

North Queensland Bulk Ports Corporation Mky

Southern Breakwater and Northern Breakwater

Ambient Air Quality Monitoring

Validated Report

1st February 2017 – 28th February 2017

Report No.: DAT11715

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Maintenance contract: MC2077

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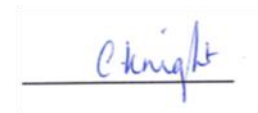
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Revision History			
Revision	Report ID	Date	Analyst
0	DAT11715	28/03/2017	Caroline Knight

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Executive Summary

North Queensland Bulk Ports Corporation has commissioned Ecotech P/L to conduct air quality monitoring for the Mackay Dust Monitoring Program. The monitoring stations at Loves Jetty and Northern Break Waters are each equipped with an E-Sampler measuring TSP.

The air quality stations were commissioned in July 2016.

This report presents the data collected from the Loves Jetty and Northern Break Waters stations during the month of February 2017.

Data capture for Southern Breakwater fell to 41.0% during the month due to the instrument being removed from the station for repairs between 1st and 16th February 2017.

Data capture for Northern Breakwater during 99.8% during February 2017.

The TSP monthly average for Southern Breakwater was 16 $\mu\text{g}/\text{m}^3$ with a standard deviation of 9 $\mu\text{g}/\text{m}^3$. The TSP monthly average for Northern Breakwater was 27 $\mu\text{g}/\text{m}^3$ with a standard deviation of 24 $\mu\text{g}/\text{m}^3$.

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1.0 Introduction

Ecotech Pty Ltd was commissioned by North Queensland Bulk Ports Corporation to provide monitoring and data reporting for the Mackay Dust Monitoring Program at Southern Breakwater and Northern Breakwater monitoring stations, located in Mackay Harbour, QLD, Australia as detailed in Table 1. Ecotech commenced data collection from both station on 20th July 2016.

This report presents the data for the 1st – 28th February 2017

The data presented in this report:

- Describes air quality measurements;
- Compares monitoring results;
- Has been quality assured;

2.0 Monitoring and Data Collection

2.1. Siting Details

Station locations and siting details are described below.

Table 1: Southern Breakwater and Northern Breakwater monitoring siting:

Site Name	Geographical Coordinates	Height Above Sea Level (m)
Northern Breakwater	Lat: -21.101406° Long: 149.225057°	5m
Southern Breakwater	Lat: -21.108898° Long: 149.226012°	13m

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Figure 1: Southern Breakwater and Northern Breakwater Monitoring Stations Location

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2.2. Monitored Parameters

Table 2 below details the parameters monitored and the instruments used at the Loves Jetty and Northern Break Waters stations. Appendix 1 defines any abbreviated parameter names used throughout the report.

Table 2: Parameters measured at the Southern Breakwater and Northern Breakwater monitoring stations

Parameter Measured	Instrument and Measurement Technique
TSP	Met One E-Sampler – light scatter aerosol monitor

2.3. Data Collection Methods

Table 3 shows the methods used for data collection.

Table 3: Methods

Parameter Measured	Data Collection Methods Used	Description of Method
TSP (E-Sampler)	Met One E-Sampler Operation Manual	Met One E-Sampler Operation Manual

2.3.1. Data Acquisition

Data is logged by the E-sampler at each monitoring site. Each E-sampler is equipped with a 3G modem for remote data collection. The recorded data is remotely collected from the E-samplers on a daily basis (using Airodis™ version 5.1.0) and stored at Ecotech's Environmental Reporting Services (ERS) department in Melbourne, Australia. Data samples are logged in 5 minute intervals.

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2.4. Data Validation and Reporting

2.4.1. Validation

The Ecotech ERS department performs daily data checks to ensure maximum data capture rates are maintained. Any equipment failures are communicated to the responsible field engineers for urgent rectification. Ecotech ERS maintains two distinct databases containing non-validated and validated data respectively.

The validated database is created by duplicating the non-validated database and then flagging data affected by instrument faults, calibrations and other maintenance activities. The data validation software requires the analyst to supply a valid reason (e.g. backed by maintenance notes, calibration sheets etc) in the database for flagging any data as invalid.

Validation is performed by the Ecotech ERS operator, and the validation is reviewed. All data is checked and graphs and reports are generated based on the verified five minute data.

2.4.2. Reporting

The reported data is in a Microsoft Excel format file named “NQBP Mky Southern Breakwater and Northern Breakwater Monthly Data Report February 2017.xls”.

The Excel file consists of six worksheets:

1. Cover
2. 5 Min Averages
3. 15 Min Averages
4. 1 Hour Averages
5. 24 Hour Averages
6. Valid Data Exception Tables

The data contained in these reports is based on Australian Eastern Standard Time. Data is for all parameters measured continuously.

All averages are calculated from the five minute data. Averages are based on a minimum of 75% valid readings within the averaging period. Averaging periods of eight hours or less are reported for the end of the period, i.e. the hourly average 02:00am is for the data collected from 1:00am to 2:00am. One hour averages are calculated based on a clock hour. One day and one year averages are calculated based on calendar days.

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2.5. Calibrations and Maintenance

2.5.1. Units and Uncertainties

The uncertainties for each parameter have been determined by the manufacturer's tolerance limits of the equipment's parameters, and by the data collection standard method.

The reported uncertainties are expanded uncertainties, calculated using coverage factors which give a level of confidence of approximately 95%.

Table 4: Units and Uncertainties

Parameter	Units	Resolution	Uncertainty	Measurement Range ¹
TSP (E-Sampler)	µg/m ³	1 µg/m ³	± 10% to gravimetric method ²	0 to 65,530 µg/m ³

2.5.2. Maintenance

Scheduled maintenance is completed quarterly by Ecotech.

2.5.2.1. Calibration & Maintenance Summary Tables

The last calibrations for the following parameters were performed on the indicated dates. Data supplied after this time is subject to verification, to be performed at the next calibration cycle.

Note: Maintenance and calibration dates may differ, as calibrations may be less frequent than scheduled maintenance visits.

Table 5 indicates when the particulate equipment was last maintained/calibrated.

² Manufacturer's stated accuracy for nephelometer when calibrated for local particulate type.

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Table 5: Southern Breakwater and Northern Breakwater Maintenance Table February 2017

Station	Parameter	Date of Last Maintenance	Maintenance Type	Date of Last Calibration
Southern Breakwater	TSP	28/02/2017	2 Monthly, 6 Monthly	28/02/2017
Northern Breakwater	TSP	14/11/2016	Monthly, 3 Monthly, 6 Monthly	14/11/2016

3.0 Results

3.1. Data Capture

Data capture calculated from 5 minute data, and refers to the amount of available data collected during the report period.

The percentage of data captured is calculated using the following equation:

$$\text{Data capture} = (\text{Reported air quality data} / \text{Total data}) \times 100\%$$

Where:

- Reported air quality data = Number of instrument readings which have been verified through a quality assured process and excludes all data errors, zero data collection due to calibration, failures and planned and unplanned maintenance.
- Total data = Total number of instrument readings since the start of the term assuming no maintenance, errors, loss of data or calibration.

Table 6 below displays data capture statistics for February 2017. **Bold** values in the table indicate data capture below 95%.

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Table 6: Monthly Data Capture for Southern Breakwater and Northern Breakwater stations for February 2017

Station	Parameter	Data Capture (%)
Southern Breakwater	TSP	41.0
Northern Breakwater	TSP	99.8

3.2. Air Quality Summary

Table 7 below presents some statistical parameters for February 2017. The standard deviation is calculated based on the hourly averaged data.

Table 7: General statistics for February 2017

Station	Parameter	Time Period	Average ($\mu\text{g}/\text{m}^3$)	Standard Deviation ($\mu\text{g}/\text{m}^3$)
Southern Breakwater	TSP	1 month	16	9
Northern Breakwater	TSP	1 month	27	24

3.3. Tabulated Data

Table 8 details the daily averages for TSP measured at Southern Breakwater and Northern Breakwater during February 2017.

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Table 8: Southern Breakwater and Northern Breakwater Stations Summary Data Table
February 2017

Date	Southern Breakwater ($\mu\text{g}/\text{m}^3$)	Northern Breakwater ($\mu\text{g}/\text{m}^3$)
1/02/2017		34
2/02/2017		30
3/02/2017		26
4/02/2017		31
5/02/2017		38
6/02/2017		33
7/02/2017		35
8/02/2017		35
9/02/2017		34
10/02/2017		35
11/02/2017		22
12/02/2017		15
13/02/2017		17
14/02/2017		16
15/02/2017		26
16/02/2017		37
17/02/2017		22
18/02/2017	10	15
19/02/2017	9	12
20/02/2017	7	12
21/02/2017	8	10
22/02/2017	15	16
23/02/2017	35	43
24/02/2017	19	30
25/02/2017	17	71
26/02/2017	18	22
27/02/2017	18	24
28/02/2017	18	23

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3.4. Graphic Representations

Validated TSP data was used to construct the following monthly graphic representations.

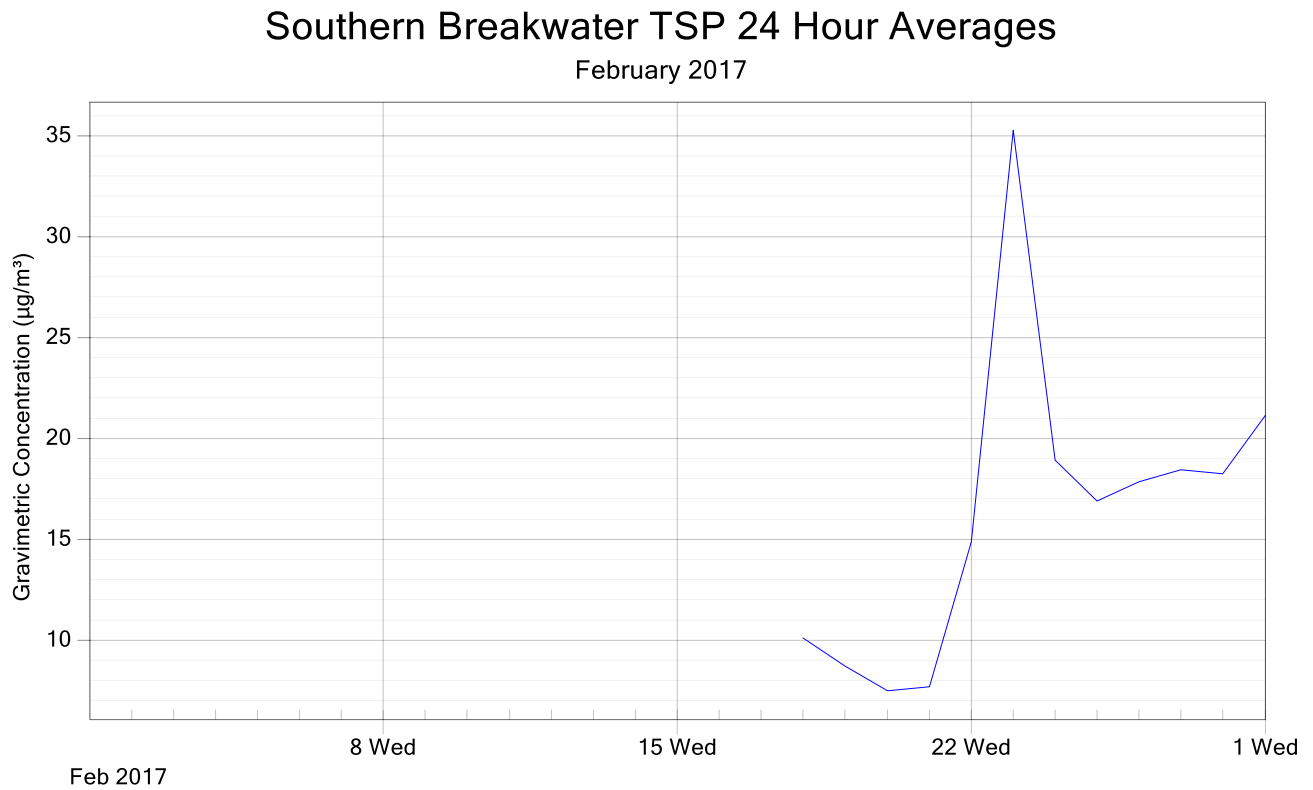


Figure 2: Southern Breakwater TSP 24 Hour Averages February 2017

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Northern Breakwater TSP 24 Hour Averages

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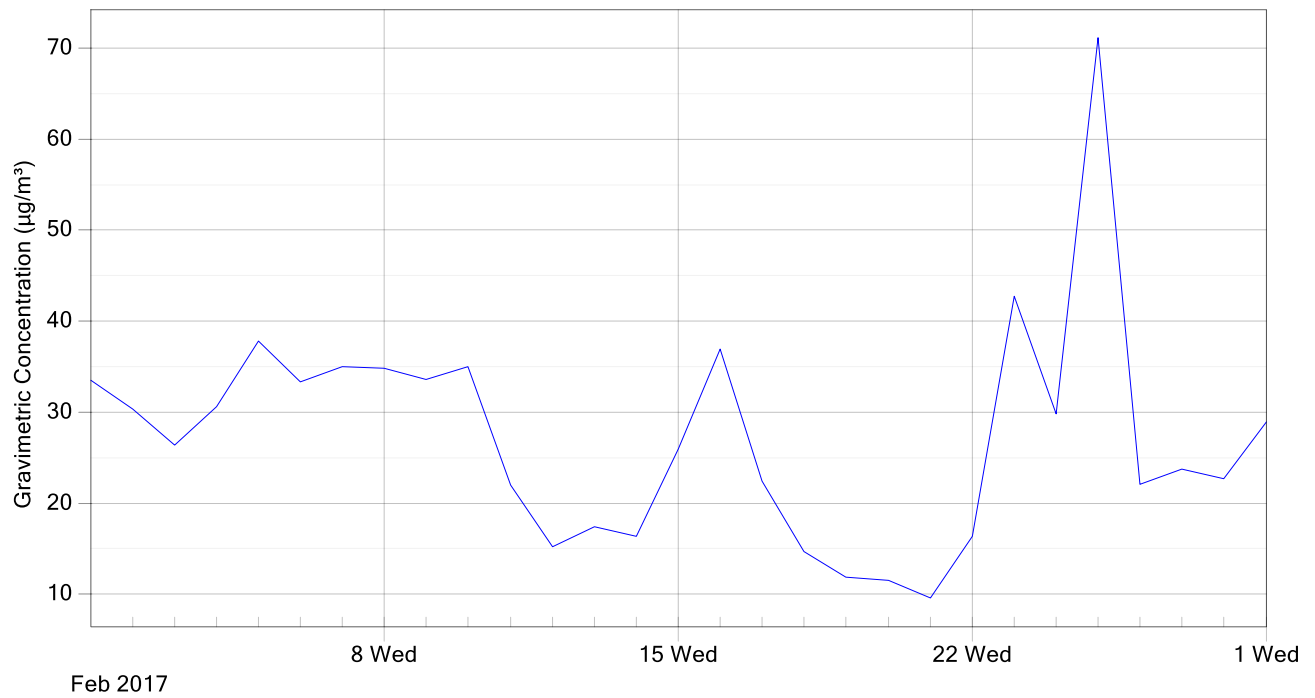
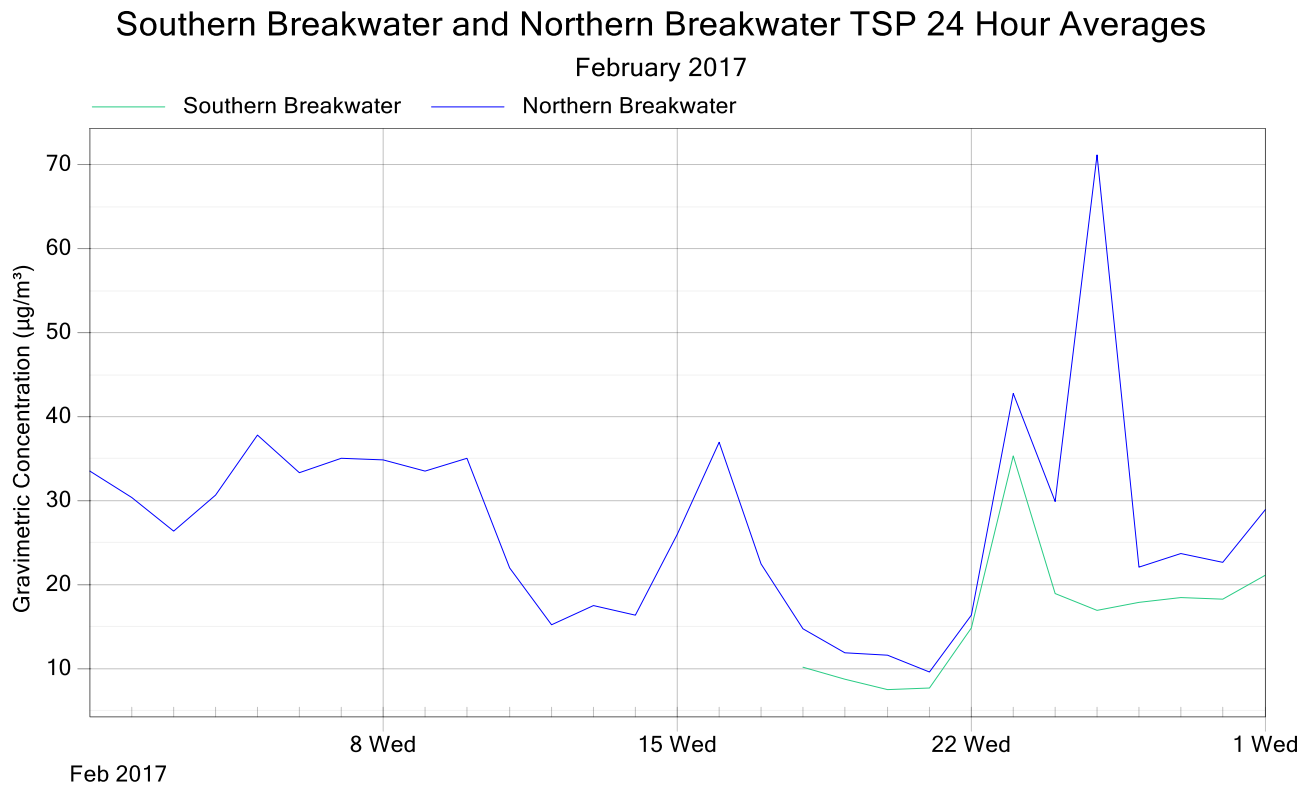


Figure 3: Northern Breakwater TSP 24 Hour Averages February 2017

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**Figure 4: Southern Breakwater and Northern Breakwater TSP 24 Hour Averages comparison
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4 Valid Data Exception Tables

The tables below detail all changes made to the raw data set during the validation process. An explanation of reasons given in the table can be found in Appendix 2.

Table 9: Southern Breakwater TSP Valid Data Exception Table

Start Date	End Date	Reason	Change Details	User Name	Change Date
01/02/2017 00:00	17/02/2017 07:50	Original E-sampler unit removed from site for repair. Replacement E-Sampler unit installed and turned off to allow solar panels to charge.	TSP	CK	20/03/2017
17/02/2017 07:55	17/02/2017 08:25	E-Sampler switched on and installation maintenance performed.	TSP	CK	20/03/2017
28/02/2017 14:20	28/02/2017 16:20	Replacement E-sampler removed and original unit re-installed into site. Maintenance performed.	TSP	CK	20/03/2017

Table 10: Northern Breakwater TSP Valid Data Exception Table

Start Date	End Date	Reason	Change Details	User Name	Change Date
10/02/2017 15:55	10/02/2017 16:50	Data gap - unrecoverable	TSP	CK	20/03/2017
16/02/2017 16:55	16/02/2017 17:00	Brief power interruption and subsequent instrument stabilisation	TSP	CK	20/03/2017

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5 Report Summary

- Data capture for Southern Breakwater fell to 41.0% during the month due to the instrument being removed from the station for repairs between 1st and 16th February 2017.
- Data capture for Northern Breakwater during 99.8% during February 2017.
- The TSP monthly average for Southern Breakwater was 16 $\mu\text{g}/\text{m}^3$ with a standard deviation of 9 $\mu\text{g}/\text{m}^3$.
- The TSP monthly average for Northern Breakwater was 27 $\mu\text{g}/\text{m}^3$ with a standard deviation of 24 $\mu\text{g}/\text{m}^3$.

-----END OF REPORT-----

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Appendix 1 - Definitions & Abbreviations

$\mu\text{g}/\text{m}^3$	Micrograms per cubic metre at standard temperature and pressure (0°C and 101.3 kPa)
TSP	Total suspended particulates

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Appendix 2 - Explanation of Exception Table

Commissioning refers to the initial setup and calibration of the instrument when it is first installed. For some instruments there may be a stabilisation period before normal operation commences.

Data transmission error refers to a period of time when the instrument could not transmit data. This may be due to interference, or a problem with the phone line or modem.

Equipment malfunction/instrument fault refers to a period of time when the instrument was not in the normal operating mode and did not measure a representative value of the existing conditions.

Gap in data/data not available refers to a period of time when either data has been lost or could not be collected.

Instrument Alarm refers to an alarm produced by the instrument. A range of alarms can be produced depending on how operation of the instrument is being affected.

Instrument out of service refers to a lack of data due to an instrument being shut down for repair, maintenance, or factory calibration.

Linear offset or multiplier refers to when an offset or multiplier has been applied between two points where the values of the offset or multiplier are different and the correction is interpolated between the two points.

Logger error refers to when an error occurs and instrument readings are not correctly recorded by the logger.

Maintenance refers to a period of time when the logger/instrument was switched off due to maintenance.

Power Interruption refers to no power to the station therefore no data was collected at this time.

Warm up after power interruption refers to the startup period of an instrument after power has been restored.