Port Kembla Gas Terminal

Air Quality Management Plan
Early Enabling Works

Australian Industrial Energy

26 May 2021

→ **The Power of Commitment**

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Acronyms

Term	Definition
ACM	Asbestos containing material
AIE	Australian Industrial Energy
Air NEPM	National Environment Protection (Ambient Air Quality) Measure
Approved Methods	Approved Methods for the Modelling and Assessment of Air Pollutants in NSW
AQMP	Air Quality Management Plan
ASS	Acid Sulfate Soils
Clean Air Regulation	*Protection of the Environment Operations (Clean Air) Regulation 2010*
CO	carbon monoxide
CPT	Cone Penetration Testing
CSSI	Critical State Significant Infrastructure
EMS	Construction Traffic Management Plan
DICL	ductile iron cement lined
DPIE	Department of Planning, Industry and Environment
EWN	Early Warning Network
EIS	Environmental Impact Statement
EMS	Environmental Management Strategy
EPA	NSW Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPL	Environmental Protection Licence
FSRU	Floating storage and re-gasification unit
HVAS	High Volume Air Samplers
KPIs	Key Performance Indicators
LNG	liquefied natural gas
NEPC	National Environment Protection Council
NGP	Pipeline Installation including tie-ins
NO_2	nitrogen dioxide
OEH	Office of Environment and Heritage
ORF	Onshore Receiving Facilities
PANSW	Port Authority of NSW
PKCT	Port Kembla Coal Terminal
PKGT EIS	Port Kembla Gas Terminal Environmental Impact Statement
PKGT	Port Kembla Gas Terminal
PKHD	Port Kembla Height Datum
PM	Particulate matter
POEO Act	*Protection of the Environment Operations Act 1997*
SRD SEPP	State Environmental Planning Policy State and Regional Development
SO^2	sulfur dioxide

Term	Definition
TTE	Tertiary Treated Effluent

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1. Introduction

1.1 Overview

This Air Quality Management Plan (AQMP) for the Early Enabling Works phase of the Marine Berth Construction and Dredging (MBD) package of work has been developed as a sub-plan to the Port Kembla Gas Terminal Project (the Project) Environmental Management Strategy (EMS).

This AQMP was prepared by the SCSB JV on behalf of Australian Industrial Energy (AIE) to apply to construction activities associated with the Project. GHD Pty Ltd (GHD) has updated this AQMP on behalf of AIE for application to the management of air quality during the Early Enabling Works of the MBD. This AQMP does not cover the management of air quality associated with Marine Berth Construction and Dredging or the construction of Onshore Receiving Facilities, or Pipeline Installation.

This AQMP interfaces with the other associated sub-plans, which together describe the proposed overall management system for the Project. This AQMP addresses the requirements of the Project Infrastructure Approval (SSI 9471) 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% 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% 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 the 29th of 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.

The development has progressed to the early works stage at Berth 101 (the site or MBD Site Compound), which includes the demolition and removal of all existing surface infrastructure, and disconnection and removal of all underground services. The Early Enabling Works phase is required to facilitate all future stages of development and to meet an obligation in the lease of the site to demolish existing wharf infrastructure by 29 September 2021.

1.3 Purpose

This AQMP has been prepared in accordance with the Port Kembla Gas Terminal Environmental Impact Statement (PKGT EIS) and associated Infrastructure Approval (SSI 9471) and describes how Liberty Industrial propose to manage air quality during Early Enabling Works for the MBD. Specifically, this plan includes requirements to:

- Ensure no offensive odours are emitted from the Early Enabling Works.
- Minimise and/or prevent:
  - Dust emissions, including wind-blown and traffic generated dust.
  - Surface disturbance.
  - Greenhouse gas emissions.
- Ensure compliance with air quality related requirements of the Environmental Protection Licence (EPL) issued for the construction phase of the Project.

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

- Performance criteria for dust and particulate mitigation.
- Mitigation strategies to minimise impacts on air quality.
- Monitoring plans and reporting demonstrating the performance during Early Enabling Works.

AIE and its contractors acknowledge that maintaining air quality in the vicinity of the Early Enabling Works is paramount to the successful delivery of the construction phase of the Project.

This AQMP is applicable to all staff, employees, subcontractors, and any statutory service authorities undertaking works including, but not limited to, excavation works, transportation, or handling of fill throughout the duration of the Early Enabling Works for the MBD. The AQMP implementation and on-going development will be managed by the Project team.

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 the 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 in 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. The 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 such as 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 use. Berth and wharf facilities and 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.

A site overview is provided as Figure 2.1.

Figure 2.1 Site overview

2.2 Project construction scope of work

The Project construction scope of work has been divided into the three main packages (with associated activities), as outlined in Table 2.1. This AQMP applies only to the Early Enabling Works associated with the MBD.

Table 2.1 Construction work packages

Stage	Package	Proposed commencement	Activities	Applicability to this AQMP
1	Early Enabling Works	May 2021	Early Enabling Works. 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.	Applicable.
2	Marine Berth Construction and Dredging (MBD)	November 2021	Quay wall construction.	Not applicable.
			Excavation/dredging.	Not applicable.
			Wharf facilities construction including mooring system, navigational aids, and associated works.	Not applicable.
	Onshore Receiving Facilities (ORF)		Construction of the ORF, which comprises of three areas: Wharf Topside Area; Utility Area; and Common Area. Installation of a small section of pipeline within the Berth 101 site boundary.*	Not applicable.
3	Pipeline Installation including tie-ins (NGP)	March 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.	Not appliable.

2.3 Early enabling works for MBD

The site of the Early Enabling Works is the former Port Kembla Coal Terminal (PKCT) Bulk Products Berth. The removal of existing structures and services is required to facilitate subsequent development stages of the Project. The scope of the Early Enabling Works will involve the following tasks:

– Excavation down to level of RL+2.5 metres Port Kembla Height Datum (PKHD) to allow removal of existing structures and services and facilitate construction of the quay wall.
– Demolition/removal of Berth 101 and aboveground structures.
– Demolition/removal of aboveground and underground services.
– Removal of existing stockpiles from site.
– Transport of spoil via road from the MBD Site Compound to the Emplacement Cell Construction Site.
– Platform excavation and stockpiling.
– Processing demolished materials (for re-use or recycling) by others.
– CPT in the Outer Harbour.

An outline of the tasks associated with the Early Enabling Works is provided in Section 2.3.1 through Section 2.3.5. The Early Enabling Works site includes the MBD Site Compound and the Emplacement Cell Construction Site, as shown in Figure 2.2.

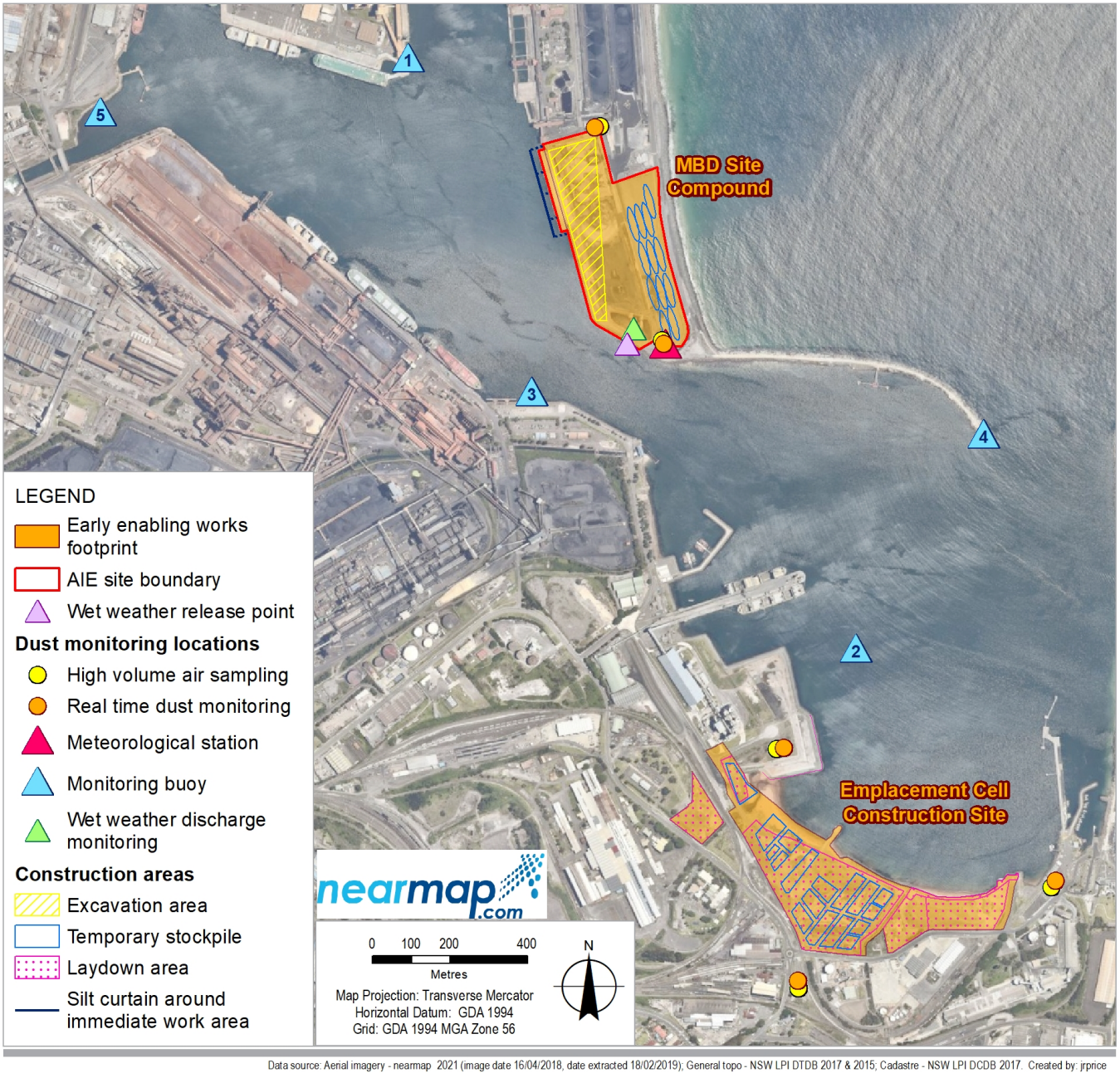

Figure 2.2 Early Enabling Works for MBD

2.3.1 Excavation

Excavation is required to facilitate the removal of existing aboveground and underground structures and services within the MBD Site Compound to a level of RL +2.5 metres on PKHD.

The proposed excavation zone generally extends from Road No. 7 at the northern end of the West Stockyard to the South Ponds and across to Road No. 9 as shown by the yellow shaded area in Figure 2.3.

Figure 2.3 Proposed excavation zone within MBD Site Compound

It is proposed to segregate, manage, stockpile and transport excavated materials into the following categories:

- Fill materials and concrete suitable for re-use for wharf construction will be crushed on-site and stockpiled in the East Stockyard (refer to Figure 2.3).
- Excess materials suitable for placement in the Outer Harbour will be transported to the Emplacement Cell Construction Site (refer to Figure 2.2 and Figure 2.4).
- Revetment rock armour will be stockpiled for reuse, if removed.
- Recyclable material such as steel, cables, etc. will be transported off site for recycling.
- Waste materials that are unsuitable as fill or for recycling will be disposed off-site at an approved landfill facility.

Figure 2.4 Emplacement Cell Construction Site

2.3.1.1 Demolition/removal of structures

All structures, foundations, piling, paving, site services, etc. within the excavation zone require demolition and removal. The proposed structures for demolition are summarised in Table 2.2.

Table 2.2 Structures to be demolished/removed during Early Enabling Works for MBD

Structure	Works required
Tower T1	Remove any remaining miscellaneous steel work as necessary (e.g., handrails and guardrails)
Tower T2 and T3	Demolish headstock and cut-off any piles at RL+1.5 m PKHD.
Tower T1, T3, T4 and T6 Clean Out Pits/ Drains	Demolish any remaining miscellaneous steel work, the Clean Out Pit, and associated drains.
Conveyor C3	Demolish any pavement/gutter and cut-off any piling in the excavation zone
T3 Pond	Demolish any remaining miscellaneous steel work, the pit and associated drain.
Tower T5 gantries	Demolish the remaining footings and headstock and cut-off piles at RL +1.5m PKHD. The two southern gantries require complete removal of the headstock and piles.
Conveyor C5 Gantry Walls	Demolish the remaining West Stockyard walls (inverted precast concrete T sections).
Reclaim conveyors C6 and C7	Demolish all remaining parts including the reclaim hopper, paving and any foundations/piling/footings.
West shore clean out pit	Demolish any remaining miscellaneous steel work, the pit and associated drain.
West Stockyard Hardstand Area	Demolish and excavate the hardstand to RL + 2.5 m PKHD. The excavation of the hardstand shall extend to 3 m beyond the tie rod anchors (the hardstand area is constructed of 300 mm heavily bound base course (road building material), 340 mm lightly bound base course (80% blast furnace slag and 20% granulated blast furnace slag) and 200 mm of engineered fill.
Light Towers	Demolish the foundations and remove associated cabling. Demolish and remove all other light towers from the site.
Berth 101	Berth 101 comprises a concrete deck supported by 568 concrete and timber piles, tie rods and dead man blocks. There is also a fendering system comprising timber piling, timber waling and rubber fenders, various utilities, and a sheet pile cut-off wall (approximately 175 m long) along the landside of the berth. Works required include cut and remove the concrete deck, remove tie rods, and anchor blocks. Removal of piles will be via a crane positioned on a barge immediately

Structure	Works required
	adjacent to the wharf structure. Silt curtains will be positioned surrounding the work area during the removal of piles. AIE has an obligation under its lease agreement to demolish the Wharf at Berth 101 by 29 September 2021.
Substation	Undertake asbestos containing material (ACM) inspections and testing of materials prior to demolition (as required). Where ACM is confirmed, remove and dispose off-site by licensed contractor with clearance certificate. Demolish building and transformer bays including underground foundations and conduits. Remove and dispose of any remaining cables from Substation within the site.
Mooring lines	Remove lines and blocks.
Sewer tanks	Two underground concrete sewer tanks are located on the south side of Tower TS8. Demolish the tanks following pump out and flushing.

2.3.1.2 Demolition/removal of services

Numerous services are currently located in the excavation zone and will be demolished and removed generally down to RL +1.5 m PKHD as part of the excavation process. The services that will be demolished/removed are summarised in Table 2.3.

Table 2.3 Services to be demolished/removed during Early Enabling Works for MBD

Structure	Works required
Bunker oil pipeline	The existing bunker oil pipeline extends from storage facilities on the southern shore of Port Kembla, under The Cut to the oil berth at the northern breakwater. A 300 mm carbon steel pipeline extends underground (approximately 600 mm clear cover) along the western shore of the site to Berth 101. An above ground section then passes under Berth 101 and on to Berth 102 to the north. The pipeline sections, both underground and running under Berth 101 require removal with management and disposal of any residual hydrocarbons. It is proposed to cut the pipeline into transportable lengths and removed from site to an appropriate and approved location. Beyond the excavation zone, the pipeline will remain in-situ and will be capped at both ends with suitable identification.
Domestic water pipeline	An underground potable water supply pipeline currently runs underground on the eastern side of Tower TS8 to supply Berth 101 and a ductile iron cement lined (DICL) pipeline continues along the western shore of Berth 101 supplying the Port Authority of NSW (PANSW) meter compound at the south of the site. An abandoned pipeline formed from ACM runs parallel to the DICL pipeline. A licenced removal company shall be engaged to remove and transport the asbestos material in a safe manner to an approved disposal site. An asbestos clearance certificate shall be provided following removal. All abandoned domestic water piping is to be removed within the excavation zone. Beyond the excavation zone, the pipeline shall remain in the ground and be capped at both ends.
Electricity supply	Electricity is supplied from the PKCT 11 kV South Substation and distributed in Substation B (south of Berth 101). These supplies include: An underground 11 kV electricity cable (approximately 900 mm cover) from Substation B to the PANSW pad-mounted transformer at the southern end of the site. Several 415 V cables from Substation B to Pumps 01 at the South Ponds, to Pumps 09 and 17 at drain pit sumps and to light poles across the site Control cabling for pumps, lights, and water spray nozzles. The substation building will be demolished with all cables in the excavation zone removed.
Telecommunications	The telecommunications cable extends from a pit near PKCT South Substation to a pit near the PANSW meter compound. The route of the cable is uncertain, however, it is understood to follow the western shore. During demolition works, the cable is required to be removed and disposed of. Any cable beyond the excavation zone, is to remain in-situ.

Structure	Works required
Tertiary treated effluent	Tertiary Treated Effluent (TTE) is supplied to PKCT for firefighting and dust suppression sprays. An interconnected ring main circles around both the East and West Stockyards supplying dust suppression sprays and fire hydrants. The pipelines and sprays serving the West Stockyard will be demolished and removed. The western incoming supply shall be capped near Tower TS7 and at the branch from West Stockyard to the PKCT truck wash. The spray system for the East Stockyard is not required and will be demolished. The TTE pipeline along the eastern side (Seawall Road) is to remain in-service. The TTE pipeline along Road No. 9 shall be capped on the western side of PANSW meter compound.

During demolition, stormwater from the site will be directed to Southern Pond. The overflow pipes at the Southern Pond are AIE's licensed discharge point into Port Kembla Harbour.

As the demolition work proceeds, the contractor will ensure stormwater runoff always flows to the Southern Pond in accordance with AIE's EPL conditions.

2.3.2 Removal of stockpiles

Two large stockpiles, approximately 700 metres^3 to 800 metres^3 of mixed sandy gravel material are present in the south-western section of the MBD Site Compound. The stockpiles also contain inclusions of slag gravel, cobbles, concrete, and boulders. Both stockpiles will be removed as part of the Early Enabling Works and will be characterised (visual and sampling, as required) for re-use.

2.3.3 Transport of spoil from MBD Site Compound to Emplacement Cell Construction Site

Approximately 50,000 metres^3 of spoil will need to be transported via road from the MBD Site Compound and stockpiled at the Emplacement Cell Construction Site.

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

Spoil will be characterised prior to transport based on the source location, the availability of any existing data and additional sampling and analysis, as required.

2.3.4 Processing of demolished materials (reuse and recycling)

Demolished materials which are suitable may be re-used in the works, subject to approval by AIE and the Auditor. Materials for re-use may include:

– Uncontaminated excavated material as fill.
– Crushed concrete as fill.

Excavation of a platform to stockpile up to 70,000 metres^3 of material will be undertaken in the East Stockyard.

Materials for re-use will be stockpiled and stored in the East Stockyard until further stages of the works proceed.

Materials suitable for recycling will be preserved during the demolition works and removed and stored on-site in the eastern stockyard as directed by AIE until collected or removed from site by appropriate contractors.

2.3.5 Cone Penetration Testing

CPT will be undertaken at 50 to 60 locations within the Outer Harbour to inform the design and alignment of the Emplacement Cell. CPT locations will target alignment of Emplacement Cell and proposed fill area. Works comprise of surveying the seabed level and geotechnical testing (including CPT) via a purpose-built CPT rig attached to a small jack barge, portable 15t CPT rig and jack up barge.

2.4 Program for Early Enabling Works of MBD

Early Enabling Works for the MBD is anticipated to commence in May 2021. It is estimated to be completed in six months.

3. Roles and responsibilities

The Project team is responsible for all activities associated with the Early Enabling Works, including the implementation and maintenance of the various air quality mitigation/management measures. The Project team is outlined in the Organisational Chart in the Covering EMS. Relevant roles and responsibilities for the AQMP are outlined in Table 3.1.

Table 3.1 Roles and responsibilities

Project Role	Responsibility
AIE Project Director	– Responsible for the overall funding and direction of the Early Enabling Works. – 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	– Proactively stewards the effective implementation of the Early Enabling works in accordance with requirements of the Infrastructure Approval (SSI9471), Environmental Strategy and all related sub-plans – Demonstrate proactive support for environmental requirements
AIE HS&E Manager	– Implementation and updates of all Health, Safety and Environmental 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 – Environmental Reporting
Liberty Industrial Project Manager	– 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, AQMP and improved procedures. – Ensure this AQMP is implemented for the duration of the Early Enabling Works.
Liberty Industrial Construction Foreman	– 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 the Early Enabling Works.

Project Role	Responsibility
Liberty Industrial Environmental Representative	– Delivers environmentally focussed toolbox talks. – Provides environmental advice, assistance, and direction to Liberty Industrial Project Manager to ensure construction activities are conducted in accordance with regulatory legislation and this AQMP. – 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 Liberty Industrial Project Manager and AIE HSE Manager.
AIE Environmental Representative	– Develop strong working relationships with the Liberty Team and Consultants. – Ensure environmental risks are appropriately identified, communicated, and effectively managed. – Instruct and advise AIE Management Team on compliance issues. – Provide specialist advice and input as required. – Co-ordinate and where required, conduct internal audits of the AQMP. – Reports on the performance of the AQMP and recommends change or improvements to the AIE HSE 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	– 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 the Early Enabling Works for the MBD are listed in Table 4.1.

Table 4.1 Legislation and relevant policy applicable to the AQMP

Legislation and Regulation	Description	Applicability
Federal		
National Environment Protection (Ambient Air Quality) Measure	The National Environment Protection Council (NEPC) set uniform national standards for ambient air quality in February 2016. These are known as the *National Environment Protection (Ambient Air Quality) Measure* (the Air NEPM). The Air NEPM outlines the monitoring procedures, assessment and reporting measures that participating jurisdictions must undertake in regards to pollutants such as – PM_{10} and $PM_{2.5}$ and – toxic pollutants including carbon monoxide (CO), nitrogen dioxide (NO_2), and sulfur dioxide (SO_2). The Air NEPM outlines national environmental protection goals and standards for ambient air quality protection for human health and well-being.	NSW is a participating jurisdiction to the Air NEPM. The NSW EPA and OEH are the agencies responsible for implementing how the Air NEPM is implemented. The EPA 'Approved Methods for the Modelling and Assessment of Air Pollutants in NSW' guidelines have been consulted for this AQMP, as outlined below.
State		
Protection of the Environment Operations Act 1997 (POEO Act)	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.	Where an EPL applies, air quality requirements (including criteria) may be specified by the licence. Activities undertaken onsite must not contribute to environmental degradation, and pollution and air emissions must not exceed the standards.
Protection of the Environment Operations (Clean Air) Regulation 2010 (the Clean Air Regulation)	the Clean Air Regulation is made under the POEO Act and provides regulatory measures to control emissions from motor vehicles, fuels, and industry.	Part 5 Division 2 outlines the standards for scheduled premises applicable to the Project (being Group 6) regarding variations to EPL licence regarding air impurity emissions and determining if standards have been exceeded. Schedule 3 of the Clean Air Regulation outlines the standard of concentration applicable to the Project.
The Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (EPA, 2016)	The Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (EPA, 2016) (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.	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. 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.

5. Planning requirements

The planning requirements and the corresponding air quality management measures applicable to the Early Enabling Works for the MBD are listed in Table 5.1. Management measures are detailed in Section 7 through Section 9.

The planning requirements include the conditions set out in Infrastructure Approval SSI 9471 dated 24th April 2019 and the mitigation/management measures outlined in the PKGT EIS.

Table 5.1 Approval conditions

Requirement	Reference	Responsibility	Evidence	Applicability to this AQMP
General				
The proponent must not transport more than 360,000 cubic metres of spoil for disposal by road and must maintain records of the volume of spoil transported by road to track compliance against this condition	Infrastructure Approval Sched 3, 7	– AIE Construction Manager – Liberty Industrial Project Manager	Section 7	Applicable
The proponent must ensure that no offensive odours are emitted from the development, as defined under the POEO Act.	Infrastructure Approval Sched 3, 30	– AIE HS&E Manager – Liberty Industrial Project Manager	Section 7	Applicable
The proponent must minimise and/or prevent the: – dust emissions of the development, including wind- blown and traffic generated dust. – surface disturbance of the development. – greenhouse gas emissions of the development.	Infrastructure Approval Sched 3, 31	– AIE HS&E Manager – Liberty Industrial Project Manager	Section 7	Applicable
The proponent must ensure that air emissions from the development comply with the requirements of any Environmental Protection Licence (EPL) issued for the development.	Infrastructure Approval Sched 3, 32	– AIE HS&E Manager – Liberty Industrial Project Manager	Section 8	Applicable
Air Quality Verification Program				
Prior to the commencement of operations, the Proponent must prepare an air quality verification program plan in consultation with the NSW Environment Protection Authority (EPA) and to the satisfaction of the Planning Secretary.	Infrastructure Approval Sched 3, 32A	– AIE HS&E Manager – Liberty Industrial Project Manager	Not applicable.	Not applicable
The Proponent must implement the approved Air Quality Verification Program.	Infrastructure Approval Sched 3, 32B	– AIE HS&E Manager – Liberty Industrial Project Manager	Not applicable.	Not applicable
Air Quality Management Plan				
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: – 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: – objectives and performance criteria, including trigger levels for investigating any potential or actual adverse impacts associated with air emissions.	Infrastructure Approval Sched 3, 33	– AIE HS&E Manager – Liberty Industrial Project Manager – Liberty Industrial Environment Rep	This AQMP, Section 7, and Section 8.	Applicable

Requirement	Reference	Responsibility	Evidence	Applicability to this AQMP
– 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: – a detailed description of the air quality monitoring that would be undertaken. – 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.	Infrastructure Approval Sched 3, 34	– AIE HS&E Manager – Liberty Industrial Project Manager	This AQMP	Applicable
Meteorology				
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. 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: – AM-1 Guide to Siting of Sampling Units (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.	Infrastructure Approval Sched 3, 35	– AIE HS&E Manager – Liberty Industrial Project Manager	Section 9	Applicable
Water material prior to it being loaded for on-site haulage, where appropriate.	EIS Measure AQ1	– Liberty Industrial Construction Foreman	Section 7	Applicable
Aim to minimise the size of storage piles where possible.	EIS Measure AQ2	– Liberty Industrial Construction Foreman	Section 7	Applicable
Limit cleared areas of land and clear only when necessary to reduce fugitive dust emissions.	EIS Measure AQ3	– Liberty Industrial Construction Foreman	Section 7	Applicable

Requirement	Reference	Responsibility	Evidence	Applicability to this AQMP
Control on-site traffic by designating specific routes for haulage and access and limiting vehicle speeds to below 25 km/hr	EIS Measure AQ4	– Liberty Industrial Construction Foreman	Section 7 Also refer to Construction Traffic Management Plan (EMS)	Applicable
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	– Liberty Industrial Construction Foreman	Section 7 and Also refer to EMS	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	– Liberty Industrial Construction Foreman	Section 7	Applicable

6. Objectives, performance criteria, and EPL

6.1 Objectives and performance criteria

Air quality performance criteria for particulates is based on the 70th percentile of air quality data taken by an Office of Environment and Heritage (OEH) observation station in Kembla Grange, the results year recorded in 2014. Kembla Grange is a relatively underdeveloped region of the Illawarra with areas of greenfield zones and minor pockets of heavy industry. In contrast, Port Kembla is amongst the most heavily industrialised regions in Australia.

Air quality data obtained from surrounding land uses in Port Kembla, demonstrates results indicative of the heavily industrialised surrounds of the Project. Air quality performance of the Project's surrounding industries demonstrate the criteria stipulated by the Approved (NSW EPA, 2017) are more reasonable yet still in line with OEH regulatory targets.

The performance criteria detailed within the Approved Methods (NSW EPA 2017), is included in Table 6.1.

Table 6.1 Air Quality Monitoring and Assessment Criteria

Pollutant	Averaging Period	Criteria
PM_{10}	24 Hours	$50ug/m^3$
PM_{10}	Annual	$30ug/m^3$

The air quality criteria nominated for particulates by the NSW EPA 2017 will be adopted for the construction phase of the Project. Operational criteria will be addressed as part of the application for the EPL for the operational phase.

The performance criteria for odour management is to not generate offensive odours, adversely affecting nearby land/ port uses or sensitive receptors for the full span of the construction activities. The Project footprint has sensitive receivers over two kilometres away. It is unlikely that Early Enabling Works of MBD will generate offensive odours.

6.2 Environmental Protection Licence

NSW EPA will issue an EPL for the Project, including limit conditions, monitoring, and reporting conditions. This AQMP will incorporate the conditions of the EPL that are relevant to air quality.

Furthermore, it is anticipated that limits, monitoring, and reporting requirements will be updated at the completion of the construction phase. An updated Operational AQMP, will be developed by AIE and replace this Construction AQMP.

7. Impact of works and mitigation

7.1 Overview of air quality management during Early Enabling Works of MBD

The risks to air quality and associated mitigation/management measures that will be implemented during the Early Enabling Works of the MBD are outlined in Table 7.1. Further details are provided in Section 7.2 through Section 7.4. Compliance and reporting requirements are addressed in Section 8.

Table 7.1 Risk and mitigation measures for Early Enabling Works for MBD

Risk	Mitigation/management measures	Implementation/trigger level	Responsibility
Dust	– 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. – Low elevation stockpiles where possible (EIS AQ 2). – Travel speeds of vehicles on site to be kept below 25 km/ hr. – Strategic excavation plan to reduce size of excavation face and loose material that is most susceptible to erosion (EIS AQ 2). – 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 tyred vehicles and the creation of dust. – Real time dust monitoring. – A maximum of 50,000 metres^3 of spoil will transported via road from the MBD Site Compound and stockpiled at the Emplacement Cell Construction Site during Early Enabling Works – 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. – Potential dust from demolition, crushing and screening 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 (i.e. modification of crushing activities to avoid predicted high winds, or 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	AIE HS&E Manager and Liberty Industrial Project Manager
	– 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	AIE HS&E Manager and Liberty Industrial Project Manager

Risk	Mitigation/management measures	Implementation/trigger level	Responsibility
	– Excavation faces and stockpiling works to be maintained free of visible dust generation using truck mounted water carts.		
	– Stabilise stockpiles with when stockpile complete.	At completion of stockpile; or in response to Amber or Red Trigger Level Alert	AIE HS&E Manager and Liberty Industrial Project Manager
Combustion engine emissions	– Well maintained modern fleet of machines used on the Project. – Modern exhaust system to meet Australian standard/ best practice – Where available hybrid machines used to reduce the dependence on diesel powered engines.	Established prior to works and maintained full time	AIE HS&E Manager and Liberty Industrial Project Manager
Extreme weather	– Customised alerts will be provided by the Early Warning Network (EWN) to the Project 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 (EIS AQ-6)	Per event	AIE HS&E Manager and Liberty Industrial Project Manager

7.2 Stockpiling

Excavated material will be stockpiled within the MBD Site Compound during Early Enabling Works for the MBD. Stockpiled materials suitable for placement in the Outer Harbour will be transported to the Emplacement Cell Construction Site. Controls on the stockpile are outlined above 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 6 months. Polymer will be reapplied if the stockpile life is longer than 6 months. Vital Stonewall is suitable for use adjacent to marine environments. Further details regarding Vital Stonewall are included in Appendix A.
  - 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.

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 granular haul roads.
– Construction of rumble grids at the MBD Site Compound and Emplacement Cell Construction Site, as outlined in the EMS.
– Utilisation of wheel wash at the MBD Site Compound.

– Scheduling of regular road sweeping, twice weekly 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.
– Soil and sediment to be wetted down prior to transport.
– Additional road sweeping to be available in response to an observation of mud being tracked onto roads.

7.4 Chain of responsibility

The AQMP is the responsibility of the Project team, and the AIE HSE Manager shall report to the NSW EPA, DPIE and broader AIE management team on issues as they occur (where required) and on a weekly and monthly basis.

Amongst other obligations, AIE will be responsible for:

– Development of systems, procedures and reporting mechanisms which will ensure, and demonstrate in a tangible way, compliance with the approved AQMP.
– Development and implementation of appropriate training to all staff and contractors on the requirements of the approved AQMP. This shall range from detailed training for supervisors, through to inclusion of relevant matters in Project inductions for other workers.
– A training register will be maintained to ensure minimum requirements per position are met.
– Providing a suitably qualified and experienced environmental representative.
– Participating in audits and reviews and undertaking corrective actions and system improvements, as required.

Liberty Industrial and AIE will take an active role in ensuring that all aspects of the approved AQMP are implemented and managed. All Project roles will be filled with suitably qualified and experienced personnel and are outlined in the covering EMS.

8. Compliance management

8.1 Ambient dust monitoring program

AIE is required to undertake air quality monitoring during the Early Enabling Works in accordance with Infrastructure Approval SSI 9471 condition 33(c) (refer to Table 5.1). Dust monitoring will be conducted prior to, and during, the Early Enabling Works from five separate locations:

– One north and one south of the MBD Site Compound to provide upwind and downwind coverage, as the site is generally oriented north/south (refer to Figure 2.2).
– Three located on the eastern, western and northern site boundaries of the Emplacement Cell Construction Site based upon prevailing winds and proximity to sensitive receptors (refer to Figure 2.2).

Dust monitoring will consist of real-time sampling and High Volume Air Samplers (HVAS). The dust monitors that will be located at the MBD Site Compound will be established one month prior to excavation works commencing. The dust monitors that will be located at the Emplacement Cell Construction Site will be established one month prior to spoil stockpiling at the Site. The ambient dust monitoring program will be amended to include the requirements of the EPL, when issued.

8.1.1 Real-time sampling

The monitoring will use a series of Met One Instruments' EBAM Plus. The EBAM Plus provides accurate, precise, real time measurement of fine particulate matter automatically.. It is approved by the US EPA for the measurement of PM_{10} and can measure in real-time, accurate results without correction factors, regardless of season or geographic location.

Each unit will continuously monitor PM_{10} over the construction period (24 hours a day) and will enable 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. A copy of the unit's specification sheet is included in Appendix B.

8.1.2 High Volume Air Samples

HVAS will be used to monitor air at the five fixed locations described above: two at the MBD Site Compound and three at the Emplacement Cell Construction Site (refer to Figure 2.2). HVAS samplers will:

– Sample air continuously for dust as PM_{10} in accordance with the Australian Standard.
– Include the requirements of the EPL (when issued).
– Be sited in general accordance with AS/NZS 3580.1.1:2007 methods for sampling and analysis for ambient air including:
  - Clear sky angle of 120º around sample inlet.
  - 10 metres clear of nearest object or dripline of trees that are higher than 2 metres above the inlet.
  - No extraneous sources nearby.
  - More than 50 metres from a road.
– Be correlated with real-time dust monitoring data (EBAM Plus).
– Require filter changes every six days.

8.1.3 Visual monitoring

Daily observations for visible dust generation will be undertaken by the Liberty Industrial 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 Daily Inspection Checklist.

Dust detection trigger values and triggered response procedures for visible dust are provided in Table 8.1 and Table 8.2, respectively.

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.

8.1.4 Triggered monitoring response system

Liberty Industrial will employ a triggered alert and response system for the levels of dust measured in real time on-site and at sensitive receivers, which will be dictated by the values in Table 8.1 . The trigger levels are designed to protect the overall PM_{10} 24-hour standard (50 µg/m^3). Response and mitigation measures to be employed for exceedances in each of the trigger levels are outlined in Table 8.2. The mitigation measures should be implemented by the Environmental Representative. The trigger levels apply to both the MBD Site Compound and the Emplacement Cell Construction Site.

Table 8.1 Dust detection trigger values

Parameter	Monitoring type	Level 1 Trigger	Level 2 Trigger	Level 3 Trigger	Concentration Limit
PM_{10} micrograms per metre cubed	Real time	Upwind Dust Levels + 30% for 1 hour and >50ug/m^3 for 1 hour	Upwind Dust Levels + 60% for 1 hour and >50ug/m^3 for 1 hour	Upwind DustLevels + 90% for 1 hour and >50ug/m^3 for 1 hour or; If over 100ug/m^3 (ceiling level)	50ug/m^3 24-hour average
Visible dust	Visual observation	Visible dust generation at source	Moderate dust generated onsite	Elevated dust generated onsite with potential to leave the site boundary	-

Table 8.2 Triggered response procedures

Normal Situation	Level 1 Trigger	Level 2 Trigger	Level 3 Trigger
Not triggered	– No need for intervention – Comparison of the concentration at the upwind monitor to determine the site contribution • *Optional:* Identifying risk areas and notifying construction site personnel to be alert to dust generation to employadditional damping down/ water spraying, where required – Pro-actively reduce suspended dust attributable to demolition or construction works by adopting more adaptive management practices **Examples:** – Timing – for instance, briefsuspension of constructionoperations during times of high wind – Location – for instance, change location of construction equipment and/or optimise dump location so as better dust management strategies can be employed – Application – Correct or re-apply dust control mechanisms if found to be unfit for purpose	– Responsive interventionrequired – 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 orirrigation system) are sufficient, operational and allocated correctly to high-risk areas – Check to ensure dust prevention mechanisms suchas polymer or tarps are still in place and functional – Return to normal operationscan only take place if dust generating activities are reduced by implementing one or more appropriate adaptive management options. **Examples:** – Timing – for instance, briefsuspension of constructionoperations during times ofhigh wind – Location – for instance, change location of construction equipment and/or optimise dump location so as better dust management strategies canbe employed – Application – Correct or re-apply dust control mechanisms if found to be unfit for purpose	– Contingency intervention required – Immediately temporarily suspend construction operations until such it can be demonstrated that the operation is “environmentally secure” and all controls are functioning and in place – Liberty Industrial to investigate and identify the source of the exceedance – Cessation of dust generating activity at all or parts of the sitewhen the elevated PM_{10} 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. **Examples:** – Timing – for instance, brief suspension of construction operations during times of highwind – Location – for instance, change location of construction equipment and/or optimise dump location so as better dustmanagement strategies can be employed – Application – Correct or re- apply dust control mechanismsif found to be unfit for purpose

8.1.5 Program review

The monitoring program will be reviewed on a three-month basis to ensure monitoring locations are targeting the impact of works associated with the Project. Upon preparation of the half yearly report the reactive strategies for non-complying results will be carefully considered to ensure its adequacy.

8.2 Site inspection and monitoring

As part of the daily monitoring, the AIE 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

Weekly summary reports will be provided to the AIE HSE Manager.

A monthly report for dust will be prepared, comparing the performance of the site, assessment of results against the performance criteria, summary of incidents and events that may have contributed to anomalies in the results.

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.

8.3 Reporting

AIE will provide regular compliance reporting to the Department of Planning, Industry and Environment (DPIE) in accordance with the guideline *Compliance Reporting Post Approval Requirements* (DPIE, 2020). Reporting will consist of:

– Air quality monitoring results, compared to trigger levels and monitoring limits.
– Requirements of the EPL (when issued).
– Construction works progress and appraisal of air quality controls.
– Environmental Incident Report(s), as required.
– Annual returns, as required by the EPL.

A summary of monthly data will be published on the Project's webpage, noting any exceedance of EPL trigger value, investigation, and response. AIE will also report to the relevant regulator in the event of an exceedance in EPL or infrastructure consent conditions.

8.3.1 Incident Reporting

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 noncompliance. The consequences of such incidents may result in material environmental harm, damage, or asset loss.

All incidents including those involving Liberty Industrial, its subcontractors and visitors that occur during construction will be managed according to Liberty Industrial's Safety Management Plan. All environmental incidents and near misses will be reported to DPIE in writing (to compliance@planning.nsw.gov.au) immediately after AIE becomes aware of the incident as per Schedule 4 Condition 5 of Infrastructure Approval (SSI 9471).

The AIE 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.

8.3.2 Non-Compliance and notifiable incidents

If an EPL condition or limit is not met, a non-compliance may result. The non-compliance will be investigated and reported to EPA immediately, and in writing within 48 hours. AIE will then communicate the non-compliance to DPIE in writing (to compliance@planning.nsw.gov.au) within seven days of the Project management team becoming aware of the non-compliance.

The written notification will 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.

8.4 Corrective actions

The AIE Environmental Representative will maintain a corrective action register, this register will be populated with any corrective actions identified through the course of daily Inspections, other internal and external inspections, audits, and incidents reports.

Corrective actions will be assessed by the Liberty Industrial and AIE Environmental Representative and prioritised based on evaluated level of risk. High priority items will be closed out as soon as possible while all other items will be endeavoured to be closed out within seven days.

8.5 Continuous improvement

Areas for improvement identified during daily inspections will be addressed by the Liberty Industrial Environmental Representative at daily pre-start meetings with the appropriate construction supervisor and crew to prevent their ongoing occurrence.

At the discretion of the Liberty Industrial Environmental Representative, they may also form the basis for more formalised ‘Toolbox Talks’ which will be conducted on a weekly basis. Addressing non-conformance and areas for improvement with the construction crews in this forum is aimed at continuously improving the environmental performance of the Project and driving environmental awareness on site.

8.6 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.

A complaints register will also be maintained by the AIE HSE Manager or delegate, and will detail what the issue was, initial response provided, how and when the issue was resolved, and by whom.

Corrective actions and other recommendations including, where applicable, modifications to practices and procedures shall be made and closed out under the direction of the AIE HSE Manager. The outcomes from incident investigations will be discussed at daily pre-starts and toolbox talks and will be adopted into work practices or induction programs, as appropriate.

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 too. 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); and
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.

References

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.*

DPIE (2020) *Compliance Reporting Post Approval Requirements*.

GHD 2018, Port Kembla Gas Terminal Environmental Impact Statement, https://www.planningportal.nsw.gov.au/major-Projects/Project/11651

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 data

Vital Chemical
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PRODUCT DATA SHEET

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.

Vital Chemical

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
Author(s):	Simon Lewer (B.Ag.Sc), Mike Ferguson (B.App.Sc (Hons), M.Env.Mgt)
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
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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

Table of Contents

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 (≤0.001%)
- Defoamer (silicone based) – minor constituent (≤1%).
- Dyes (Phthalocyanine Green Pigment) – minor constituent (≤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 (LD50 >2000mg/kg body weight). Aquatic eco-toxicity is also low, with acute fish LC50 >100mg/L (ISO7346/2 semi-static) and acute bacterial ECO>100mg/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. EC50 (Rainbow Trout) 96hr >100mg/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.

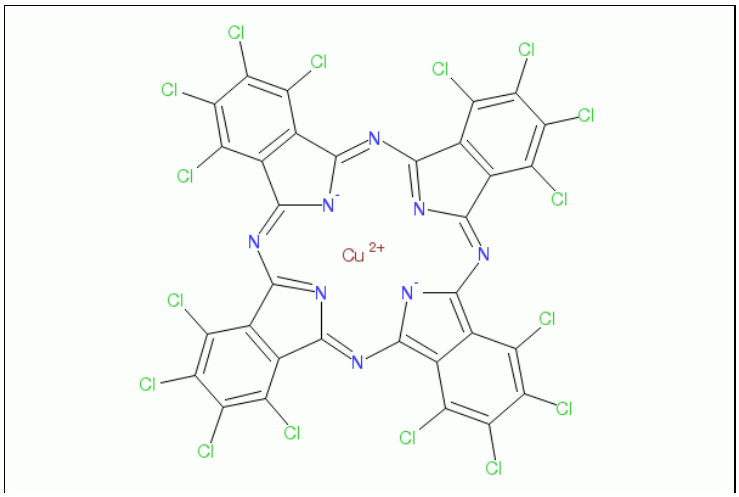
The isothiazolone has a relatively short half-life (17.3 hours) in an aquatic environment (Rohm & Haas, 2004) and presents little risk in terms of persistence or accumulation in the environment. Degradation of the thin film over time is unlikely to present a significant risk from the preservative component.

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 ≤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

ALS Environmental

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
Telephone	: +61 07 33755111	Telephone	: +61 7 3243 7222
Facsimile	: +61 07 33755854	Facsimile	: +61 7 3243 7218
Project	: Pthalocyanine Pigment Metal Analysis	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: 31992		
C-O-C number	: ----	Date Samples Received	: 23-JUN-2014
Sampler	: ----	Issue Date	: 26-JUN-2014
Site	: ----		
		No. of samples received	: 2
Quote number	: ----	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.

NATA WORLD RECOGNISED ACCREDITATION

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
Andrew Epps	Senior Inorganic Chemist	WB Water Lab Brisbane

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 laboratory

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 (Pthalocyanine 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	----	----	----	----
EG094F: 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

Dust monitoring module specifications

Ecotech
ACOEM Group

HiVol 3000

HIGH VOLUME AIR SAMPLER

The HiVol 3000 particulate sampler performs remote unattended sampling of $PM_{2.5}$, PM_{10} 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 PM_{10}
- Meets Australian standard for PM_{10} 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 ± 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

- PM_{10}, $PM_{2.5}$ or TSP size selective inlets
- Calibration plate and field calibration transport case
- Manometer
- WS/WD sensors
- RH Sensor
- Muffler.

bsi. ISO 9001 Quality Management FS 603790 AS/NZS 4801 Occupational Health and Safety Management OHS 603791

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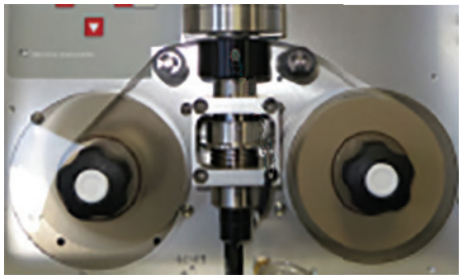
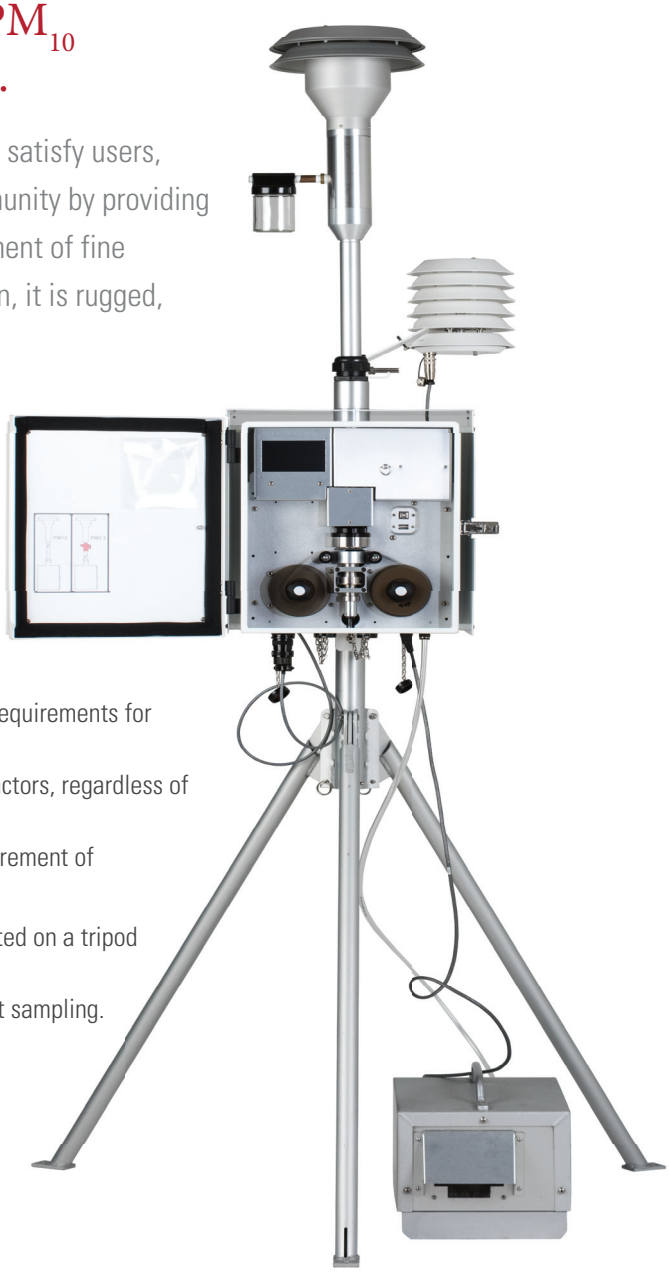
Ecotech
ACOEM Group

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 PM_{10} 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 PM_{10} 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
- PM_{10} 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/m³ – 10,000 µg/m³
Measurement Accuracy	Exceeds US-EPA Class III PM_{10} FEM standards for additive and multiplicative bias
Measurement Resolution	1.0 µg/m³
Lower Detection Limit	(2σ) (1 hour) Less than 10 µg/m³ (2σ) (24 hour) Less than 2 µg/m³
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 106 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 PM_{10} 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

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