatory Modelling Applications*.

Appendices

Appendix A

Vital Stonewall product datasheet

VITAL BON-MATT STONEWALL (IGD)

DESCRIPTION

A multipurpose, water-based copolymer emulsion dust suppressant and erosion control agent designed for applications over numerous surfaces where strong, durable and flexible surface conditions are required. **Vital Bon-Matt Stonewall (IGD)** is a concentrated liquid emulsion which is diluted with water prior to application to create long-term binding and surface sealing.

RECOMMENDED APPLICATIONS

All erosion/sediment control and dust suppression applications including haul roads, civil construction, unsealed roads, traffic areas, areas of soil erosion, broad acre areas, long-term sealing, tailing dams, rail wagon veneering and stockpile applications.

Suitable for use on traffic areas and areas of harsh environmental conditions.

FEATURES

- Highly effective dust abatement;
- High wind speed resistance;
- Highly effective erosion control and stabilisation;
- Long-term capping;
- A strong, durable and flexible veneer over the applied surface;
- An environmentally safe product with inert degradation products;
- High molecular weight polymers.

SPECIFICATIONS

Appearance	GREEN LIQUID	Solubility (water)	SOLUBLE
Odour	SLIGHT ODOUR	Vapour pressure	NOT AVAILABLE
Flammability	NON FLAMMABLE	Upper explosion limit	NOT RELEVANT
Flash point	NOT RELEVANT	Lower explosion limit	NOT RELEVANT
Boiling point	NOT AVAILABLE	Partition coefficient	NOT AVAILABLE
Melting point	NOT AVAILABLE	Viscosity	NOT AVAILABLE
Evaporation rate	NOT AVAILABLE	Explosive properties	NOT AVAILABLE
Specific gravity	1.04 (Approximately)	Oxidising properties	NOT AVAILABLE
Vapour density	NOT AVAILABLE	Odour threshold	NOT AVAILABLE
Autoignition temperature	NOT AVAILABLE	pH	7.0 - 9.5
Decomposition temperature	NOT AVAILABLE		

APPLICATION METHODS

Vital Bon-Matt Stonewall (IGD) is applied via water cart dribble bar, hand spray applications and spray nozzle veneering rail wagon systems. Cannon side sprays and hand spraying are effectively utilised for stockpile embankment and other erosion control applications.

It is preferable for road areas to be dressed prior to application for product and road longevity.

Water carts should be semi-filled with water prior to the addition of the **Vital Bon-Matt Stonewall (IGD)** concentrate. This order of filling assists mixing of product and water within the cart and ensures the concentrate does not fill the sprayer lines and dribble bar.

Vital Bon-Matt Stonewall (IGD) should not be applied before rain or wind events without allowing for appropriate drying time (4 to 6 hours).

Dilution Rates

Due to numerous variables associated with surface composition and the level of control required, it is not practical to list a standard application rate. Onsite analysis and assessment by our *Technical Representatives* will ensure the optimum

application is employed for each individual site. However, it is essential to abide by the recommended dilution rates for all applications to ensure product efficiency and other factors such as site and environmental requirements are upheld.

A generalised surface coverage of diluted product equates to: **1L dilute : 1m² surface**

Maintenance

Maintenance will vary according to site specifications. Once effectiveness is reduced, more dilute **Vital Bon-Matt Stonewall (IGD)** applications can be employed if required for water cart and hand spray applications.

CLEANING OF WATER CART AND PUMPS

Water cart pumps and application devices must be flushed with water immediately after **Vital Bon-Matt Stonewall (IGD)** application runs.

SHELF LIFE

Vital Bon-Matt Stonewall (IGD) should be stored at a temperature of min. +5°C to max. +45°C. Shelf life is approximately 12 months.

Vital Bon-Matt Stonewall (IGD) must be kept in closed drums/containers or closed tanks. Containers must be closed tightly to avoid contact with air, which can contribute to product contamination.

Do not keep pre-diluted product for longer than 2 days as the shelf life is drastically reduced once contaminants (such as water) are introduced.

PACKAGING

Vital Bon-Matt Stonewall (IGD) is supplied in 1,000L IBCs and bulk volumes.

PRECAUTIONS

Vital Bon-Matt Stonewall (IGD) contains no hazardous substances requiring labeling. For more information, refer to Safety Data Sheet.

For any further product or application advice or instruction, contact Vital Chemical Pty Ltd.

Ensure product concentrate or solution is not sprayed, applied or enabled to enter waterways and water systems.

Contractors must undertake appropriate risk assessments to ensure the safe delivery of the product to the application area.

STATEMENT OF RESPONSIBILITY

The technical information and application advice given in the **Vital Chemical Pty Ltd** publication are based on the present state of our best scientific and practical knowledge. As the information herein is of a general nature, no assumption can be made as to a product's suitability for a particular use or application and no warranty as to its accuracy, reliability or completeness either expressed or implied is given other than those required by law. The user is responsible for checking the suitability of products for their intended use.

NOTE

Field service where provided does not constitute supervisory responsibility. Suggestions made by **Vital Chemical Pty Ltd** either orally or in writing may be followed, modified or rejected by the owner, engineer or contractor since they, and not **Vital Chemical Pty Ltd**, are responsible for carrying out procedures appropriate to a specific application.



NEW PARALLEL RUNWAY PROJECT

BRISBANE AIRPORT CASE STUDY

Vital Bon - *Matt Stonewall*



STATEMENT

Brisbane's New Parallel Runway (NPR) project is the biggest aviation project in Australia. To prepare the land for construction, 11 million cubic metres of sand was pumped onto the 360 hectare site in preparation for construction of the runways and taxiways.

The large volume of sand has been placed in layers of sand up to 10m high to raise the land above potential flooding inundation and future sea level rise and also create a weight capable of squeezing the water from the underlying soft waterlogged soils to suitably consolidate the land for construction.

Given the NPR sand platforms are adjacent the existing operational runway protection of the operational areas from wind borne sand

particles is of primary importance.

Brisbane Airport Corporation's (BAC) dredge contractor, Jan de Nul (JDN), chose Vital Chemical's (VC) Vital Bon-Matt Stonewall as its principal erosion control product for the sand reclamation platforms.

Vital Bon-Matt Stonewall is a non-toxic, environmentally friendly polymer solution providing a flexible, inert and binding layer to any applied surface. The polymer formulation does not cross biological membranes or accumulate in the food chain due to the high molecular weight of the contained polymers. It is the ideal product to achieve an environmentally acceptable erosion control solution for the NPR.





SUMMARY OF THE PROJECT

**NOMINATION FOR THE IECA
ENVIRONMENTAL AWARDS: NEW
PARALLEL RUNWAY (NPR) PHASE 1-SITE
PREPARATORY WORKS**

Brisbane Airport Corporation (BAC) and Jan De Nul Australia (JDN) partnering with Vital Chemical (VC) are pleased to submit this joint nomination for the 2015 Awards of Environmental Excellence in Erosion and Sediment Control for the New Parallel Runway Project (NPR), Phase 1 Dredging and Reclamation Works. This stage of the project commenced in October 2013 and was completed in June 2015. The submission features the surface stabilisation treatment for erosion control of the sand platforms with Vital Bon-Matt Stonewall (Stonewall) which was applied in stages between November 2014 and June 2015.

The mass placement of 11 million cubic metres of sand as fill and surcharge for the new runway presented unique challenges to BAC to ensure the sand did not become wind borne. With the Domestic Terminal situated less than 100m away from the construction zone wind-blown sand erosion has the potential to damage aircraft engines and also affect visibility within the operational airfield.

Also, as the sand platforms must be in place for up to three years while the soft underlying soils consolidate, the product selected to stabilise the sand must also have a lifespan suitable to the time required.

BAC and JDN, following extensive research,

chose the Stonewall product from VC. Whilst BAC employed a suite of erosion and sediment control strategies for the project overall, Stonewall was used to stabilise the vast majority of the surface area of the sand platforms.

The main reasons Stonewall was chosen were:

- a) environmental performance,
- b) ease of application and re-application,
- c) the elimination of stripping the product before removing the excess sand;
- d) the willingness of VC to work with BAC and JDN to trial the product to ensure Stonewall's fitness for purpose; and
- e) cost-effectiveness.

The chemical character of Stonewall was a significant attraction for BAC. Unlike bitumen emulsion, a contaminant, which is typically used for this type of application, the Stonewall veneer can remain in place once settlement is achieved breaking down naturally without causing any harm to the receiving environment. This is also an advantage as none of the placed sand material is lost to disposal upon removal.

By adopting some simple environmental best practice philosophies of delivering immediate ground cover through Stonewall application to contain the sand material to site, BAC, JDN and VC have delivered a 5 star outcome to one enormous 11 million cubic metre stockpile!





LOCATION, DURATION, MAJOR PARTIES AND PROCESS OF THE PROJECT

LOCATION

The NPR project site is located adjacent to and to west of the existing operational Brisbane Airport (Airport). It is bounded to its North by Moreton Bay and the Kedron Brook Floodway corridor to the east.



COMMENCEMENT DATE

The NPR Phase 1 Dredging and Reclamation Works commenced in October 2013 following the appointment of Jan De Nul as the principal contractor for the works.

END DATE

The works were completed in June 2015.

MAJOR PARTIES

- Brisbane Airport Corporation (BAC)
- Jan de Nul (JDN)
- Vital Chemical Pty Ltd (VC)

As industry leaders in erosion control and soil stabilisation, Vital Chemical (VC) teamed with JDN and BAC to achieve an excellent erosion control solution for the reclamation sand platforms for the NPR Phase 1 Dredging and Reclamation Works.

SEQUENCE AND DATES OF ACTIVITIES

Dredging and Reclamation Works - October 2013 – June 2015

In October 2013 construction of the New Parallel Runway (NPR) progressed to its next crucial stage – the Dredging and Reclamation works. The following dredging and sand pumping operations were completed on 7 December 2014:

- Remainder of the site cleared.
- Temporary sand pipeline lay between Luggage Point and the NPR site to pump sand ashore.





LOCATION, DURATION, MAJOR PARTIES AND PROCESS OF THE PROJECT

- 330,000 vertical (wick) drains driven into the poor underlying soils to fast track drainage on the site.
- 11 million cubic metres of sand extracted from Middle Banks, Moreton Bay and placed at different heights across the site to achieve the required consistent ground settlement.
- Settlement monitoring plates installed to measure the extent of ground settlement.
- Sand treated with Vital Bon-Matt Stonewall stabilising agent to prevent windblown erosion.
- Pipeline and dredge mooring removed.

7th December 2014 - Ground Settlement Period: 3 years

The site will now be allowed to settle for three years to provide a compressed and stable base on which to build.

Sand and wick drains left in place to consolidate the underlying soils.

The application of a heavy load (e.g.: sand) forces moisture out of the soil causing the ground level to sink as the earth is consolidated to form a stable foundation for the runway. This is known as 'settlement'. Parts of the site will sink by more than 2m.





DISTINCTIVE FEATURES, SPECIAL ACCOMPLISHMENTS, DIFFICULT CHALLENGES AND OTHER UNIQUE ASPECTS

The NPR project faced unique challenges from an erosion and sediment control perspective to ensure 11 million cubic metres of sand remained stabilised and in place following hydraulic delivery by JDN. Traditional ground control methods of vegetation and mulching were used in some of the highest risk areas but this was not an option for the vast majority of the sand platform due to its expansive area (300 hectares) and the need to stabilise at speed once the sand placement was complete in a particular area.

The sand platforms which are up to 10m in height in places are very similar to a sand dune system made up of very fine mobile particles that are constantly moving. The challenge for BAC/JDN and VC was to find a material that could stop the movement and the natural erosive nature of the sand. The solution that was chosen, after rigorous environmental and performance analysis, was to apply Stonewall to the exposed surface of the sand bund. The environmentally sound polymer based product provided a robust surface treatment that encapsulated over 95% of the total platform area of 300 hectares. The application of Stonewall provided immediate ground cover

and was not reliant upon vegetation strike to commence its efficacy.

The application of Stonewall has been a major success in preventing wind-borne erosion from the NPR site. BAC actively monitors for sand migration off the site in a series of dust samplers located at sensitive receptors around the site. No exceedences have been recorded to date and furthermore no complaints have been received from airline operators in connection with wind-blown sand from the site.

Supporting independent data that was able to assist with the implementation decision of Stonewall as the significant erosion control method for the project:

- Rain Simulation Testing of Stonewall: SEEC Landloch
- Wind Tunnel Testing: Tunra Bulk Solids University of Newcastle
- In situ testing on sand bund: Jan Den Nul
- Aquatic Ecosystem Risk Report: Gauge Environmental and Industrial





BENEFITS TO THE ENVIRONMENT, COMMUNITY, THE EROSION CONTROL INDUSTRY AND OUR COMPANY

Benefits to the environment, community and the industry:

- The prevention of onsite erosion which in turns allows for manageable sediment control and treatment.
- No contamination of surrounding waterways from unstabilised material movement.
- Reduction in wind erosion of the Stonewall treated surface area has ensured high standard of visibility near the airport and the surrounding communities.
- Installing a successful ground control method to the unique environment of an active airport site has enabled such methodology to be applied to other airport expansions.
- Employment of Stonewall as the ground control method results in not requiring seeding, making the application and site maintenance simple and cost effective.
- Significant water savings and other considerable cost savings resulted from not implementing seed based solutions.





Review of Aquatic Ecosystem Risks Associated with
the Use of Dust and Erosion Control Products (Vital
Bon-Matt P47-VR1 and Vital Bon-Matt Stonewall) in
Western Queensland

Update 3
(June 2015)

Version 2.1

DOCUMENT HISTORY AND STATUS				
Document Name:	Review of aquatic ecosystem risks associated with the use of dust suppression products (Vital Bon-Matt P47-VR1 and Vital Bon-Matt Stonewall) in Western Queensland. Update 1 (July 2014)			
Document Location:	D:\\...\\Vital\\			
Project manager:	Simon Lewer			
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Client:	Vital Chemical Pty Ltd			
Client contact(s):	Letiscia Xavier			
Distribution:	Letiscia Xavier			
REVISION RECORD				
Rev	Reason for issue	Date	Issuer	Checked
0.1	Draft (internal review)	27 June 2013	M Ferguson	S Lewer
0.2	Draft (client review)	27 June 2013	S Lewer	L Xavier
1.0	Final (after approval)	27 June 2013	M Ferguson	S Lewer
1.1	Draft (internal review)	3 July 2014	M Ferguson	S Lewer
1.2	Draft (client review)	21 July 2014	S Lewer	L Xavier
2.0	Final (after approval)	28 July 2014	M Ferguson	L Xavier
2.1	Final	18 June 2015	S Lewer	L Xavier

LIMITATIONS

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1. Purpose & Scope

An energy resource operation near Roma, Queensland is considering the use of dust and erosion control products, and is interested in the local aquatic environmental risks associated with the use of these products. This report reviews the use, chemistry and ecotoxicology of two products (*Vital Bon –Matt P47-VR1* and *Vital Bon-Matt Stonewall*), applied to ecosystems common to the region.

This report update (July 2014) includes the addition of the dye, Phthalocyanine Green Pigment, to both products. The assessment found this dye did not materially change the findings from the previous version (v1.0) of this report.

2. Local Ecosystems

The area is situated in the Murray Darling basin in a region characterised by ephemeral streams feeding larger creeks and rivers containing more permanent water, often with high suspended and settled sediment loadings. There are no specific Queensland (QWQG, 2009) or Australian (ANZECC & ARMCANZ, 2000) ecosystem guidelines applicable for the chemistries in question. In reviewing the risks to aquatic ecosystems, the bioavailability of the chemistries is considered, particularly whether the material is soluble in water and available for uptake by aquatic flora and fauna, or more directly interferes with organisms, or is prone to adverse degradation impacts such as oxygen depletion.

3. Product Application

For the control of dust emissions and soil erosion, Vital Chemical Pty Ltd manufactures and markets chemical products including *Vital Bon-Matt P47-VR1* and *Vital Bon-Matt Stonewall*. These products are diluted into a working solution (5-10% in water) prior to spraying onto roadways, earthworks and other exposed dust surfaces. Upon drying, the sprayed product forms a thin surface film, binding the soil particles and preventing dispersion by air or water. If the application of these products is done in dry conditions with sufficient time to dry or cure, it is expected they will remain in areas where they were applied.

These products may enter the environment by either a spill of the concentrate or working solution, or degradation of the thin film. This report reviews both the spill and degradation pathways of exposure.

4. Review of Chemistries and Aquatic Toxicology

Both *P47-VR1* and *Stonewall* are water-based products containing the following ingredients as disclosed by the manufacturer:

- Acrylic or styrene-acrylic copolymers (mix of types with molecular weights ranging from 250,000-400,000 Dalton)
- Surfactant (fatty alcohol ether sulfate) – minor constituent (<1%)

- Preservative (isothiazolone type) – very minor constituent ($\leq 0.001\%$)
- Defoamer (silicone based) – minor constituent ($\leq 1\%$).
- Dyes (Phthalocyanine Green Pigment) – minor constituent ($\leq 1\%$) (Optional)

4.1 Acrylic Copolymers

Acrylic copolymers are polymeric compounds made from more than one acrylate monomer and/or styrene monomer. A feature of these polymers is their extremely high molecular weights, which range from 100,000 Daltons to one million Daltons. These polymers are expected to be inert in the environment and if released to surface water would initially remain dispersed, but eventually settle into the sediments (Dow, 2013).

Based on data from similar emulsion polymers, the acute toxicity would be expected to be low to fish and other aquatic organisms (Dow, 2013).

These polymers are likely to absorb to soil and other solids. They degrade very slowly in the environment, including degradation by physical action or upon exposure to sunlight. Due to their high molecular weight and low water solubility, the polymers would not be expected to accumulate in the food chain (Dow, 2013).

4.2 Surfactant

Both Vital products contain a fatty alcohol ether sulfate surfactant. The surfactant is rapidly and readily biodegradable (BASF MSDS). Toxicity by ingestion is low ($LD_{50} > 2000\text{mg/kg}$ body weight). Aquatic eco-toxicity is also low, with acute fish $LC_{50} > 100\text{mg/L}$ (ISO7346/2 semi-static) and acute bacterial $ECO > 100\text{mg/L}$ (BASF MSDS). The concentration of the surfactant is low in both products and not expected to pose a significant acute toxicity risk to aquatic organisms under normal use conditions. The environmental risk is more associated with release or spill of the concentrate or working solution directly to waterways where there is minimal dilution.

4.3 Defoamer

Both products contain a defoamer based on polydimethylsiloxane, a commonly used non-hazardous compound used in industries including the food industry. This material has a low toxicity to aquatic organisms (e.g. EC_{50} (Rainbow Trout) 96hr $> 100\text{mg/L}$) and not expected to pose a risk to aquatic organisms (Applied Australia, 2008), particularly at the low concentrations present.

4.4 Preservative

The products contain very low levels of isothiazolones, a common biocide group used as preservatives in industry,

particularly cosmetics. Aquatic ecotoxicity data for this chemical ranges from 0.19mg/L-0.28mg/L for fish (LC50-96hr Rainbow trout and Bluegill sunfish), 0.018mg/L for algae (EC50 *Selenastrum capricornutum*), and 0.16mg/L for invertebrates (EC50-48hr *Daphnia magna*) (Rohm & Haas, 2004).

The concentration of isothiazolone in working dilutions (5-10%) of the two products is lower than the fish and invertebrate toxicity values, although higher than the EC50 value for the algae *Selenastrum capricornutum*. A spill of concentrated product, or a working solution, directly into a waterway presents some risk of environmental harm associated with isothiazolone preservatives. However, in practical terms the risk is low particularly as the dilution in a stream is likely to reduce concentrations below toxic thresholds. As a precaution, care should be taken to prevent spills entering streams.

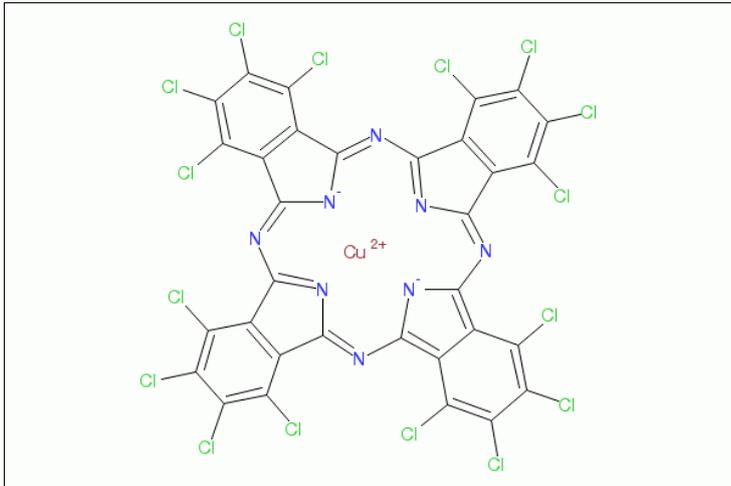
The isothiazolone has a relatively short half-life (17.3 hours) in an aquatic environment (Rohm & Haas, 2004) and presents little risk in terms of persistence or accumulation in the environment. Degradation of the thin film over time is unlikely to present a significant risk from the preservative component.

Indications are mammalian toxicity is relatively low, based on an LD50 of 3,310mg/kg LD50 for female rats (Rohm & Haas, 2004) presenting negligible risk for mammals drinking from waters contaminated with the preservative, or the working solution or neat product.

4.5 Dyes (Optional)

The products contain $\leq 1\%$ of the dye Phthalocyanine Green pigment (CAS No. 1328-53-6). This dye is a water insoluble, soft green powder, made up of a complex of copper (II) with chlorinated phthalocyanine (Figure 1). It is commonly used to colour plastics and in a variety of other applications including paints, inks and coatings. The chemical is considered safe for the environment as it is virtually non-toxic, non-sensitising, and causes no known ill effects (BASF, 2011). There is a high probability that the material is not acutely harmful to aquatic and terrestrial organisms, and its poor biodegradability limits the production of by-products. Due to the low solubility in water, and in octanol, accumulation of the substance in organisms is not expected.

Figure 1 – Chemical Structure of Phthalocyanine Green



Source: <http://www.emolecules.com>

The Phthalocyanine Green pigment is optionally added to the dust and erosion control products as a water-based paste (dispersion) available from a number of suppliers. These proprietary paste formulations generally include the pigment (40-50%), water and emulsifiers, such as glycols (15-20%) (Siena, 2010b; Shellyx, 2010).

One manufacturer's Material Safety Data Sheet (MSDS) provides no information regarding aquatic toxicity aside from the generic warning that the product should not be allowed to enter drains or water courses (Siena, 2010a). Another supplier's MSDS describes their Phthalocyanine Green paste as non-toxic: *"Based upon industry-wide experience over many years of manufacturing and published toxicological studies, organic pigments in general are considered to be practically non-toxic. There was no evidence of adsorption or adverse health effects. The product has not been evaluated for its ecotoxicity. However biodegradation of organic colorants under aerobic conditions is expected to be poor and there is no evidence to suggest they create significant ecological problems when released into the environment"* (Shellyx, 2013).

As the dye contains a metal (copper) as a central component, the metal content of the pigment was analysed for other trace metals as possible by-products of manufacture (Appendix A). The analysis results were converted to application use rates of product (2-10% dilution) and compared to Australian guidelines (Table 1). The results show that if the products are applied at the highest use rate (10% dilution) the metals contributed by the pigment will be lower than the ANZECC & ARMCANZ guidelines for livestock watering, irrigation, ecosystems and the NHRMC health drinking water guidelines. The only exceptions are copper and zinc; however in practical application terms they present little risk. Copper exceeded the ANZECC irrigation guideline for long term exposure, however as this product is not applied directly to crops, it poses no risk. Zinc slightly exceeded the ecosystem guideline; however any dilution in a stream will place the zinc concentration below the guideline. Copper exceeded the ANZECC ecosystem guideline, although will only pose a risk if the working solution is discharged to a stream without sufficient dilution (1:1000). Additionally, the ecosystem

guidelines are based on dissolved (filterable) copper in water, whereas the pigment analysis was conducted on unfiltered or total sample. This is likely to overestimate the copper component significantly in terms of the ecosystem guideline. Furthermore, the copper is mostly present as a low toxicity copper complex which is poorly biodegradable (BASF, 2011) and unlikely to be released as a bioavailable form.

Table 1 – Analysis of Metals in Phthalocyanine Green Pigment

Analyte	Units	Limit of Reporting (LOR)	Analysis result	Extrapolation	Extrapolation	ANZECC Guidelines	ANZECC Guidelines	ANZECC Guidelines	NHMRC Guidelines
			1% dilution of Phthalocyanine Green Pigment	Application rate (2%)	Application rate (10%)	Ecosystem*	Livestock watering (beef cattle)	Irrigation (long term exposure)	Drinking water (Health)
Antimony	µg/L	0.2	0.8	0.016	0.08	9	-	-	3
Arsenic	µg/L	0.2	0.5	0.01	0.05	13	500	100	10
Beryllium	µg/L	0.1	<0.1	<0.002	<0.01	0.13	-	100	60
Boron	µg/L	5	200	4	20	370	5,000	500	4000
Cadmium	µg/L	0.05	<0.05	<0.001	<0.005	0.2	10	10	2
Chromium	µg/L	0.2	0.6	0.012	0.06	1	1000	100	50
Cobalt	µg/L	0.1	<0.1	<0.002	<0.01	-	1000	50	-
Copper	µg/L	0.5	4540	90.8	454	1.4	1000 (beef), 500 (sheep), 5000 (pigs & poultry)	200 (long term) 500 (short term)	2
Lead	µg/L	0.1	0.1	0.002	0.01	3.4	100	2000	10
Manganese	µg/L	0.5	2.4	0.048	0.24	1900	-	200	500
Mercury	µg/L	0.1	<10	<0.2	<1	0.06	2	2	1
Molybdenum	µg/L	0.1	3.3	0.066	0.33	-	150	10	50
Nickel	µg/L	0.5	1.5	0.03	0.15	11	1000	200	20
Selenium	µg/L	0.2	0.2	0.004	0.02	5	20	20	10
Silver	µg/L	0.1	<0.1	<0.002	<0.01	0.05	-	-	100
Tin	µg/L	0.2	<0.2	<0.004	<0.02	-	-	-	-
Zinc	µg/L	1	87	1.74	8.7	8	20,000	2000	-

* ANZECC ecosystem guidelines are based on filtered water samples to determine dissolved (more bioavailable) metals. These guidelines are not directly comparable to the results of analysis in this case, being overly stringent; however they have been included for reference as a worst case scenario assessment of the pigment.

As the metals analysis was conducted on pigment from one supplier, use of this pigment from other suppliers should be accompanied by a certificate of analysis to ensure product is received within an acceptable range for trace metals.

5. Conclusion

Under normal conditions of use Vital Bon-Matt *P47-VR1* and Vital Bon-Matt *Stonewall* are expected to present a low

environmental risk in terms of aquatic impacts. The ingredients are generally low in toxicity and/or in such low concentrations that exposure is unlikely to cause harm.

Care is required to use the product according to product data sheets and the precautions listed in the Material Safety Data Sheet are followed. In the event of a spill reaching a waterway, the impacts are expected to be minimal provided there is reasonable dilution at the site of release.

6. References

ANZECC & ARMCANZ (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Environment and Conservation Council (ANZECC) & Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ).

Applied Australia (2008) Material Safety Data Sheet. Applied 3481. Jan 2008.

BASF (2011) GPS Safety Summary - C I Pigment Green 7. BASF. Date of Issue: 1 July 2011.

<http://www.basf.com/group/corporate/en/literature-document:/GPS+Safety+Summaries--C+I+Pigment+Green+7-English.pdf>

Dow (2013) *Product Safety Assessment. Primal and Rhoplex Acrylic Styrene Emulsions*. Feb 4, 2013.

www.dow.com/productsafety/finder/

QWQG (2010) *Establishing Environmental Values, Water Quality Guidelines and Water Quality Objectives for Fitzroy Basin Waters*. Draft for Consultation. December 2010. Department of Environment and Resource Management. Queensland.

Rohm and Haas (2004) Kathon WT 1.5%. Material Safety Data Sheet. 22-9-2004.

Siena (2010a) Siena Pthalo Green UD. *Material Safety Data Sheet*. Siena Chemical Pvt.Ltd. 6th April 2010.

Siena (2010b) *Pthalo Green UD*. Product Data Sheet. Siena Chemicals Pvt.Ltd. 6th April 2010.

Shellyx (2013) *Pigment Green 7. Material Safety Data Sheet*. Shellyx Pty Ltd. 10th Sept 2013.

Appendix A - Laboratory Report for Metals Analysis of Phthalocyanine Green Dye



CERTIFICATE OF ANALYSIS

Work Order	: EB1415100	Page	: 1 of 3
Client	: VITAL CHEMICAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: LETISCIA XAVIER	Contact	: Customer Services
Address	: P O BOX 3143 DARRA QLD, AUSTRALIA 4076	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: letiscia@vitalindustries.com.au	E-mail	: Brisbane.Enviro.Services@alsglobal.com
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Facsimile	: +61 07 33755854	Facsimile	: +61 7 3243 7218
Project	: Phthalocyanine Pigment Metal Analysis	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: 31992		
D-O-C number	: ----	Date Samples Received	: 23-JUN-2014
Sampler	: ----	Issue Date	: 26-JUN-2014
Site	: ----		
Quote number	: ----	No. of samples received	: 2
		No. of samples analysed	: 1

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Andrew Epps	Senior Inorganic Chemist	Brisbane Inorganics
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Page	: 2 of 3
Work Order	: EB1415100
Client	: VITAL CHEMICAL PTY LTD
Project	: Phthalocyanine Pigment Metal Analysis

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laborator.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- EG035F (Dissolved Mercury); LOR's have been raised for sample EB1415100-001 (Phthalocyanine Green Pigment) due to sample matrix interference.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Pthalocyanine Green Pigment (1%)	---	---	---	---
Client sampling date / time					20-JUN-2014 15:00	---	---	---	---
Compound	CAS Number	LOR	Unit	EB1415100-001					
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0100	---	---	---	---	---
EG084F: Dissolved Metals in Fresh Water by ORC-ICPMS									
Antimony	7440-36-0	0.2	µg/L	0.8	---	---	---	---	---
Selenium	7782-49-2	0.2	µg/L	0.2	---	---	---	---	---
Arsenic	7440-38-2	0.2	µg/L	0.5	---	---	---	---	---
Beryllium	7440-41-7	0.1	µg/L	<0.1	---	---	---	---	---
Boron	7440-42-8	5	µg/L	200	---	---	---	---	---
Cadmium	7440-43-9	0.05	µg/L	<0.05	---	---	---	---	---
Chromium	7440-47-3	0.2	µg/L	0.6	---	---	---	---	---
Cobalt	7440-48-4	0.1	µg/L	<0.1	---	---	---	---	---
Copper	7440-50-8	0.5	µg/L	4540	---	---	---	---	---
Lead	7439-92-1	0.1	µg/L	0.1	---	---	---	---	---
Manganese	7439-96-5	0.5	µg/L	2.4	---	---	---	---	---
Molybdenum	7439-98-7	0.1	µg/L	3.3	---	---	---	---	---
Nickel	7440-02-0	0.5	µg/L	1.5	---	---	---	---	---
Silver	7440-22-4	0.1	µg/L	<0.1	---	---	---	---	---
Tin	7440-31-5	0.2	µg/L	<0.2	---	---	---	---	---
Zinc	7440-66-6	1	µg/L	87	---	---	---	---	---

Appendix B

EBAM Plus product datasheet

E-BAM Plus Portable Beta Gauge

The Met One Instruments, Inc. E-BAM Plus Portable Beta Gauge has been built to satisfy users, regulators and those from the health community by providing truly accurate, precise, real time measurement of fine particulate matter automatically. In addition, it is rugged, portable, and deployable in 15 minutes. The E-BAM Plus is a U.S.-EPA designated equivalent method for PM₁₀

The E-BAM Plus Offers the Following Advanced Features:

- Accuracy and precision approval with U.S.-EPA designation for PM₁₀ measurement.
- Real-time, accurate results without correction factors, regardless of season or geographic location.
- True ambient sampling provides accurate measurement of semi-volatile nitrates and organic compounds.
- Lightweight, rugged construction is easily mounted on a tripod in minutes.
- All-weather construction allows for true ambient sampling.
- Operates on AC power.

The E-BAM Plus is a Complete Measurement System That Comes With the Following Standard Components and Features:

- Internal Data-logger
- External AC Vacuum Pump Standard
- Real-Time Concentration
- PM₁₀ Inlet
- Aluminum Tripod
- Temp/RH/Pressure Sensor
- Volumetric Flow Control
- Weatherproof Enclosure
- Filter Temperature Sensor
- Filter RH Sensor
- Filter Pressure Sensor
- Calibration Membrane



The Met One Instruments, Inc. E-BAM Plus is a portable, real-time beta gauge is a U.S.-EPA designated equivalent method for PM₁₀.



Measurement Principle	Particulate Concentration by Beta Attenuation
U.S. EPA Designations Measurement	PM ₁₀ Designation Number: EQPM-1215-226
Measurement Sample Time	1 Hour
Flow Rate	16.7 L/min inlet flow rate; actual volumetric flow
Filter Tape	Continuous glass fiber filter; 30 mm x 21 m roll; > 60 days/roll
Span Check	Manual, 800ug (typical), span foil included.
Beta Source	¹⁴ C (carbon-14); 60 µCi ±15 µCi (2.22 MBq)
Beta Detector Type	Photomultiplier tube with organic plastic scintillator
Operating Temperature Range	-30° to +50°C.
Operating Humidity Range	0 – 90% RH, noncondensing
Inlet Humidity Control	Actively controlled inlet heater module
User Interface	4.3" graphical touch screen
Ambient Sensor	Model 597A combination AT, RH, and BP serial sensor AT: -50° to +70°C; RH: 0 to 98%; BP: 375 to 825 mmHg
Analog Outputs	2 Channels; optically Isolated; Voltage Range 0-1, 0-2.5 or 0-5 VDC, Current Ranges 4-20 MA
7500 Digital Serial Interface	2 channels, half duplex RS-485
Serial Interface	1 channel; full duplex RS-232, USB (Shared common serial output) 1 channel; half duplex RS-485, Baud rates 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
Internal Data Storage	8 Days 1-minute average, 1.3 years 60-minute average
External Data Storage	1 USB Flash drive device
Compatible Software Power	Air Plus 5, COMET™, HyperTerminal®
Supply	AC Version: 100 - 230 VAC; 50/60 Hz; 150W, 3A @ 115 VAC/ 2A @ 230 VAC
Weight	75 lbs. (34.1 kg)
Dimensions (Without Tripod)	Height: 18 in (46 cm) Width: 16 in (41 cm) Depth: 12 in (31 cm)

Standard Accessories

- BX-802 PM₁₀ Inlet EPA Spec.
- EX-597 Ambient RH Pressure Sensor
- 460180 Filter Tape, Roll
- COMET Software
- External Pump 115 or 230 VAC Option (Specify Medo or Gast)

Specifications are subject to change at any time.

Optional Accessories

- BX-302 Zero Calibration Kit
- BX-307 Flow Calibrator
- BX-807 PM2.5 Sharp-Cut Cyclone
- BX-803 TSP Inlet
- EX-MSO Wind Speed and Direction Sensor
- EX-AIO 2 Sonic Wind Speed and Direction Sensor



Appendix C

Dust Master Pro product datasheet

DUST MASTER PRO

REAL-TIME PARTICULATE MONITOR



- ▶ Made in Australia
- ▶ Near reference measurement
- ▶ PM10, PM2.5, PM Total and more
- ▶ Easy to use
- ▶ Remote connectivity & telemetry
- ▶ Local and genuine support



HOW IT WORKS

The QAMS Dust Master Pro particle counter uses laser technology for simultaneous real-time PM monitoring of up to 5 PM fractions: PM₁₀, PM₄, PM_{2.5}, PM₁ and Total PM.

The advanced pump system provides accurate data with quiet operation due to consistent 5LPM flow rate and pulsation dampening technology.

The quick deploy design, graphical display, and dedicated keypad with intuitive menu simplifies on-site operation, while the new Visual Master Pro Software gives remote users unprecedented capabilities.

PERFECT FOR:

- ▶ Governments & Authorities
- ▶ Consultants & Engineering
- ▶ Civil & Construction
- ▶ Mining & Quarries
- ▶ Logistics, Ports & Terminals



KEY FEATURES AND HIGHLIGHTS:

- **Real-time** measurement of up to 5 PM fractions **simultaneously**
- Capable of measuring **PM10** and **PM2.5** (the most common fractions for measuring dust that is harmful to health) as well as **PM4, PM1** and **Total PM**
- **Manufactured in Australia** with premium quality and service you can trust
- Advanced pump system with high **5LPM flow rate** and quiet operation
- Easy field calibration available via **Automatic Field Calibration Mode**
- RH controlled heated inlet along with a unique in-line water trap **eliminates moisture interference**
- Annual factory service recommended. **No other maintenance required**
- Mains, battery or solar power options
- **In-built** data logging capability
- **Remote data access** via 3G modem
- Easy to set alarm capabilities through **SMS messaging to mobile phone**, external siren or visual beacon.



Weather & Meteorological Sensors

The Dust Master Pro has Plug 'n' Play integration with up to 3 Lufft Meteorological Sensors, which means no additional costly data loggers for your weather monitoring requirements. The DMP has the capability to record up to 47 distinct parameters, including:

- Wind Speed and Direction
- Air Temperature
- Relative Humidity
- Barometric Pressure
- Precipitation Type, Intensity and Quantity
- Solar Radiation
- Lightning Strikes
- and more



Visual Master Pro Data Logging Software

VMP Software (valued at \$1,799) comes **included** with your Dust Master Pro purchase. The remote interface software requires no coding and makes it simple for both non-technical and expert users to access data and adjust instrument setting at an advanced level.

- Live data display allows you to access first-hand information
- Real-time data display, real-time decision making
- Remote access for data downloading and configuration
- Synchronised data set for ease of download
- Unique EPA mode allows user to simply set up the system to meet EPA requirements
- Operating on Windows 7 through to Windows 10
- Compatible with QAMS Dust Master Pro and Met Master Pro
- Format available in CSV, HTML and ASCII.

Proudly Manufactured in Australia by Thomson Environmental Systems

We developed the QAMS range specifically for outdoor monitoring in Australia's harsh conditions. We built QAMS for ease-of-use, robustness and suitability for a diverse number of applications.

Since the first QAMS monitor launched in 2008, we have continually strived to improve the product and make it the highest quality instrument on the market. With years of field operation and a strong positive response from our users, we are proud that the QAMS range has become a leader in monitoring, construction, mining and industrial monitoring applications.



DUST MASTER PRO DATASHEET

Particle Size Range	0.2um to 18um	Relay Contacts	3 relay contacts (NC/COM/NO), Alarm 1 set point, Alarm 2 set point, Instrument fault alert, Max. contact switching 5A for Alarm Capabilities
Dust Measurement Range	0.001 to 10mg/m ³ (internal dilution available)	Alarm Capabilities	SMS messaging to mobile phone, external siren, visual strobe light and email alerts. Carrier charges may apply.
Simultaneous PM Fraction Measurements	Simultaneously measures all 3 popular PM fractions; PM _{2.5} , PM ₁₀ and Total PM with option to add PM ₁ and PM ₄ . Other PM fractions available upon request.	Enclosure Type	NEMA4 / IP66 rated, excluding heated inlet and exhaust Display Type 128 x 64 bit low energy graphical LCD display
Measurement Resolution	0.001mg/m ³ (1ug/m ³)	Keypad / User Interface	12 button function with keys
Flow Rate Flow Accuracy Single Pump System	5.0 litre per minute (default), user adjustable from 3 to 8 lpm Precision automatic flow control to within +/- 1% With internal solenoid valve to control internal purge cycle every 30 minutes as standard	Tripod or Post Mounting	May be easily mounted on a 50mm diameter post or on a TES transportable heavy duty tripod
Barometric Pressure	Built in barometer for ambient static pressure measurements for precise flow control	Optional Inlet Jets	PM _{2.5} , PM ₁₀ , Total PM - supplied with unit
Data Download	Data is polled or, upon special request, automatically and continually pushed to your server. Ability to fully synchronise data with the use of Visual Master Pro Software	Heated Inlet	Precision heated inlet controls inlet temperature to ensure sampling at 45% Relative Humidity max.
Gravimetric Filter Sampling	Integrated filter holder, 37mm filter cartridge	Calibration Method	Fully calibrated to ISO12103-1 international standards by TES
Data Logging Interval and Internal Memory	Fully user adjustable from 5 to 999s Ability to store over 2 years of time and date stamped 10 minute data captures from a single PM channel. Note, actual storage depends on the application as it will vary depending on additional parameters	Power Options	Mains Power - Operates from 80 to 260 VAC and is fully weatherproof. Battery Power - Standard or Portable. Includes rechargeable battery, regulator and battery box. 'Standard Battery System' provides approx 210 hours of operation with the inlet heater OFF or 70 hours with the inlet heater ON. Solar Power System provides continuous operation based on average of >4.5 hours of sunlight per day, and will continue for up to 3 days no sun. System includes Solar Panel & Stand, Battery & Battery box, Regulator
NIOSH 5040 Capable Sampling	Yes, using 37mm filter cassette	Weight	System 7Kg Heated inlet 1.5Kg
Web Based Data Collection	Optional	Dimensions - System	Width 300mm Depth 200mm Height 350mm
Meteorological Inputs	Up to 3 Lufft instruments can be integrated - each with multiple channels including wind speed, wind direction, humidity, temperature, precipitation, barometric pressure, solar radiation, evaporation, sigma theta, lightning & more.	Dimensions - Heated Inlet	Length 500mm Width 48mm
Digital Inputs/Inputs	3 optically isolated inputs, voltage free 1 x RS232, 2 x Analogue (0 to 2.5 volt standard, 0 - 5 volt optional, or 4-20mA [jumper selectable]), 2 x Counter Channels, 2 x PT100 & 1 x SHT75X inputs included.	Operating Conditions	-10 to 50°C temperature range 0 to 95% humidity range
Communications	1 x RS232 digital port Analogue Modbus TCP (optional)	Annual Calibration	TES' unique design gives you a low-cost for calibration. Instead of returning the entire monitor, you can choose to return only the optical engine for annual calibration. The calibrated optical engine will be returned to you with a new pump and a replacement internal filter. You can then perform temperature, pressure and flow calibrations to complete the process. Alternatively, TES can perform the entire calibration.
Outputs	3 x Analogue Outputs (0 to 2.5 volt standard, 0 - 5 volt optional, or 4-20mA [jumper selectable]), 1 x RS232 Output, Ethernet Module Optional, 3 x Solid State Relays for Audio and Visual Alarms		

Appendix D

HIVOL product datasheet

HiVol 3000

HIGH VOLUME AIR SAMPLER



The HiVol 3000 particulate sampler performs remote unattended sampling of PM_{2.5}, PM₁₀ or TSP along with basic meteorological parameters.

The HiVol 3000 incorporates advanced programming functions and electronic volumetric flow control to maintain a consistent flow and collect a truly representative sample of particulate matter.

Optional attachments allow the sampler to measure wind speed and direction which can then be used to trigger sector selectable sampling (e.g. fence-line monitoring).

APPROVALS

- US EPA Manual Reference Method: RFPS-0706-162 approval for PM₁₀
- Meets Australian standard for PM₁₀ and TSP monitoring
- Only high volume air sampler with CE and C-tick approval
- Manufactured under ISO9001.

RELIABLE SAMPLING

- Volumetric flow control automatically corrected to standard reference temperature
- Programmable reference temperatures
- Industrial brushless motor (100,000 hours continuous field operation)
- Weather-proof marine quality anodised aluminium cabinet
- Automatic supply voltage monitoring and shut-down facility reduces damage to instrument.

DIRECTIONAL SAMPLING

- Wind direction and speed used to activate/de-activate sampler
- External trigger (0 - 5 VDC) can be used for activating sampling program.

ENHANCED COMMUNICATION

- RS232 output for data collection and remote communication
- Filter blocked and instrument error alarms
- Total control of instrument remotely from PC
- Simple programming of sampling periods, including daily and weekly programs, with in-built "1-in-X day" sampling capability.

SPECIFICATIONS

Operation:	Microprocessor controlled (internal data logging)
Pump/Motor:	Side channel blower driven by an induction motor (brushless)
Flow controller:	Variable frequency drive
Volumetric flow range:	Nominal 45 - 96 m ³ /hr
Vacuum capability:	140 mBar max
Flow accuracy:	Better than ± 1 m ³ /hr
Flow repeatability:	± 1 % of reading
Construction:	Anodised aluminium and stainless steel fasteners
Filter size:	250 x 200 mm rectangular element
Dimensions:	380 x 380 x 1200 mm plus inlet
Weight:	45 kg plus inlet weight
Operating voltage:	200 - 240 V + 10 % 50/60 Hz (optional 115 V 60 Hz)
Power Consumption:	1500 VA Max (depending on filter loading & flow rate)
Temp measurement range:	0 - 50 °C
Barometric pressure:	600 - 900 mmHg \pm 4 mmHg

COMMUNICATION & DATA LOGGING

No. of readings

- 150 (user selectable averaging period,
e.g. 75 hrs of 30 min averages)

External inputs

- 1 x wind direction sensor input (10k potentiometer)
- 1 x wind speed sensor input (contact closure)
- 1 x spare contact closure input (e.g. tipping bucket rain gauge).

Output

- RS232C

OPTIONS

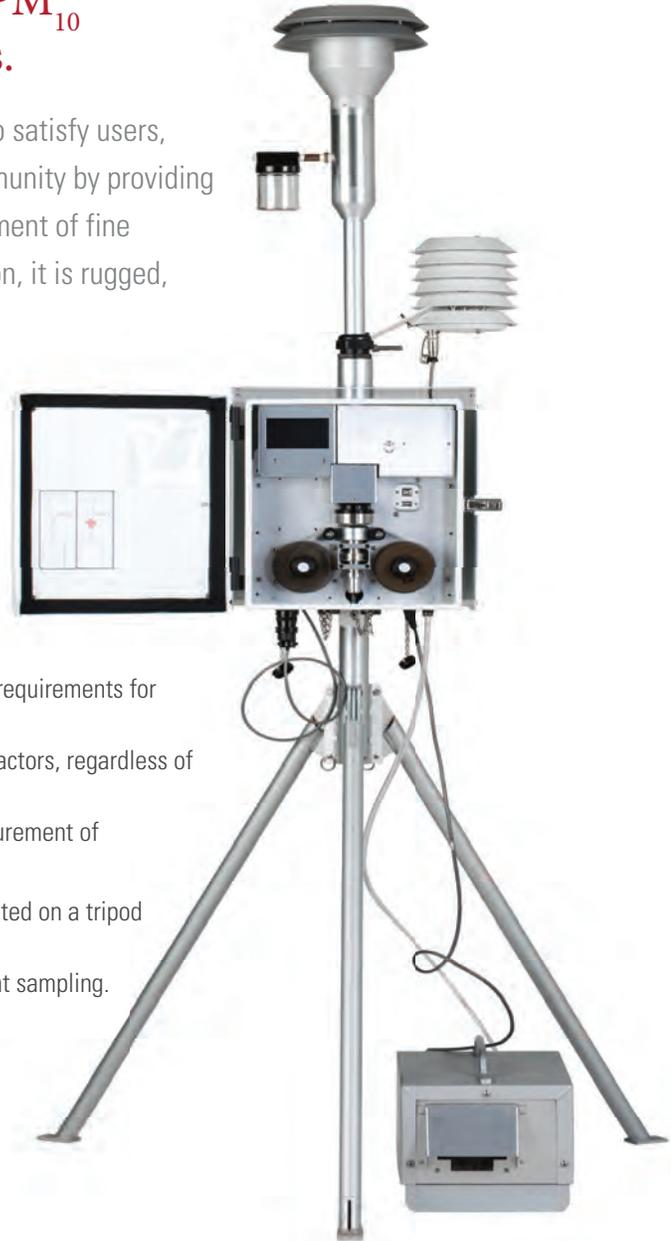
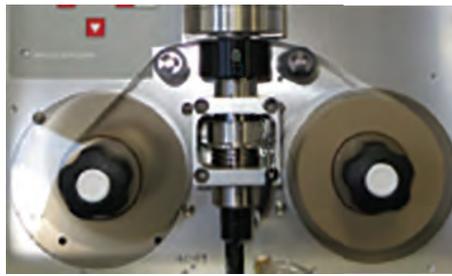
- PM₁₀, PM_{2.5} or TSP size selective inlets
- Calibration plate and field calibration transport case
- Manometer
- WS/WD sensors
- RH Sensor
- Muffler.



E-BAM Plus

The Met One E-BAM Plus is a Portable, Real-time Beta Gauge which is Comparable to U.S. EPA Methods for PM₁₀ Particulate Measurements.

The Met One E-BAM Plus has been built to satisfy users, regulators and those from the health community by providing truly accurate, precise, real time measurement of fine particulate matter automatically. In addition, it is rugged, portable, and deployable in 15 minutes.



The E-BAM Plus Offers the Following Advanced Features

- Accuracy and precision approval with U.S. EPA requirements for PM₁₀ measurement.
- Real-time, accurate results without correction factors, regardless of season or geographic location.
- True ambient sampling provides accurate measurement of semi-volatile nitrates and organic compounds.
- Lightweight, rugged construction is easily mounted on a tripod in minutes.
- All-weather construction allows for true ambient sampling.
- Operates on AC power.

E-bam Plus is a Complete Measurement System It Comes With the Following Standard Components:

- Internal Datalogger
- External AC Vacuum Pump Standard
- Real-Time Concentration
- PM₁₀ Inlet
- Aluminum Tripod
- Temp/RH/Pressure Sensor
- Volumetric Flow Control
- Weatherproof Enclosure
- Filter Temperature Sensor
- Filter RH Sensor
- Filter Pressure Sensor
- Calibration Membrane



Specifications

PARAMETER	SPECIFICATION*
Measurement Principle	Particulate Concentration by Beta Attenuation
U.S. EPA Designations	Outdoor PM ₁₀ FEM Configuration (EQPM-1215-226)
Measurement Range	-15 µg/m ³ – 10,000 µg/m ³
Measurement Accuracy	Exceeds US-EPA Class III PM ₁₀ FEM standards for additive and multiplicative bias
Measurement Resolution	1.0 µg/m ³
Lower Detection Limit	(2σ) (1 hour) Less than 10 µg/m ³ (2σ) (24 hour) Less than 2 µg/m ³
Measurement Sample Time	1 Hour
Flow Rate	16.7 L/min inlet flow rate; actual volumetric flow
Filter Tape	Continuous glass fiber filter; 30 mm x 21 m roll; > 60 days/roll
Span Check	Manual
Beta Source	C-14 (carbon-14); 60 µCi ±15 µCi (< 2.22 X 10 ⁶ Beq); Half-Life 5730 years
Beta Detector Type	Photomultiplier tube with organic plastic scintillator
Operating Temperature Range	-25° to +50°C.
Operating Humidity Range	0 – 90% RH, noncondensing
Inlet Humidity Control	Actively controlled inlet heater module; 0 - 50 C filter temperature set point
User Interface	4.3" graphical touch screen
Ambient Sensor	Model 597 combination AT, RH, and BP serial sensor AT: -50° to +70°C; RH: 0 to 100%; BP: 375 to 825 mmHg
Analog Outputs	2 channels; optically isolated; Voltage range 0–1 VDC, 0–2.5 VDC, 0–5 VDC Current range 4–20 mA
Alarm Output	1 channel; dry NO contact; 1 A at 125 VAC or 60 VDC maximum.
7500 Digital Serial Interface	2 channels, half duplex RS-485
Serial Interface	1 channel; full duplex RS-232 and USB (Shared common serial output) Baud rates 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
Internal Data Storage	8 Days 1-minute average, 1.3 years 60-minute average
External Data Storage	1 USB Flash drive device
Compatible Software	Air Plus 5, Comet™, HyperTerminal®
Power Supply	AC Version: 100 - 230 VAC; 50/60 Hz; 150 W, 3 A @115 VAC / 2 A @230 VAC
Weight	75 lbs. (34 kg) (Top unit 35 lbs., Pump box 40 lbs.)
Dimensions (Without Tripod)	Height: 18" (46 cm) Width: 16" (41 cm) Depth: 12" (31 cm)

Standard Accessories

- BX-802 PM₁₀ Inlet EPA Spec.
- EX-597 Ambient RH Pressure Sensor
- 460180 Filter Tape, Roll
- COMET Software
- External Pump 115 or 230 VAC Option (Specify Medo or Gast)

Optional Accessories

- BX-302 Zero Calibration Kit
- BX-307 Flow Calibrator
- BX-807 PM_{2.5} Sharp-Cut Cyclone
- BX-803 TSP Inlet
- EX-MSO Wind Speed and Direction Sensor
- EX-AIO 2 Sonic Wind Speed and Direction Sensor

REV AUGUST 2018


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→ **The Power of Commitment**