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AIR QUALITY



This document has been prepared on behalf of **Griffith City Council**:

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Air Quality Monitoring Plan

Tharbogang Waste Management Centre

Addressee(s):	Griffith City Council
Site Location(s):	Lot 1, 168 Hillside Dr., Tharbogang, NSW 2680
Report Reference:	20.1051.FR1V2
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Quality Control

Study	Status	Prepared by	Checked by	Authorised by
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MANAGEMENT MEASURES AND MONITORING PROTOCOL	Final	Northstar Air Quality	GCG, MD, MLN, JR	GCG
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Final Authority

This report must be regarded as draft until the above study components have been each marked as final, and the document has been signed and dated below.



G. Graham

7th November 2019

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CONTENTS

1.	INTRODUCTION	5
1.1	Objective	5
1.2	Scope	5
2.	BACKGROUND.....	7
2.1	Location	7
2.2	Meteorology	8
2.3	Legislation.....	9
3.	MANAGEMENT MEASURES AND MONITORING PROTOCOL.....	13
3.1	Identification of Sources of Dust Generation	13
3.2	Implemented Dust Control Measures.....	13
4.	AIR QUALITY MONITORING PLAN.....	15
4.1	Monitoring and Reporting Process.....	15
4.2	Monitoring Locations.....	16
4.3	Dust Monitoring Devices	18
4.4	Monitoring Procedure	19
4.5	Data Recording and Reporting	19
4.6	Response to Exceedance of Dust Deposition Criteria	19
4.7	Responsibilities and Accountabilities	20

Tables

Table 1	Sensitive receptor locations used in the study	7
Table 2	Air quality criteria	11
Table 3	General mitigation measures for fugitive dust emissions	14
Table 4	Dust deposition monitoring locations	16
Table 5	Air quality monitoring plan responsibilities	20

Figures

Figure 1	AQMP scope of work	6
Figure 2	TWMC site and sensitive receptor locations	8
Figure 3	Wind speed and direction – Griffith Airport AWS 2013 to 2017	9
Figure 4	Dust deposition gauge monitoring locations	17
Figure 5	Dust Deposition Gauge with Stand	18

1. INTRODUCTION

Griffith City Council (Council) has engaged Northstar Air Quality Pty Ltd (Northstar) to provide an updated air quality monitoring plan (AQMP) for the Tharbogang Waste Management Centre (TWMC) located at Lot 1, 168 Hillside Dr., Tharbogang, NSW 2680.

1.1 Objective

In 2013, an AQMP¹ was prepared on behalf of Council to meet the requirements of the Conditions of Approval² (CoA) issued by the Department of Planning (DoP) (now Department of Planning, Industry and Environment [DPI&E]). That AQMP has been implemented by Council at TWMC from 2013-2019.

The objective of this AQMP is to provide Council with a review and update of the AQMP, to be submitted to DPI&E for approval and implementation by Council.

1.2 Scope

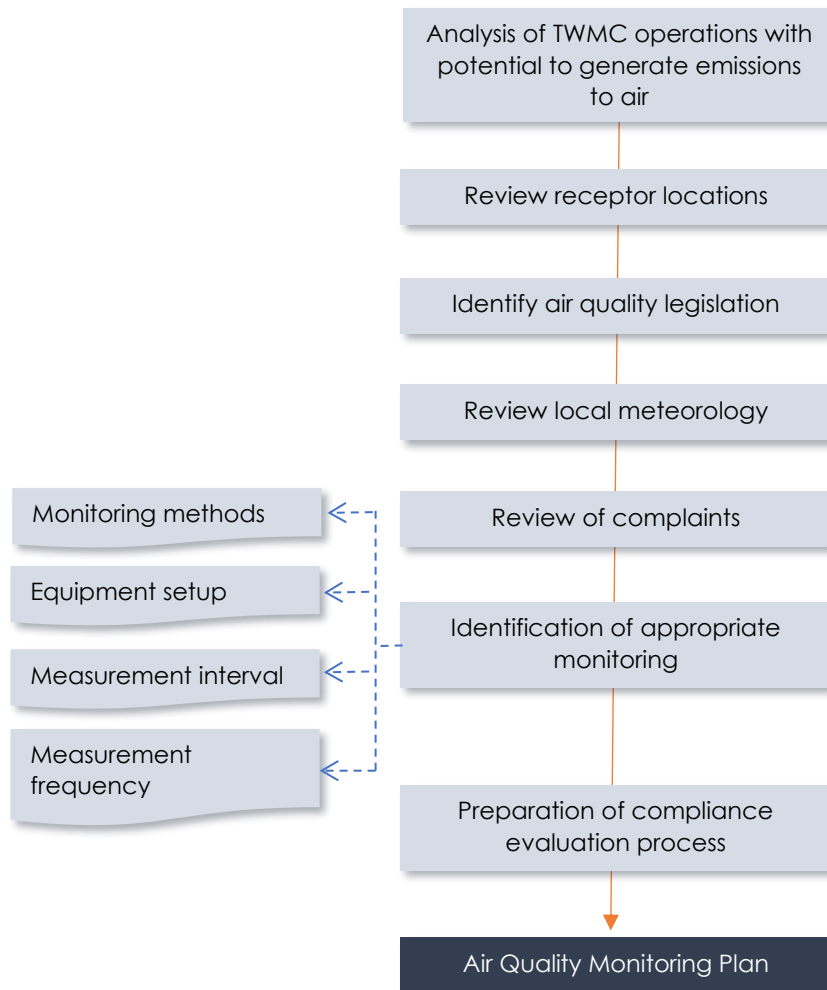
The purpose of this AQMP is to provide, in accordance with the CoA, Environment Protection Licence (EPL) and relevant legislation, air quality management procedures to form part of the over-arching environmental monitoring program conducted at TWMC. This AQMP provides information on the key air quality issues which are affected by the activities performed at TWMC.

The scope of work involved in preparing the air quality monitoring program is generalised in **Figure 1**.

¹ GHD (2013). Griffith City Council – Tharbogang Quarry Air Monitoring Plan.

² NSW Government Department of Planning, Application No. 06_0334, July 2010

Figure 1 AQMP scope of work



2. BACKGROUND

2.1 Location

The TWMC is located in Tharbogang, NSW, approximately 9.5 kilometres (km) northwest of Griffith. The existing operations are conducted in the centre of Lot 202 DP 756035.

A number of sensitive receptor locations surrounding TWMC have been identified in the previous AQMP and these receptors have been adopted for use within this AQMP as presented in **Table 1** and illustrated in **Figure 2**. No additional receptor locations have been identified as part of this review.

The table is not intended to represent a definitive list of sensitive land uses, but a cross section of available locations that are used to characterise larger areas, or selected as they represent more sensitive locations which may represent people who are more susceptible to changes in air pollution than the general population.

It is noted that there are potential plans to extend activities and operations at TWMC to cover more of the allotted land, which would subsequently alter the separation distance between the receptors and operations.

Table 1 Sensitive receptor locations used in the study

Receptor ID	Address	Approximate distance from TWMC (m)
R1	Farm 1765 Slopes Rd	1 020
R2	Farm 1743 Slopes Rd	1 300
R3	Farm 1760 Slopes Rd	1 150
R4	Farm 1757 Slopes Rd	850
R5	250 Slopes Rd	850

Figure 2 TWMC site and sensitive receptor locations



Source: Griffith City Council Blast Management Plan

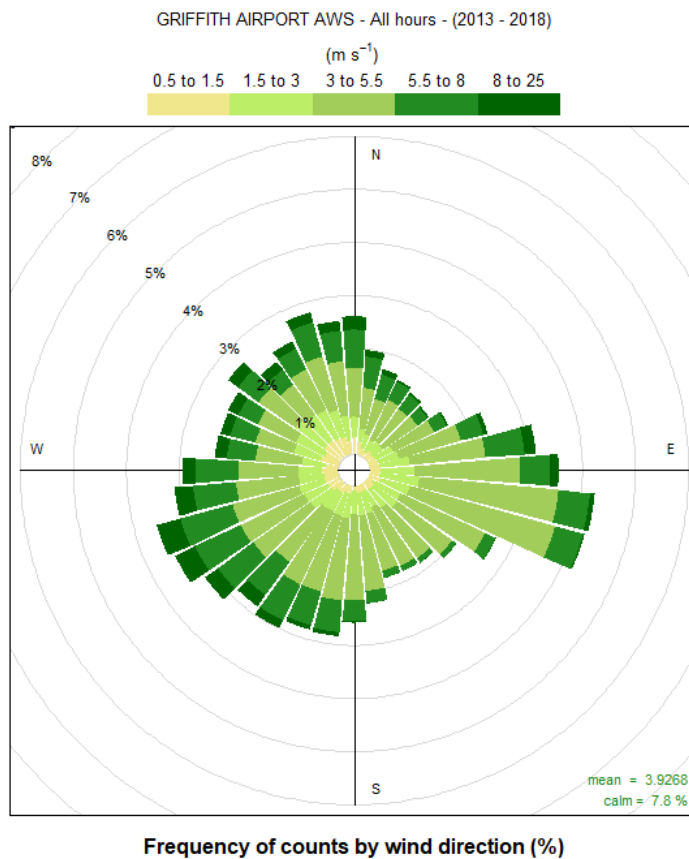
2.2 Meteorology

The meteorology experienced within an area can govern the generation (in the case of wind dependent emission sources), dispersion, transport and eventual fate of pollutants in the atmosphere. The meteorology of the area surrounding TWMC has been examined using data collected by the Australian Government Bureau of Meteorology (BoM) at the Griffith Airport Automatic Weather Station (AWS) (Station #75041), which is located approximately 8.6 km to the southeast.

A wind rose for the period 2013 to 2018 measured at the Griffith Airport AWS is presented in **Figure 3** which shows the prevailing wind directions which may be experienced at TWMC.

The majority of wind speeds experienced at Griffith Airport AWS over the 6-year period 2013 to 2018 (inclusive), are generally in the range of 3.0 metres per second ($\text{m}\cdot\text{s}^{-1}$) to 5.5 $\text{m}\cdot\text{s}^{-1}$ with the highest wind speeds (greater than 8 $\text{m}\cdot\text{s}^{-1}$) occurring from a westerly direction. Winds of this speed are not overly common, occurring during 5.2 % of the observed hours over the 6-year period. Calm winds ($<0.5 \text{ m}\cdot\text{s}^{-1}$) occur during 7.8 % of hours on average across the 6-year period.

Figure 3 Wind speed and direction – Griffith Airport AWS 2013 to 2018



2.3 Legislation

2.3.1 Development Consent

Under the DoP CoA, air quality assessment criteria have been provided for TWMC:

Impact Assessment Criteria

41. The Proponent shall ensure that dust emissions generated by the project do not cause additional exceedances of the criteria listed in Tables 5 to 7 at any residence on privately owned land, or on more than 25 percent of any privately-owned land.

Table 5: Long term impact assessment criteria for particulate matter

Pollutant	Averaging period	Criterion
Total suspended particulate (TSP) matter	Annual	90 µg/m ³
Particulate matter < 10 µm (PM ₁₀)	Annual	30 µg/m ³

Table 6: Short term impact assessment criterion for particulate matter

Pollutant	Averaging period	Criterion
Particulate matter < 10 µm (PM ₁₀)	24 hour	50 µg/m ³

Table 7: Long term impact assessment criterion for deposited dust

Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level
Deposited dust	Annual	2 g/m ² /month	4 g/m ² /month

Note: Deposited dust is assessed as insoluble solids as defined by Standards Australia, 1991, AS/NZS 3580.10.1-2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulates - Deposited Matter - Gravimetric Method.

Odour

42. Except as otherwise expressly provided in any Environment Protection Licence condition for the project, the Proponent must comply with section 129 of the POEO Act.

Additionally, air quality monitoring requirements have been listed:

Air Quality Monitoring

43. The Proponent shall prepare and implement an Air Quality Monitoring Program for the project to the satisfaction of the Secretary. This program must:

(a) be prepared in consultation with EPA, and be submitted to the Secretary for approval within 3 months of the date of this approval; and

(b) include details of how the air quality performance of the project will be monitored, and include a protocol for evaluation compliance with the relevant air quality criteria in this approval.

Continuous Improvement

44. The Proponent shall:

(a) implement all reasonable and feasible dust mitigation measures;

(b) investigate ways to reduce the dust generated by the project; and

(c) report on these investigations and the implementation and effectiveness of these measures in the AEMR, to the satisfaction of the Secretary.

2.3.2 Environment Protection Licence Conditions

The most recent EPL (number 5875) was provided by NSW EPA to Council on 20 September 2000. Conditions within that EPL associated with air quality are stated below:

Dust

O3.1 All the operations and activities occurring at the premises must be carried out in a manner that will minimise the emission of dust from the premises.

2.3.3 Relevant Air Quality Criteria

The primary pollutant that has the potential to create exceedances/complaints is considered to be wind-blown dust, which would be experienced at off-site locations as deposited dust (further discussed in **Section 3**). This would be experienced as potential soiling of surfaces, such as windowsills, car bonnets etcetera, and is supported by the conditions imposed through the CoA and EPL. The air quality criteria applicable to monitoring at TWMC is presented in **Table 2** and have been adopted in this AQMP.

This criterion and sampling methodology are consistent with the requirements as stipulated in NSW EPA (2016) *Approved methods for the modelling and assessment of air pollutants in NSW* and NSW DEC (2006) *Approved methods for the sampling and analysis of air pollutants in NSW*.

Table 2 Air quality criteria

Pollutant	Averaging period	Units	Criterion
Deposited dust	1 year	$\text{g}\cdot\text{m}^{-2}\cdot\text{month}^{-1}$ (a)	2
		$\text{g}\cdot\text{m}^{-2}\cdot\text{month}^{-1}$ (b)	4

Notes: (a): Maximum increase in deposited dust level

(b): Maximum total deposited dust level

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3. MANAGEMENT MEASURES AND MONITORING PROTOCOL

3.1 Identification of Sources of Dust Generation

Potential sources of dust emissions at TWMC include the following:

- Material handling;
- Vehicle generated dust emissions on unsealed roads;
- Loading of material;
- Dumping of material; and
- Wind erosion of unsealed, disturbed or unconsolidated surfaces.

The principal method used to measure effectiveness of dust control is the monitoring of dust deposition, in accordance with Australian Standard / New Zealand Standard (AS/NZ) 3580.10.1:2016 *Methods for sampling and analysis of ambient air Determination of particulate matter - Deposited matter - Gravimetric method*.

Dust deposition describes any dust that settles out of suspension in the atmosphere. Deposited dust is commonly used as an indicator of the effectiveness of site dust management and the risk of off-site dust amenity complaints. Due to the separation distance between the operations conducted on site and the identified sensitive receptors (see **Table 1**), it is considered that the monitoring of deposited dust is most appropriate to examine the potential impacts on the local amenity.

Negative health impacts due to fine particulate matter typically have an impact radius at a scale of tens of metres rather than hundreds of metres. As the identified receptors are at distances greater than 800 m, it is not considered appropriate to monitor TSP or PM₁₀, unless the monitoring of dust deposition reveals a high level of dust emissions being dispersed from the TWMC site.

3.2 Implemented Dust Control Measures

Currently TWMC implements the following dust mitigation measures:

- Use of water carts to periodically spray haul routes and unsealed surfaces;
- Use of a water sprinkler system on the quarry crushing plant and stockpiles;
- The revegetation and rehabilitation of completed areas;
- Newly stripped topsoil stockpiles are watered immediately and revegetated with grass cover (or similar); and
- Access routes to and from stockpiles are watered as required.

Table E1 of the Project Approval³ also requires that:

- *When the 10-minute average wind speed measured at the Proposal site is greater than 30 km.hr⁻¹ from the northeast quadrant (between 0° and 90°) operations at the Proposal site will cease or further mitigation measures will be applied to ensure no risk of off-site dust impacts.*
- *When the 10-minute average wind speed measured at the Proposal site is greater than 35 km.hr⁻¹ in any direction, operations at the Proposal site will cease, or further mitigation measures will be applied to ensure no risk of off-site dust impacts.*

The original AQMP⁴ also suggested additional management measures be implemented to further control dust. These measures are described in

Table 3.

Table 3 General mitigation measures for fugitive dust emissions

Emission Source	Proposed Management
Dust produced from transport operations on and off site	Apply water sprays to access roads. Ensure sealed roads and egress points are cleaned frequently of dust.
Dust produced from the loading and unloading of material	Apply water sprays to trucks. Make sure that stored materials are suitably enclosed to ensure no release of material to atmosphere.
Dust produced from the transportation of fill	When material is exported or imported at the site, trucks will cover their load whenever dust nuisance is being generated due to windy conditions or the load contains fine particulate material.
Dust produced from crushing and screening operations	Apply the water spray system on equipment. Use water spray cart or manual canon water spray to control surface silt on working surfaces around the processing site.
Unconsolidated surfaces	Frequently compact the active tipping face of the landfill. If dust nuisance is being generated on site, then apply water sprays on vehicle haul routes within the Proposal site [TWMC]

This review agrees that the above measures should be adopted and are maintained in this updated AQMP.

³ NSW Government Department of Planning, Application No. 06_0334, July 2010

⁴ GHD (2013). Griffith City Council – Tharbogang Quarry Air Monitoring Plan.

4. AIR QUALITY MONITORING PLAN

Dust monitoring has been conducted at TWMC since September 2018 and is the requirement of both the reviewed and current AQMP. It is considered that the monitoring of deposited dust is still the most effective method for quantifying and managing dust emissions from the site.

4.1 Monitoring and Reporting Process

The monitoring process is detailed below and will support the assessment of compliance for dust deposition against the criteria specified in **Section 2.3.3**. The process will consist of:

- Maintaining dust deposition monitoring devices at TWMC in line with AS 3580.10.1:2016 and other relevant standards;
- Collect dust samples each 30 ± 2 days in accordance with AS 3580.10.1:2016 and other relevant standards and provide the collected samples to a NATA accredited laboratory for analysis;
- Compile monitoring results over a 12-month sampling period and calculate the annual average dust deposition rate (as $\text{g} \cdot \text{m}^{-2} \cdot \text{month}^{-1}$) for each monitoring location;
- Review the number, frequency and nature of any environmental complaints received over the same 12-month period, as relates to dust amenity issues;
- Produce a dust monitoring report specifying the results of the monitoring and whether compliance has been achieved; and,
- If the monitoring results reveal an exceedance of the dust deposition criteria, identify and apply further dust mitigation measures.

A review of the 12-month sampling period results will be undertaken by a suitably qualified and experienced professional.

Continued dust deposition monitoring will be undertaken at any monitoring locations where that location's monitoring result exceeds the dust deposition criteria. If dust monitoring at all locations indicate that no criteria have been exceeded and no justified dust complaints have been received over that period, then annual dust monitoring may cease.

4.2 Monitoring Locations

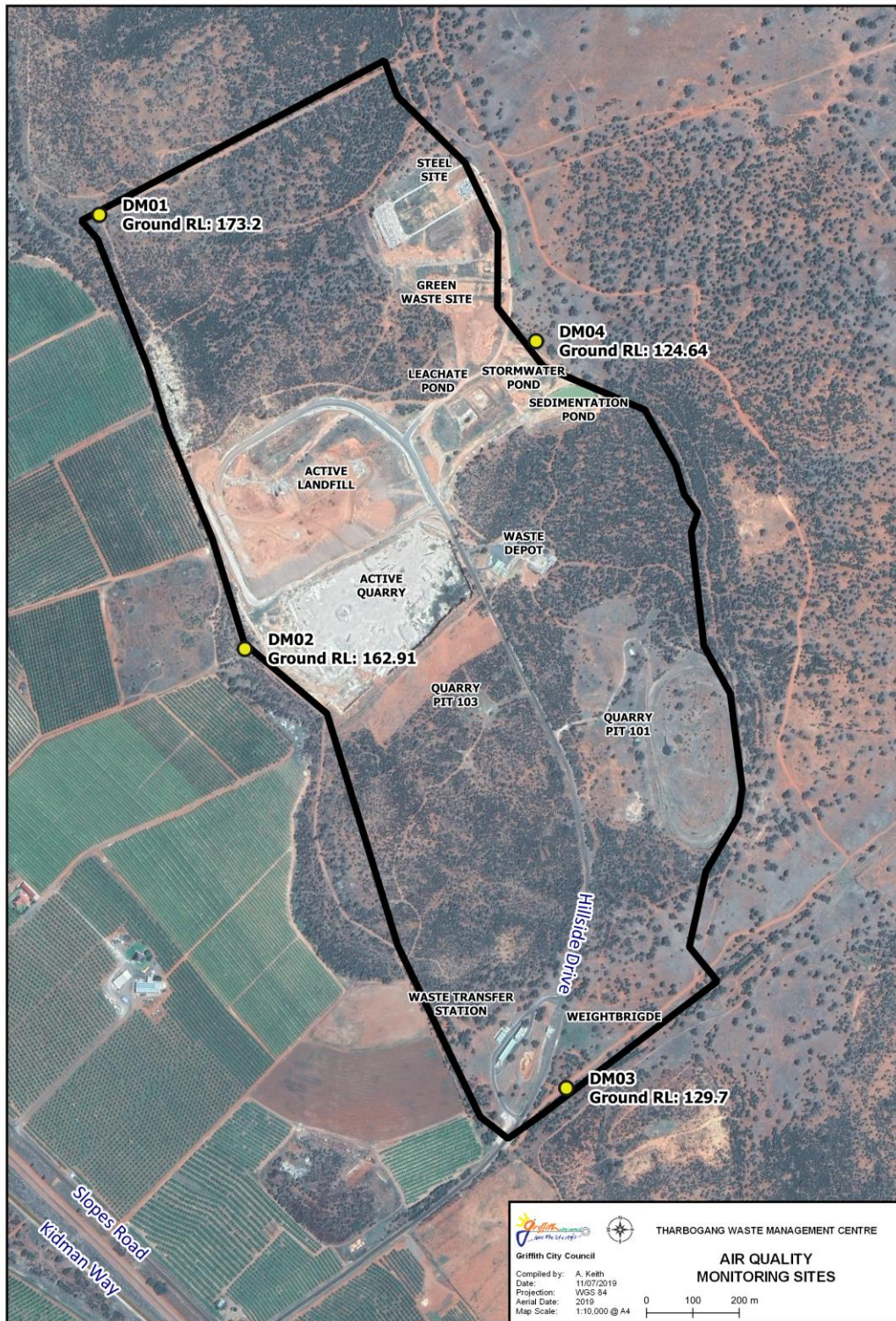
There are four monitoring locations currently operating at TWMC, as described in **Table 4** and illustrated in **Figure 4**.

Table 4 Dust deposition monitoring locations

Monitoring ID	Description
DM01 (north)	Located at the northern boundary of the TWMC site. DM01 is positioned on the closest boundary edge to Receptor 1. This monitoring location is the most upwind position from the operations and will best indicate the 'background' dust conditions.
DM02 (west)	Located at the western boundary of the TWMC site. DM02 is at the most western position relative to site operations. This monitoring location is likely to be most frequently downwind of the operations. This monitoring location is likely to best represent the dust impacts of the operations at site. This monitoring location will also be representative of the receptors to the west of the TWMC site.
DM03 (south)	Located at the southern boundary of the TWMC site.
DM04 (east)	Located at the eastern boundary of the TWMC site.

The deposited dust gauges will continue to operate in the respective monitoring locations.

Figure 4 Dust deposition gauge monitoring locations



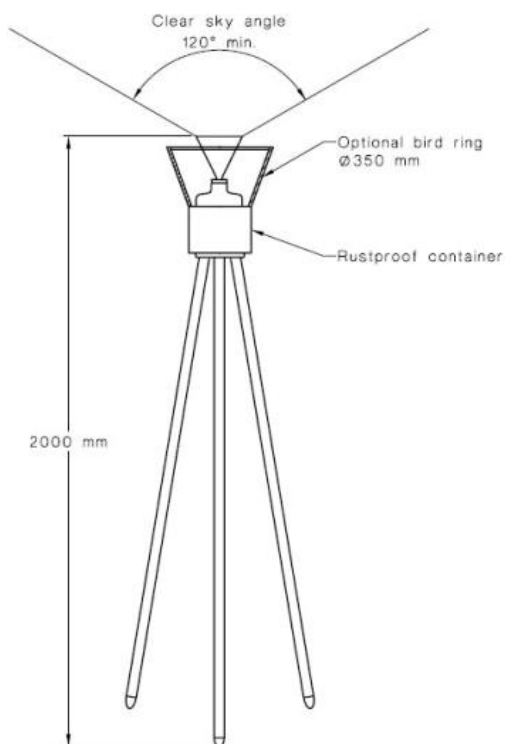
Source: Provided by Griffith City Council

4.3 Dust Monitoring Devices

Monitoring is conducted using dust deposition gauges (DDG) constructed in accordance with AS/NZS 3580.1.10:2016. This apparatus involves the collection of passing dust with a funnel and bottle arrangement. The dust emissions settle into the funnel from the ambient air and are collected in the bottle with any rainwater. The sampled mass deposition rate is calculated from the mass of solids collected from the bottle. The dust is collected over a monthly (30 day \pm 2 day) period, and the results are expressed as $\text{g}\cdot\text{m}^{-2}\cdot\text{month}^{-1}$.

A typical dust deposition gauge and stand is illustrated in **Figure 5**.

Figure 5 Dust Deposition Gauge with Stand



The monitoring locations will be sited in accordance with the requirements of 'AS/NZS 3580.1.1:2007 *Methods for sampling and analysis of ambient air - Guide to siting equipment*, and AS/NZS 3580.10.1:2016.

The monitoring of dust deposition will be performed, and quality controlled in accordance with AS/NZ 3580.10.1:2016.

4.4 Monitoring Procedure

For every monthly (30 day \pm 2 day) monitoring period the concurrent collection of all four gauges is required. The samples will be collected in accordance with AS/NZS 3580.10.1:2016.

4.5 Data Recording and Reporting

After the NATA accredited laboratory has issued the monthly analysis report, the data should be reviewed by the site environmental representative and recorded in a database, which will be subsequently used to evaluate performance against the criteria specified in **Table 2**.

Unless otherwise required, an annual monitoring report will be prepared by a suitably qualified and experienced professional, describing the methodology and comparing the dust deposition monitoring against the relevant criteria. The annual report can then identify whether further monitoring is required based on whether an exceedance of criteria has occurred (as detailed in **Section 4.1**).

4.6 Response to Exceedance of Dust Deposition Criteria

Following an exceedance of the dust deposition criterion listed in **Section 2.3.3**, or a dust related incident that results in a complaint, within 24 hours Council will notify NSW DPI&E of the exceedance/incident. Within 6 days the affected landowner(s) will be notified of the exceedance. Council will then implement additional mitigation measures to further reduce dust emissions from operations and activities on site.

In the event of a complaint, dust monitoring will continue or recommence (depending if it had ceased due to achieving compliance).

If the additional monitoring reveals that dust deposition rates continue to exceed the criterion, then a review of the monitoring site locations will be conducted, given that there is a large separation distance between the site and the surrounding sensitive receptors.

4.7 Responsibilities and Accountabilities

The implementation of mitigation measures to minimise/control fugitive dust emissions is a responsibility of all personnel at TWMC. The staff responsible for the dust monitoring program are outlined in **Table 5**.

Table 5 Air quality monitoring plan responsibilities

Role	Areas of responsibility in relation to dust monitoring
Director of Utilities	<ul style="list-style-type: none"> Ensuring all legislative requirements and reporting are met
Waste Operations Manger	<ul style="list-style-type: none"> Reporting on all matters of environmental monitoring. Overseeing monitoring program training. Overseeing monitoring program.
Landfill/Quarry Operators	<ul style="list-style-type: none"> Comply with all reasonable instructions given by the Operations Manager and any other senior manager of the Council. Advise Operations Manager of any visible dust plumes moving off-site and ensuring immediate actions taken to reduce emissions.
Monitoring Network Technician (suitably qualified person)	<ul style="list-style-type: none"> Routine cleaning of equipment. Placement and retrieval of dust deposition gauges for laboratory on a monthly basis. Collating and sending samples to the laboratory on a monthly basis. Filling out of and maintaining Chain of Custody (CoC) forms, field notes etc. All other monitoring items as required.