



# BOUNDARY AIR MONITORING PLAN

Port of Townsville Limited, on behalf of Glencore, Northern Stevedoring Services,  
South 32, Flinders TBSH Pty Ltd and Townsville Marine Logistics Pty Ltd.

POT 1881

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## 1 INTRODUCTION

Port of Townsville Limited (POTL) administers the Ports of Townsville and Lucinda. The Port of Townsville is a general-purpose cargo port in North Queensland with a land and sea jurisdiction in excess of 450 km<sup>2</sup>.

Surrounding the Port of Townsville is Cleveland Bay and the community of Townsville. Townsville is a long-established township with a history of urbanisation and industrial activities in the Ross River and Ross Creek drainage system.

The Port of Townsville operates and maintains a boundary air quality monitoring program on behalf of bulk mineral handling customers Glencore, South 32, Northern Stevedoring Services, Flinders TBSH Pty Ltd and Townsville Marine Logistics Pty Ltd.

Port Operations have the potential to generate dust, and a comprehensive boundary air quality monitoring program has been implemented to ensure that Port operations do not have an adverse impact. The long-term air monitoring program has been in place since 1994.

This program outlines the air quality monitoring that occurs at the boundary of the Port of Townsville.

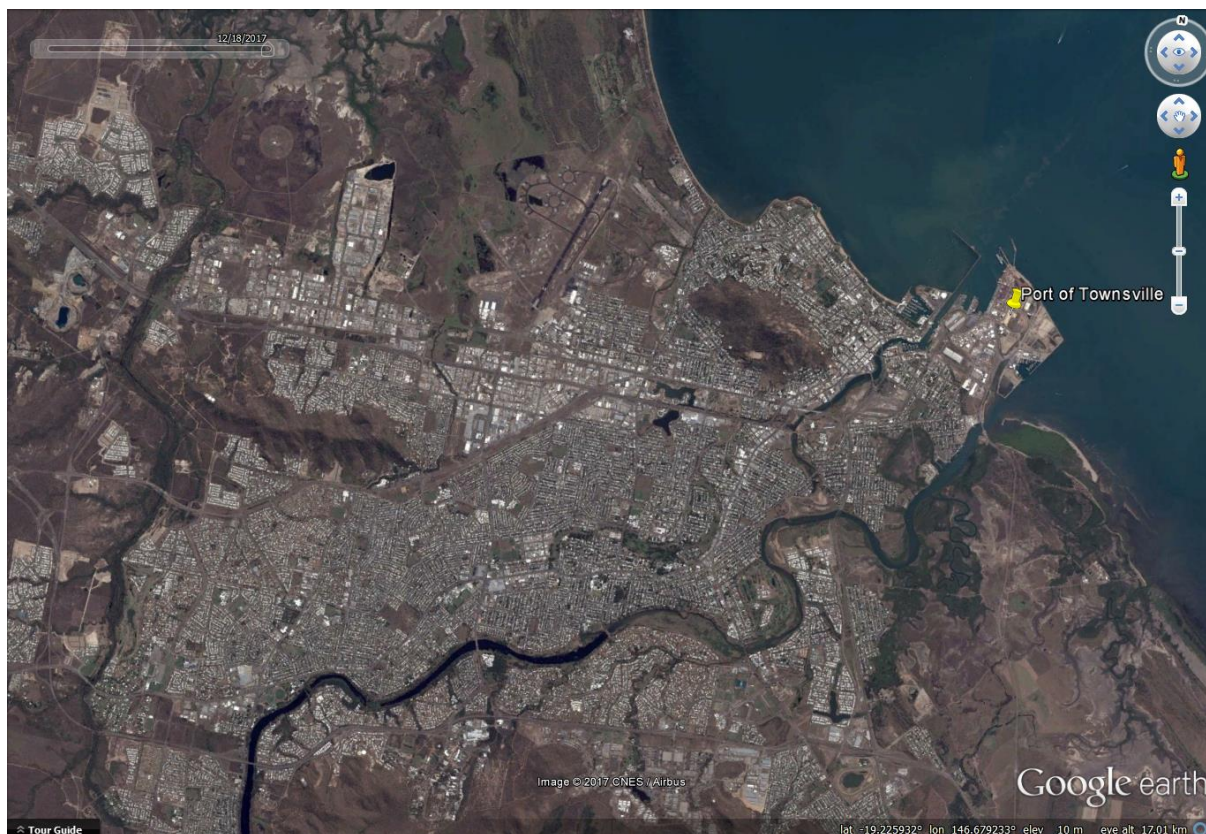
## 2 BACKGROUND

There are multiple potential contributing sources of emissions to air within the Townsville and Port air shed including:

- regional dust and smoke,
- emissions from industrial activities such as refineries, manufacturing and repair facilities, rail and other transport activities.
- localised dust sources from construction, maintenance and landscaping works

Townsville is in the dry tropics and climatic conditions such as low rainfall and windy conditions can also adversely impact air quality.

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**Figure 1: Location of Port of Townsville** (Image from Google Earth)

Port operations have the potential to impact on air quality through both point and diffuse sources of air pollutant emissions from port lands and operations. Air emissions may arise due to activities conducted by or on behalf of POTL or activities conducted by Port Customers. Point sources include product handling operations, emissions from port facilities; and exhaust emissions from vessels, trains or trucks. Diffuse sources include fugitive emissions such as from construction activities or unsealed roads and land; remobilisation of emissions; and transport activities by vessels, trains or trucks.

Port Customers who handle bulk mineral products at the Port of Townsville are required to hold an Environmental Authority (EA) under the *Environmental Protection Act 1994*. Conditions in the EA's belonging to Port Customers require extensive monitoring of air quality to measure compliance with air quality objectives at the boundary of the Port. These objectives are outlined in Table 4.

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### 3 OBJECTIVES

Boundary air monitoring at the Port of Townsville is designed to:

- Characterise air quality in the environment at the boundary of the port to determine dust and air contaminant levels that could be attributed to port operations;
- Identify trends across a range of environmental parameters to monitor effectiveness of air quality management measures; and
- Provide data to Port Customers for comparison with air quality objectives for compliance monitoring purposes.

### 4 SCOPE

This section outlines the equipment, methodology and locations of the boundary air monitoring program.

#### 4.1 Monitoring Locations

Boundary air monitoring is conducted at 3 locations (Figure 2); Coast Guard, Lennon Drive and Enviro Park. These locations have been chosen primarily to define the boundary of the port operations with the community of Townsville. Co-ordinates for all monitoring locations are included in Table 1.

**Table 1: Boundary Air Monitoring Locations**

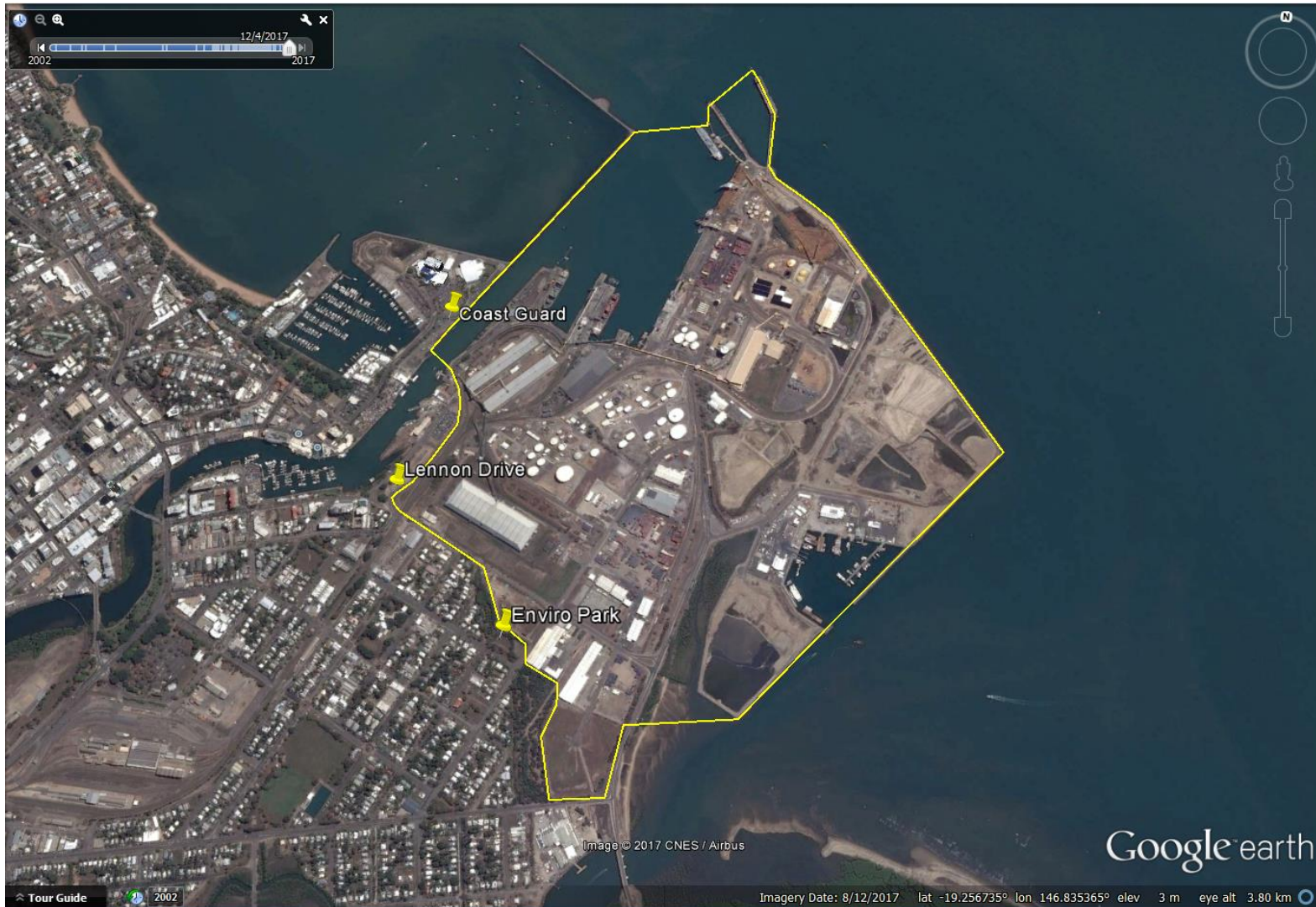
Location	Easting	Northing
Coast Guard	481841	7871218
Lennon Drive	481779	7870523
Enviro Park	482223	7869995

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Figure 2: Boundary Air Monitoring Locations (Image from Google Earth)



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## 4.2 Equipment and Methodology

Air monitoring is carried out using equipment as shown in Table 2. In addition, the Department of Environment and Science (DES) conducts an air monitoring program in Townsville and POTL utilises the data, when available, from this program.

Boundary air monitoring will be conducted via a number of methods:

**Particulate Matter (PM<sub>10</sub>) Mass Monitor** - The PM Mass Monitor is a continuous monitor which records PM<sub>10</sub> concentrations in relation to wind directions and speeds.

**Continuous Metals Analyser** - The continuous metals analyser is a continuous monitor which records metal/metalloid concentrations in real time.

**Total Suspended Particulate Matter (TSP) Monitor** - The TSP monitor is a continuous monitor which records TSP concentrations in relation to wind directions and speeds in real time.

**High Volume Air Samplers (HVAS)** - The HVAS collect samples of dust on filters over a 24-hour period, which are transported to a National Association of Testing Authorities (NATA) accredited laboratory for analysis of the deposited dust and composition of metal/metalloid components. The HVAS can measure either PM<sub>10</sub> or TSP depending on the type of head unit installed on the body of the sampler.

**Dust Deposition Gauges** - The dust deposition gauges passively collect dustfall from the surrounding air, with samples being transported to a NATA accredited laboratory for analysis of the composition of the deposited dust and its metal/metalloid composition. Two dust deposition gauges are installed at each boundary monitoring location. This enables metal/metalloid analysis to be conducted every month.

**Meteorological Equipment** - The meteorological equipment collects data such as wind direction, wind speed and rainfall in real time.

All equipment is installed, calibrated and maintained in accordance with the requirements specified in the relevant Australian Standards (AS/NZS 3580 and AS/NZS 3580.1.1), where possible taking into consideration the constraints posed by some locations, i.e. distance to roads etc. All sampling is conducted in accordance with the operating practices specified in the relevant Australian Standards (AS/NZS 3580.9.3, AS/NZS 3580.9.6, AS/NZS 3580.9.8, AS/NZS 3580.10.1, AS/NZS 3580.14 and AS/NZS 3580.15).

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Table 2: Equipment located at each station

Location	Equipment & Location ID	Implementation Date	
		Installed	To be Installed
Coast Guard	T640 (PM <sub>10</sub> ) Mass Monitor	June 2017	
	Xact continuous metals analyser [operated by DES]*	September 2015	
	TEOM TSP Monitor [operated by DES]*	Aug 2007	
	Continuous metal and TSP monitors		By Mar 2020^#
	TSP HVAS	December 2011	
	PM <sub>10</sub> HVAS	June 2013	
	Dust deposition BD05 & BD06	January 2012	
	Meteorological equipment	June 2017	
Lennon Drive	T640 (PM <sub>10</sub> ) Mass Monitor	January 2018	
	AMMS-100 TSP Atmospheric Metal Monitoring System		By May 2019^
	TSP HVAS	June 2014	
	PM <sub>10</sub> HVAS	June 2014	
	Dust deposition BD03 & BD04	May 2014	
	Meteorological equipment	June 2017	
Enviro Park	PM <sub>10</sub> Continuous Monitor		By June 2019
	TSP HVAS	June 2012	
	PM <sub>10</sub> HVAS	June 2012	
	Dust deposition BD01 & BD02	September 2011	
	Meteorological equipment	June 2017	

\* These instruments will be replaced by a POTL TSP/Metals analyser.

^ Delayed implementation to meet radiation safety requirements.

# Subject to obtaining radiation safety licences.

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### 4.3 Frequency and Timing

Boundary air monitoring is conducted throughout the year. The PM10, TSP and metal monitors run continuously and provide real time data on an hourly and daily basis. The HVAS collect samples of dust on filters over a 24-hour period every six days and the filters are collected and replaced every six days. The dust deposition gauges are collected and replaced at the end of each month to attain the standard sampling time period of  $28 \pm 2$  days.

### 4.4 Parameters

Based on the available information and knowledge of typical products likely to be handled at the Port of Townsville, along with the requirements of air quality objectives, the parameters listed in Table 2 are monitored.

**Table 3: Boundary Air Quality Parameters**

Parameter	Relevance	Monitoring Equipment	Method
PM <sub>10</sub>	Indicates the mass of that portion of the air particles that are less than 10 microns in diameter, i.e. inhalable particles	PM10 continuous monitor & PM <sub>10</sub> HVAS	Real-time Analysis and Laboratory Analysis
TSP	Indicates the mass of that portion of the air particles that are less than 100 microns in diameter suspended in the air	TSP continuous monitor & TSP HVAS	Real-time Analysis and Laboratory Analysis
Trace metal/metalloids (Arsenic, Cadmium, Copper, Lead, Nickel and Zinc)	Indicates total concentration and amount of metals/metalloids in the TSP fraction of the air column	Continuous metals analyser	Real-time Analysis and Laboratory Analysis
Trace metal/metalloids (Arsenic, Cadmium, Copper, Lead, Nickel and Zinc)	Indicates total concentration and amount of metals/metalloids in the PM <sub>10</sub> fraction of the air column	PM <sub>10</sub> HVAS	Laboratory Analysis
Trace metal/metalloids (Arsenic, Cadmium, Copper, Lead, Nickel and Zinc)	Indicates total concentration and amount of metals/metalloids in the TSP fraction of the air column	TSP HVAS	Laboratory Analysis
Ash content	Indicates the mass of that portion of the insoluble matter remaining after combustion	Dust deposition gauge	Laboratory Analysis
Combustible matter	Indicates the mass of that portion of the insoluble matter lost during combustion	Dust deposition gauge	Laboratory Analysis
Total soluble matter	Indicates the mass of the soluble portion of the deposited matter	Dust deposition gauge	Laboratory Analysis

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Parameter	Relevance	Monitoring Equipment	Method
Total insoluble matter	Indicates the mass of the insoluble portion of the deposited matter	Dust deposition gauge	Laboratory Analysis
Total solids	Indicates the mass of the particulate matter deposited in a deposit gauge	Dust deposition gauge	Laboratory Analysis
Total metals/metalloids (Arsenic, Cadmium, Copper, Lead, Nickel and Zinc)	Indicates total concentration and amount of metals/metalloids in the air column	Dust deposition gauge	Laboratory Analysis

## 5 AIR QUALITY OBJECTIVES

Results from the air monitoring program are compared against the air quality objectives listed in Table 4.

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**Table 4: Boundary Air Quality Objectives**

Parameter	Investigation Trigger Level*	Air Quality Limit	Limit Type/Measurement Period	Monitoring Equipment
PM <sub>10</sub>	N/A	50 µg/m <sup>3</sup>	Rolling 24 hour average based on 1 hour averages	Continuous PM10 monitor
	N/A	25 µg/m <sup>3</sup>	Calendar year average	Continuous PM10 monitor
TSP	100 µg/m <sup>3</sup>	N/A	Rolling 24 hour average based on 1 hour averages	Continuous TSP monitor
	N/A	90 µg/m <sup>3</sup>	Calendar year average	HVAS TSP
Arsenic and compounds	N/A	0.006 µg/m <sup>3</sup>	Calendar year average	HVAS PM <sub>10</sub>
Cadmium and compounds	N/A	0.005 µg/m <sup>3</sup>	Calendar year average	HVAS PM <sub>10</sub>
Copper and compounds	5 µg/m <sup>3</sup>	N/A	Rolling 24 hour average based on 1 hour averages	Continuous metals analyser
Lead and compounds	0.65 µg/m <sup>3</sup>	N/A	Rolling 24 hour average based on 1 hour averages	Continuous metals analyser
	0.3 µg/m <sup>3</sup>	0.5 µg/m <sup>3</sup>	Rolling 3 month average based on 1 month averages	HVAS TSP
	0.25 µg/m <sup>3</sup>	0.5 µg/m <sup>3</sup>	Rolling 12 month average based on 1 month averages	HVAS TSP
	N/A	0.5 µg/m <sup>3</sup>	Calendar year average	HVAS TSP
Nickel and compounds	0.2 µg/m <sup>3</sup>	N/A	Rolling 24 hour average based on 1 hour averages	Continuous metals analyser
	N/A	0.02 µg/m <sup>3</sup>	Calendar year average	HVAS PM <sub>10</sub>
Zinc and compounds	12 µg/m <sup>3</sup>	N/A	Rolling 24 hour average based on 1 hour averages	Continuous metals analyser

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Parameter	Investigation Trigger Level*	Air Quality Limit	Limit Type/Measurement Period	Monitoring Equipment
Dust – total insoluble matter	120 mg/m <sup>2</sup> /day	N/A	Monthly average	Dust Deposition Gauge
Dust – Arsenic and compounds	4 µg/m <sup>2</sup> /day	N/A	Calendar year average	Dust Deposition Gauge
Dust – Cadmium and compounds	2 µg/m <sup>2</sup> /day	N/A	Calendar year average	Dust Deposition Gauge
Dust – Lead and compounds	100 µg/m <sup>2</sup> /day	N/A	Calendar year average	Dust Deposition Gauge

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## 6 REPORTING

Monthly graphs of the air monitoring results are provided on the POTL website as part of the Air Quality Dashboard, with calendar year graphs provided in February of each year. Continuous data is provided on the DES Live Air Quality website.

Data is also provided to designated Port Customers as per the Port of Townsville Boundary Air Monitoring Agreement.

## 7 REVIEW

The boundary air monitoring program is subject to regular review to ensure the program considers current knowledge, products handled, operating licence changes, legislative changes etc. As a minimum, this review occurs annually.

## 8 REFERENCES

AS/NZS 3580.1.1: 2007. Methods for sampling and analysis of ambient air. Part 1.1: Guide to siting air monitoring equipment. Standards Australia, 2007.

AS/NZS 3580.9.3:2003. Methods for sampling and analysis of ambient air. Method 9.3: Determination of suspended particulate matter—Total suspended particulate matter (TSP)—High volume sampler gravimetric method. Standards Australia, 2014.

AS/NZS 3580.9.6:2003. Methods for sampling and analysis of ambient air. Method 9.6: Determination of suspended particulate matter—PM<sub>10</sub> high volume sampler with size selective inlet—Gravimetric method. Standards Australia, 2014.

AS/NZS 3580.9.8:2008. Methods for sampling and analysis of ambient air. Method 9.8: Determination of suspended particulate matter—PM<sub>10</sub> continuous direct mass method using a tapered element oscillating microbalance analyser. Standards Australia, 2008.

AS/NZS 3580.10.1: 2003. Methods for sampling and analysis of ambient air. Method 10.1: Determination of particulate matter—Deposited matter—Gravimetric method. Standards Australia, 2014.

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EPP (Air) 2008. *Environmental Protection (Air) Policy 2008*. Department of Environment and Heritage Protection, 2008.

## **9 DEFINITIONS AND ACRONYMS**

<b>AS/NZS</b>	Australian Standard / New Zealand Standard
<b>DES</b>	Department of Environment and Science
<b>EPP (Air)</b>	Environmental Protection (Air) Policy
<b>GPS</b>	Global Positioning System
<b>HVAS</b>	High Volume Air Sampler
<b>NATA</b>	National Association of Testing Authorities
<b>NEPM</b>	National Environment Protection (Ambient Air Quality) Measure
<b>PM</b>	Particulate Matter
<b>POTL</b>	Port of Townsville Limited
<b>TSP</b>	Total Suspended Particulate Matter

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