



# 2022 Annual Environmental Management Report

Tharbogang Waste Management Centre



Prepared for Griffith City Council

18 April 2023

Project Number: TE22100

DOCUMENT CONTROL					
Version	Description	Date	Author	Reviewer	Approver
1.0	First Release	31/03/2023	NB	AU	RQ
2.0	Second Release	18/04/2023	NB	GR	RQ
Approval for Release					
Name	Position	File Reference			
Rachel Qiu	Environmental Consultant	TE22100_2022_AEMR_2.0			
Signature					
Copyright of this document or any part of this document remains with Talis Consultants Pty Ltd and cannot be used, transferred or reproduced in any manner or form without prior written consent from Talis Consultants Pty Ltd.					

## Table of Contents

<b>1</b>	<b>Introduction.....</b>	<b>1</b>
1.1	Regulatory Framework .....	7
1.1.1	Project Approval .....	7
1.1.2	NSW EPA Environmental Protection Licence.....	12
1.1.3	Environmental Assessment Mitigation and Management Commitments .....	14
1.1.4	Actions required from previous AEMR .....	14
1.1.5	Management plans and monitoring programs/ reports .....	42
1.1.6	Compliance assessment.....	42
1.1.7	Independent Audit.....	43
1.1.8	Incidents during the reporting period .....	43
<b>2</b>	<b>Landfill and quarry operations.....</b>	<b>44</b>
2.1	Production data .....	44
2.2	Work completed this reporting year .....	44
2.3	Works scheduled .....	45
2.4	Hours of operation .....	45
2.5	Environmental Performance .....	45
2.5.1	Waste .....	46
2.5.2	Landfill and Operational Environmental Management Plan (LOEMP) .....	46
2.5.3	Soil, Water and Leachate Management .....	46
2.5.4	Meteorological Monitoring .....	48
2.5.5	Biodiversity .....	49
2.5.6	Noise and Vibration .....	49
2.5.7	Blasting .....	51
2.5.8	Air Quality- Dust and Odour .....	51
2.5.9	Rehabilitation and Landscape Management .....	52
2.5.10	Heritage .....	52
2.5.11	Traffic and Transport .....	52
2.5.12	Incident Management and Response .....	53
<b>3</b>	<b>Community Relations .....</b>	<b>54</b>
3.1	Complaints received this reporting year .....	54
3.2	Comparison to previous year .....	54
3.3	Community Involvement .....	54

3.4	Review .....	54
<b>4</b>	<b>Environmental Monitoring and Management .....</b>	<b>56</b>
4.1	Operations .....	56
4.1.1	Monitoring .....	56
4.1.2	Results.....	57
4.1.3	Review.....	57
4.2	Waste.....	60
4.2.1	Monitoring and Management Criteria .....	60
4.2.2	Results.....	61
4.2.3	Review.....	63
4.3	Landfilling .....	66
4.3.1	Monitoring and Management Criteria .....	66
4.3.2	Results.....	66
4.3.3	Review.....	67
4.4	Biodiversity .....	69
4.4.1	Monitoring and Management Criteria .....	69
4.4.2	Results.....	70
4.4.3	Review.....	73
4.5	Groundwater .....	76
4.5.1	Monitoring and management criteria .....	76
4.5.2	Results.....	77
4.5.3	Review.....	97
4.6	Surface Water .....	98
4.6.1	Monitoring and Management Criteria .....	98
4.6.2	Results.....	99
4.6.3	Review.....	112
4.7	Leachate.....	115
4.7.1	Monitoring and Management Criteria .....	115
4.7.2	Results.....	116
4.7.3	Review.....	116
4.8	Meteorological Monitoring .....	118
4.8.1	Monitoring and management criteria .....	118
4.8.2	Results.....	118
4.8.3	Review.....	120

4.9	Noise and Vibration .....	120
4.9.1	Monitoring and management criteria .....	120
4.9.2	Results.....	121
4.9.3	Review.....	122
4.10	Blasting .....	124
4.10.1	Monitoring and management criteria .....	124
4.10.2	Results.....	125
4.10.3	Review.....	125
4.11	Air Quality- Dust .....	126
4.11.1	Monitoring and management criteria .....	126
4.11.2	Results.....	127
4.11.3	Review.....	132
4.12	Air Quality- Odour .....	133
4.12.1	Monitoring and management criteria .....	133
4.12.2	Results.....	133
4.12.3	Review.....	133
4.13	Greenhouse Gas Emissions.....	133
4.13.1	Monitoring and management criteria .....	133
4.13.2	Results.....	134
4.13.3	Review.....	134
4.14	Rehabilitation and Landscape Management.....	135
4.14.1	Monitoring and management criteria .....	135
4.14.2	Results.....	137
4.14.3	Review.....	137
4.15	Heritage .....	140
4.15.1	Monitoring and management criteria .....	140
4.15.2	Results.....	140
4.15.3	Review.....	140
4.16	Traffic and Transport .....	141
4.16.1	Monitoring and management criteria .....	141
4.16.2	Results.....	141
4.16.3	Review.....	142
4.17	Dangerous goods and hazardous materials management .....	143
4.17.1	Monitoring and management criteria .....	143
4.17.2	Results.....	143

4.17.3	Review.....	147
4.18	Incident management and response.....	148
4.18.1	Monitoring and management criteria .....	148
4.18.2	Results.....	149
4.18.3	Review.....	150
4.19	Monitoring and recording conditions.....	153
4.19.1	Monitoring and management criteria .....	153
4.19.2	Results.....	154
4.19.3	Review.....	154
<b>5</b>	<b>Conclusions and recommendations .....</b>	<b>155</b>
5.1.1	Community engagement .....	155
5.1.2	Statement of compliance.....	155
5.1.3	Recommendations.....	168
	<b>References .....</b>	<b>169</b>

## Tables

Table 1-1:	Site Summary.....	1
Table 1-2:	Project Approval conditions summary (Application No: 06_0334).....	7
Table 1-3:	Environmental Protection Licence (EPL no 5875) compliance conditions .....	12
Table 1-4:	Non-Compliance risk status key (NSW Government 2015).....	17
Table 1-5:	Non-compliance risk assessment from previous AEMR (2021).....	18
Table 1-6:	Non-compliance from EPA (2019) audit from previous AEMR.....	32
Table 1-7:	Compliance assessment criteria .....	42
Table 2-1:	Waste Received at TWMC (Tonnes) .....	44
Table 2-2:	Quarry extraction figures .....	44
Table 2-3:	Licensed hours of operation as per the EPL .....	45
Table 2-4:	Borehole Pollutants required for analysis by the Environmental Protection Licence (EPL 2015) .....	47
Table 3-1:	Community relations compliance assessment. ....	54
Table 4-1:	Operations compliance assessment.....	57
Table 4-2:	Waste monitoring results .....	61
Table 4-3:	Waste Compliance Assessment.....	63
Table 4-4:	Landfilling compliance assessment .....	67
Table 4-5:	Biodiversity Offset Requirements (EA 'Condition A') .....	69

Table 4-6: Completed management actions for year 7 (2022) of the required monitoring period (Ecoplanning 2023) .....	72
Table 4-7: Biodiversity compliance assessment .....	73
Table 4-8: Analytes, threshold criteria for groundwater monitoring sites (Stygoecologia 2019) .....	77
Table 4-9: Bore water depths during the monitoring period .....	84
Table 4-10: Pollutant Monitoring required by the EPL and completed during the reporting period ..	85
Table 4-11: Summary of groundwater results during the monitoring period .....	86
Table 4-12: Groundwater compliance assessment .....	97
Table 4-13: Pollutant Monitoring required by the EPL and completed during the reporting period	102
Table 4-14: Summary of surface water results during the monitoring period .....	103
Table 4-15: Surface Water Compliance Assessment .....	112
Table 4-16: Leachate Compliance Assessment .....	116
Table 4-17: Meteorological monitoring data 2022 .....	119
Table 4-18: Meteorological Monitoring compliance assessment .....	120
Table 4-19: PA operational noise impact assessment criteria dB(A) .....	120
Table 4-20: Noise limits dictated under the EPL .....	121
Table 4-21: Noise monitoring summary results (GHD 2023) .....	122
Table 4-22: Noise and Vibration compliance criteria .....	122
Table 4-23: Airblast overpressure limits specified in the EPL L4.1 .....	124
Table 4-24: Ground Vibration criteria from the EPL L4.2 .....	124
Table 4-25: Blasting compliance assessment .....	125
Table 4-26: Impact assessment criteria for particulate matter under the project approval .....	127
Table 4-27: Long term impact assessment criterion for deposited dust under the project approval	127
Table 4-28: Dust and air quality monitoring results .....	130
Table 4-29 Dust compliance assessment .....	132
Table 4-30: Odour (air quality) compliance assessment .....	133
Table 4-31: Greenhouse Gas Emissions compliance assessment .....	134
Table 4-32: Rehabilitation and landscape management compliance assessment .....	138
Table 4-33: Heritage Compliance Assessment .....	140
Table 4-34: Traffic and transport compliance assessment .....	142
Table 4-35: Dangerous foods and hazardous materials compliance assessment .....	147
Table 4-36: Incident management and response compliance assessment .....	150
Table 4-37: Monitoring and recording conditions compliance assessment .....	154
Table 5-1: Non Compliance risk assessment 2022 .....	157

## Figures

<b>Figure 1-1: Site Location (Ecoplanning 2022)</b>	4
Figure 1-2: Project Layout (Ecoplanning 2022)	5
Figure 1-3: Tharbogang Vegetation Communities Biodiversity offset areas (ELA 2011)	6
Figure 2-1: Location of noise sensitive receivers (monitoring locations) (GHD 2022)	50
Figure 4-1: Location of Pollutants/ Waste Materials	62
Figure 4-2: Groundwater Borehole Monitoring Sites and Leachate Control	83
Figure 4-3: Bore water depths recorded for all sites since May 2016	84
Figure 4-4: pH Trends	88
Figure 4-5: Alkalinity trends (mg/L)	88
Figure 4-6: Fluoride Trends (mg/L)	89
Figure 4-7: Chloride trends (mg/L)	89
Figure 4-8: Sulphate trends (mg/L)	90
Figure 4-9: Conductivity trends (uS/cm)	90
Figure 4-10: Sodium trends (mg/L)	91
Figure 4-11: Suspended solids trends (mg/L)	91
Figure 4-12: Total organic carbon trends (mg/L)	92
Figure 4-13: Dissolved calcium trends (mg/L)	92
Figure 4-14: Potassium trends (mg/L)	93
Figure 4-15: Iron trends (mg/L)	93
Figure 4-16: Magnesium trends (mg/L)	94
Figure 4-17: Manganese trends (mg/L)	94
Figure 4-18: Ammonia trends (as N mg/L)	95
Figure 4-19: Total Oxidised Nitrogen (as N mg/L)	95
Figure 4-20: pH trends	104
Figure 4-21: Alkalinity trends (mg/L)	104
Figure 4-22: Fluoride trends (mg/L)	105
Figure 4-23: Chloride trends (mg/L)	105
Figure 4-24: Sulphate trends (mg/L)	106
Figure 4-25: Conductivity trends (us/cm)	106
Figure 4-26: Sodium trends (mg/L)	107
Figure 4-27: Suspended solids trends (mg/L)	107
Figure 4-28: Total organic carbon trends (mg/L)	108
Figure 4-29: Calcium trends (mg/L)	108



Figure 4-30: Potassium trends (mg/L) .....	109
Figure 4-31: Iron trends (mg/L) .....	109
Figure 4-32: Magnesium trends (mg/L) .....	110
Figure 4-33: Manganese trends (mg/L) .....	110
Figure 4-34: Ammonia trends (as N mg/L) .....	111
Figure 4-35: Total Oxidised Nitrogen (as N mg/L) .....	111
Figure 4-36: GRWP Weather Station Site Map.....	119
Figure 4-37: Total deposited dust level for 2022 .....	129
Figure 4-38: Total suspended particulate matter for 2022 .....	129
Figure 4-39: Air Quality Monitoring Locations (monitoring began in 2018) .....	131
Figure 4-40: General purpose spill kit located in the landfill workshop.....	144
Figure 4-41: Universal spill kit located within the waste transfer station.....	144
Figure 4-42: Concrete diesel fuel bund in an open area .....	145
Figure 4-43: Bund for battery storage in the landfill workshop .....	145
Figure 4-44: Bunded storage shed on site.....	146
Figure 4-45: Chemical storage with signage within the landfill workshop.....	146
Figure 4-46: MDS folder located on site .....	147

## Appendices

**APPENDIX A** Mitigation and management commitments in the PA

**APPENDIX B** Asbestos Procedure and Disposal at Tharbogang Waste Management Centre

## Glossary and Acronyms

Acronym	Description
<b>AEMR</b>	Annual Environmental Management Report
<b>AQMP</b>	Air Quality Monitoring Plan
<b>ARI</b>	Average Recurrence Interval
<b>AUR</b>	Auxiliary Right Turn
<b>BOA</b>	Biodiversity Offset Area
<b>C&amp;D</b>	Construction and Demolition Waste
<b>C&amp;I</b>	Commercial and Industry Waste
<b>DECCW</b>	Department of Environment, Climate Change and Water
<b>DoP</b>	NSW Department of Planning (currently DPE)
<b>DPE</b>	NSW Department of Planning and Environment
<b>EA</b>	Environmental Assessment (Balance 2009)
<b>EPA</b>	Environmental Protection Agency
<b>EPL</b>	Environmental Protection Licence (version 9-Dec-2015)
<b>GBMS</b>	Griffith Biodiversity Management Strategy
<b>GHG</b>	Greenhouse Gas
<b>Ha</b>	hectare(s)
<b>HV</b>	High Voltage
<b>km</b>	kilometre
<b>LBMP</b>	Landscape & Biodiversity Management Plan
<b>LEMP</b>	Landfill and Environmental Management Plan
<b>LGA</b>	Local Government Area
<b>LOEMP</b>	Landfill Operational and Environmental Management Plan
<b>Masl</b>	Metres above sea level
<b>OP</b>	Operation Plan
<b>MSW</b>	Municipal Waste
<b>NSW</b>	New South Wales
<b>PA</b>	Project Approval
<b>PIRMP</b>	Pollution Incident Response Management Plan (GCC 2008)
<b>POEO Act</b>	NSW Protection of the Environment Operations Act 1997
<b>QOEMP</b>	Quarry Operational and Environmental Management Plan
<b>RAMJO</b>	Riverina & Murray Joint Organisation
<b>SSTV</b>	Site Specific Trigger Values
<b>SWLMP</b>	Soil, Water and Leachate Management Plan
<b>TWMC</b>	Tharbogang Waste Management Centre

## 1 Introduction

This Annual Environmental Management Report (AEMR) has been prepared as a condition of Project Approval (PA) relating to the proposed extension of the Tharbogang Waste Management Centre (TWMC) (Lots 201 and 202 // DP 756035), Hillside Drive, Griffith, NSW, 2680. Tharbogang Waste Management Centre is owned and operated by Griffith City Council (GCC) and is located approximately 10 km north-east of Griffith, NSW (Figure 1-1). A summary of the site details are included below in Table 1-1.

**Table 1-1: Site Summary**

Item	Description		
<b>Name of Operation</b>	Tharbogang Quarry and Landfill		
<b>Name of Operator</b>	Griffith City Council		
<b>Development Consent/ Project Approval</b>	Project approval: MP_06_0334, 2010 Environmental Protection Licence No: 5875 (EPL)		
<b>Name of holder of development consent/ project approval</b>	Griffith City Council		
<b>Mining lease #</b>	Lots 201 and 202 // DP 756035		
<b>Name of holder of mining lease</b>	Griffith City Council		
<b>Water licence #</b>	NA		
<b>Name of holder of water licence</b>	NA		
<b>Operation Plan commencement date</b>	31/12/1997	<b>Operation Plan completion date</b>	TBA
<b>AEMR commencement date</b>	1 January 2022	<b>AEMR end date</b>	31 December 2022
<b>Name of landowner and operator</b>	Griffith City Council		
<b>Site contact</b>	John Roser - Waste Operations Manager		
<b>Name of authorised reporting officer</b>	I, John Roser, certify that this audit report is a true and accurate record of the compliance status of Tharbogang Waste Management Facility for the period 1 January 2022 - 31 December 2022 and that I am authorised to make this statement on behalf of Griffith City Council.  Note.		

Item	Description
	<p>a) The Annual Review is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, \$1 million and for an individual \$250,000.</p> <p>b) The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement— maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or \$22,000, or both).</p>
<b>Name of authorised reporting officer</b>	John Roser
<b>Title of authorised reporting officer</b>	Waste Operations Manager
<b>Contact details of authorised reporting officer</b>	Waste Operations Manager P: 02 6962 8162 M: 0428 421 443
<b>Signature of authorised reporting officer</b>	
<b>Date</b>	Friday, 31 March 2023

This AEMR provides a summary of activity, environmental performance, compliance and community relations between the period of 1 January 2022 to 31 December 2022. The AEMR includes the following:

- Description of the works completed in 2022;
- Review, summary and analysis of environmental monitoring results that were carried out in 2022;
- Analysis of trends;
- Identification of non-compliance and assessment of measures undertaken to ensure compliance; and
- Summary of complaints received during the assessed period.

As per the direction of Griffith City Council, it is acknowledged this report has been updated/adapted based on the 2021 Annual Environmental Management Report (AEMR) prepared by Ecoplaning (2022).

Ministerial approval was received for the expansion, as well as the landfilling and quarrying operations in July 2010.

The initial PA has undergone two modifications. Modification 1 allowed for the use of Lots 181 and 182 in Deposited Plan (DP) 756035 to the immediate east of the existing landfill and quarry, which was approved on 9 May 2012 (Risk Property Australia 2018). As part of Modification 1 the offset value for the TWMC was also re-negotiated. The use of Lots 181 and 182 (DP 756035) as a Biodiversity Offset Area was subsequently approved on 9 May 2018.

Modification 2 included an increased extraction volume from the existing quarry; changes to the extraction sequence for quarry pits 101 and 103; and the location of a new Green Waste Stockpile site on a capped part of former asbestos disposal site, in the north-east corner of Lot 202 DP 756035 (Figure 1-2). This modification was approved on 22 July 2014 (Property Risk Australia 2018). A new filling sequence for the new landfill development was also approved as part of this modification (NSW Government, Planning & Infrastructure 2014).

The PA requires an updated Environmental Protection Licence (EPL) from the Environmental Protection Agency (EPA) (EPA 2020).

Under the PA, there is approval to operate in the new approved sites until 31 December 2035. Within a calendar year the site must not extract more than 315,000 tonnes per year of gravel materials, or, receive more than 35,000 tonnes of general solid waste.

The existing landfill and quarry are within a natural depression in the centre of the site (Figure 1-1). The current site footprint is approximately 120 hectares. Most of the site is vegetated with a sparse cover of native trees and grasses, with weeds and regrowth dominating areas which have been previously cleared. Previously, a speedway (Blue-dot speedway) was in the south eastern section of the site but was closed in 2010.

There are five permanent residences located within 1.5 km of the western boundary of the site. The surrounding areas are primarily rural / agricultural comprising pastoral grasslands and orchards. The Biodiversity Offset Area within Lots 181 and 182 (DP 756035) is situated to the east of the existing landfill and quarry (Figure 1-3) (Ecoplaning 2022).



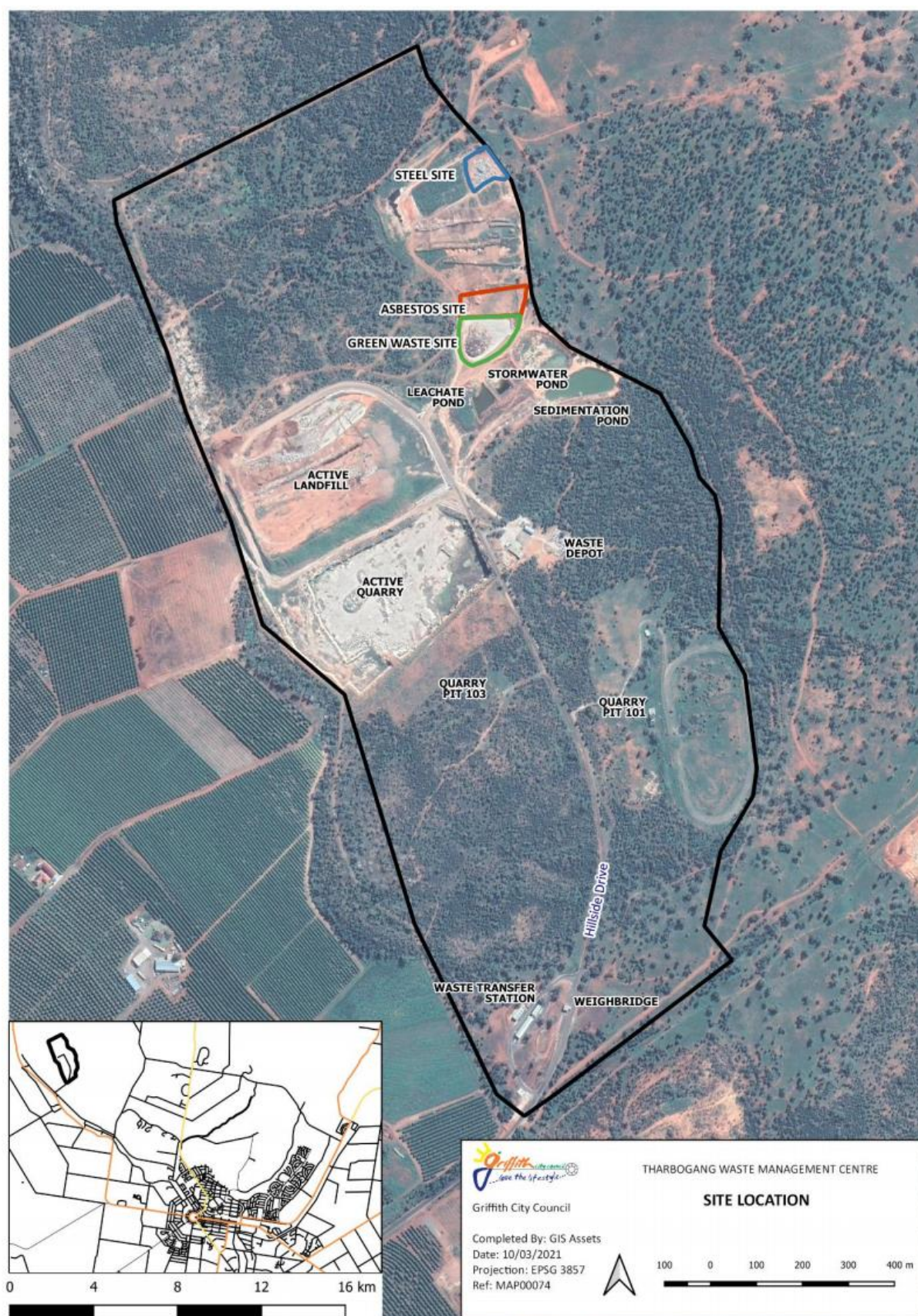


Figure 1-1: Site Location (Ecoplaning 2022)



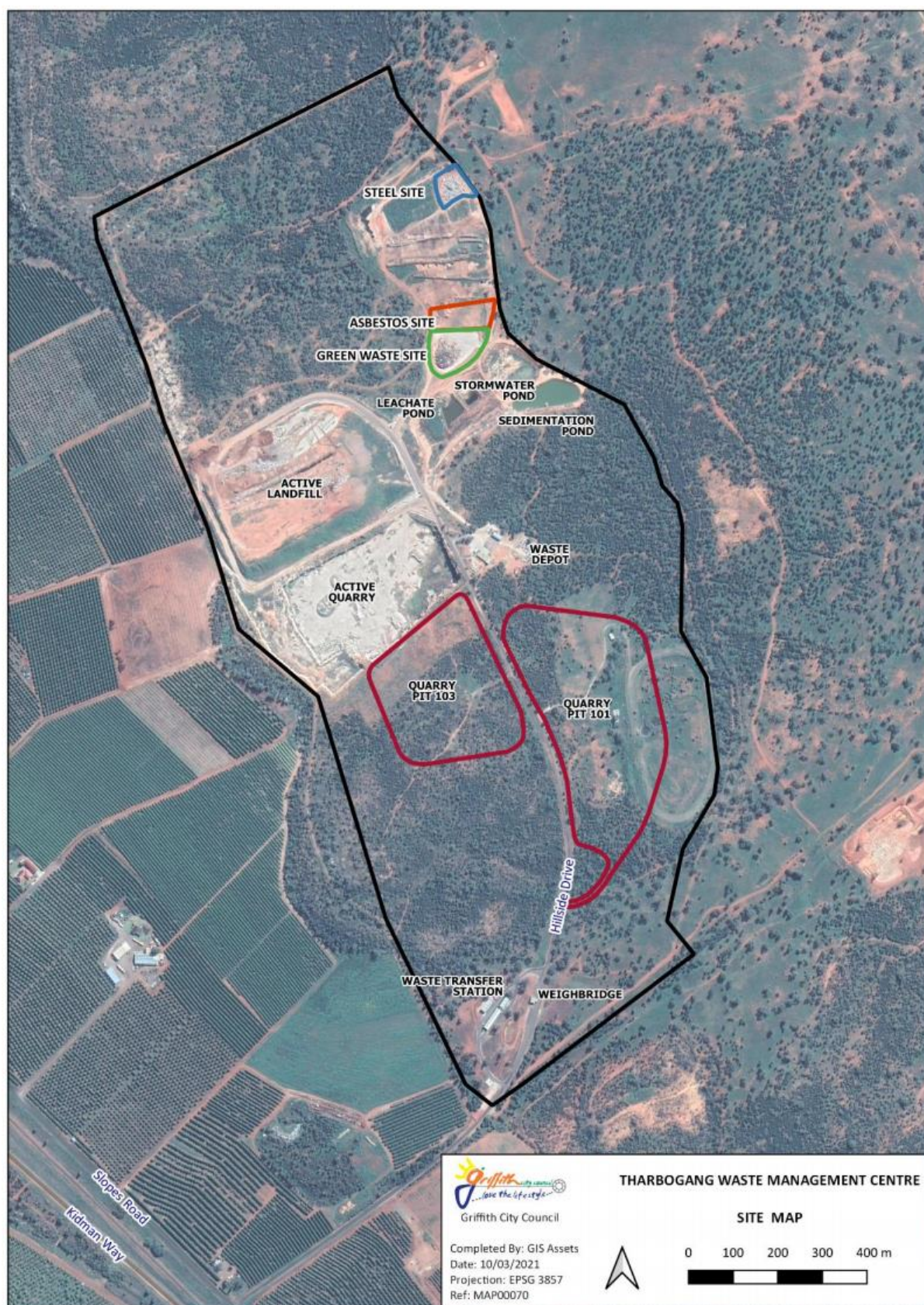


Figure 1-2: Project Layout (Ecoplanning 2022)



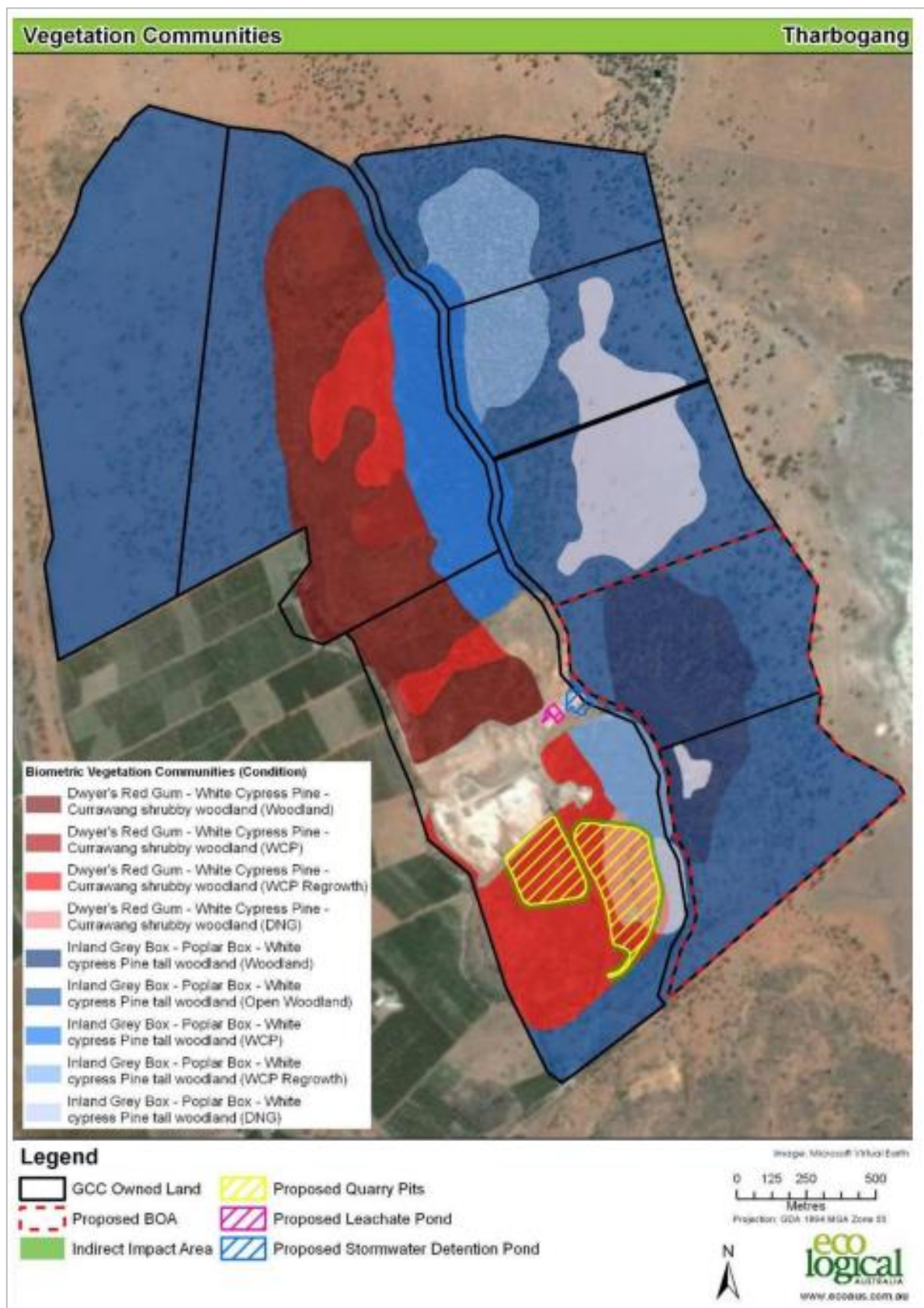


Figure 1-3: Tharbogang Vegetation Communities Biodiversity offset areas (ELA 2011)



## 1.1 Regulatory Framework

Project Approval for the expansion of the site was granted by the Minister for Planning (MP\_06\_0334) on 8 July 2010. The expansion includes landfilling of the existing quarry, two additional quarry pits (pit 103 and pit 101), two additional leachate ponds, a waste transfer station, a stormwater detention pond and minor works (Figure 1-2). The use of Lots 181 and 182 (DP 756035) as a Biodiversity Offset Area was approved on 9 May 2018.

This AEMR has been prepared to meet with Schedule 5, Condition 4 of the Project Approval (PA):

*‘Within 12 months of the date of this approval, and annually thereafter, the Proponent shall submit an AEMR to the Director-general and relevant agencies. This report must:*

- a) Identify the standards and performance measures that apply to the project;*
- b) Describe the works carried out in the last 12 months and the works that will be carried out in the next 12 months;*
- c) Include a summary of the complaints received during the past year, and compare this to the complaints received in previous years;*
- d) Include a summary of the monitoring results for the project during the past year;*
- e) Include an analysis of these monitoring results against the relevant:*
  - a. Impact assessment criteria/limits;*
  - b. Monitoring results from previous years; and*
  - c. Predictions in the EA;*
- f) Identify any trends in the monitoring results over the life of the projects;*
- g) Identify any non-compliance during the previous year; and*
- h) Describe what actions were, or are being, taken to ensure compliance.’*

### 1.1.1 Project Approval

The compliance requirements that are associated with the PA are summarised in Table 1-2. The table provides references to the relevant section of this AEMR which contains an assessment of the relevant criteria, monitoring results and a compliance assessment.

**Table 1-2: Project Approval conditions summary (Application No: 06\_0334)**

Compliance Condition	Project Approval Compliance Requirement (06_0334)	Section of AEMR
<b>Schedule 2: Administration Conditions</b>		
7	Quarrying and landfilling may be undertaken until 31 December 2035.	4.1
8	No more than 315,000 tonnes per year of gravel materials shall be extracted, and no more than 35,000 tonnes per year of general solid waste be received.	4.1 and 4.2
12	All plant equipment shall be maintained and operated in a proper and efficient condition / manner.	4.1
<b>Schedule 3: Specific Environmental Conditions</b>		

Compliance Condition	Project Approval Compliance Requirement (06_0334)	Section of AEMR
1	Only waste authorised by the EPL shall be received by the site.	4.2
2	All waste outputs should be disposed of at a suitably licenced facility.	4.2
3	All waste generated during construction must be classified and disposed of according to Department of Environment, Climate Change and Water (DECCW) Waste Classification Guidelines, Part 1: Classifying waste.	4.2
4	Suitable procedures are in place to ensure that the site does not accept prohibited waste, incoming waste loads are screened, appropriate documentation of all waste sludges and wastes that are controlled under a tracking system and adequate training to recognise and handle hazardous or unapproved waste.	4.2
6	A waste monitoring program must be prepared to the satisfaction of the DG and implemented prior to commencement of operations.	4.2
7	Prescribes landfill criteria including revegetation and systematic filling and management of landfill cells.	4.3
8	The site surrounding the landfill must be kept secure and locked when unattended.	4.1 and 4.18
9	Existing litter shall be removed, mesh fencing 1.8 m high shall be installed around the site and the site will be inspected daily with a minimum of a weekly litter removal.	4.1 and 4.14
10	Pests, vermin and noxious weeds (now priority weeds under the Biosecurity Act 2015) on site are managed and inspected regularly.	4.4
11	Composting is undertaken in accordance with Australian Standard AS 4454-2003.	4.13
12	A feasibility report outlining options to capture and use greenhouse gas in the generation of electricity is to be prepared within 5 years of PA.	4.13
13	The existing Landfill Environmental Management Plan is updated within 6 months of the PA.	4.3
14	When discharging, the Proponent will comply with section 120 of the Protection of the Environment Operations Act 1997 (POEO Act) unless expressly provided for by an EPL.	4.5
15	Stormwater will be controlled and diverted through appropriate erosion and sediment control/pollution measures.	4.5
16	On site sewerage shall be managed and comply with the Environment and Health Protection Guidelines - On-site Sewage Management for Single Households (1998).	4.5

Compliance Condition	Project Approval Compliance Requirement (06_0334)	Section of AEMR
17	Water that has come in contact with waste must not be discharged from the site.	4.5
18	Prescribes leachate management criteria.	4.7
19	All above ground tanks and vats are to be stored and handled in accordance with the relevant criteria.	4.17
20 to 26	A Soil, Water and Leachate Management Plan must be prepared and implemented which must include a site water balance, erosion and sediment control plan, stormwater management scheme, surface water monitoring program, ground water and leachate monitoring program and surface water, groundwater and leachate response plan. SWLMP to be provided to DG for approval within 6 months of PA.	4.5, 4.6 and 4.7
27	A meteorological station must be established and maintained in the vicinity of the development in accordance with the Approved Methods for Sampling Air Pollutants in NSW guideline	4.8
28	Prescribes maximum noise limits.	4.9
29	Prescribes quarrying and landfilling operating hours.	4.1
30 and 31	Prescribes blasting criteria, air blast overpressure limits and ground vibration thresholds.	4.10
32 and 33	Prescribes blasting hours and frequency	4.10
34	Requires that blasting is not undertaken within 200 m of privately-owned land unless suitable arrangements have been made	4.10
35 and 36	Requires that all landholders within 500 m are advised of proposed blasting activities and prior to 30 November 2010 these owners are entitled to a property inspection. In the event that a written request of a property inspection, the inspection shall be undertaken by a suitably qualified person.	4.10
37	Prescribes the investigation process following landholder claims of property damage as a result of blasting.	4.10
38	A Blast Management Plan must be prepared and implemented prior to 30 November 2010.	4.10
39	Prescribes continuous improvement criteria of blasting and noise impacts.	4.9 and 4.10
40	A Noise and Vibration Monitoring Plan must be prepared and implemented. This will include annual attended noise monitoring, traffic noise monitoring, details of how noise performance is monitored and a noise monitoring protocol.	4.9 and 4.16
41	Tables 5, 6 and 7 prescribe Air Quality criteria not to be exceeded.	4.11 and 0

Compliance Condition	Project Approval Compliance Requirement (06_0334)	Section of AEMR
42	Requires that odour complies with section 129 of the POEO Act unless expressly provided in the EPL.	4.12
43	An Air Quality Monitoring Plan must be prepared and implemented. The plan will include details of how air quality performance will be monitored and a protocol for evaluating compliance.	4.11 and 4.12
44	Requires continuous improvement of dust mitigation measures.	4.11
45	Table 8 prescribes Biodiversity Offset Requirements	4.4
46 and 47	Requires a revision of the Biodiversity Offset Strategy and that the strategy be implemented prior to any clearing on site.	4.4
48	A Landscape and Biodiversity Management Plan must be prepared and implemented. This must be prepared by a qualified person, be submitted to the Director-General and include a Rehabilitation and Biodiversity Offset Strategy Management Plan and a Long-Term Management Strategy.	4.4 and 4.14
49 and 50	Prescribes Landscape and Biodiversity Management Plan criteria and Long-Term Management Strategy criteria	4.14
51 and 52	Prescribes criteria for the rehabilitation bond.	4.14
53	A Cultural Heritage Management Plan must be prepared and implemented and prescribes criteria for the plan. This plan must be prepared in consultation with DECCW and local Aboriginal communities, draw on relevant recommendations for management and include description of measures that would be implemented.	4.15
54	A Traffic Management Plan must be prepared and implemented and prescribes criteria for the plan. This plan must be prepared in consultation with RTA, outline measures to manage traffic issues, review standard of access roads, outline dust mitigation measures and outline rubbish management from vehicles.	4.16
55	Requires that the Auxiliary Right Turn (AUR) at the intersection of Access Road and the Kidman Way be upgraded within 12 months of operations commencing on site.	4.16
57	All loaded vehicles must be covered when travelling to and from the site and that loaded vehicles are cleaned of material when leaving the site.	4.16
58	A logbook of the extraction quantities and traffic movements must be kept on site and available for inspection.	4.16
59	Storage, handing and transport of fuels and dangerous goods is to be conducted in accordance with the relevant Australian standards.	4.17
60 (b)	Prescribes fire management criteria.	4.18

Compliance Condition	Project Approval Compliance Requirement (06_0334)	Section of AEMR
61	Prescribes criteria for recording of annual production data and the inclusion of this data in the AEMR.	4.1
<b>Schedule 4: Additional Procedures</b>		
1	Requires that the Director General and affected landowners and tenants are notified if the monitoring in Schedule 3 identifies the impacts generated are greater than the relevant criteria. Quarterly monitoring results shall be provided to each of these parties until results indication that the project is complying with the relevant criteria.	4.18
2-5	Prescribes the criteria for an independent review.	NA
<b>Schedule 5: Environmental Management, Reporting and Auditing</b>		
1	<p>An Environmental Management Strategy must be prepared and implemented. This strategy must provide strategic framework, identify statutory approvals that apply to the project, describe the role of key personnel involved in the management, describe the procedures to:</p> <ul style="list-style-type: none"> <li>• Keep local community and relevant agencies informed about the operation and environmental performance,</li> <li>• Receive, hand, respond to and record complaints</li> <li>• Resolve any disputes that may arise during the course of the project,</li> <li>• Respond to any non-compliance, and</li> <li>• Respond to emergencies</li> </ul> <p>Additionally, copies of the strategies, plans and programs must be included in the strategy and a clear plan depicting all monitoring being carried out within the project area.</p>	Not addressed
2	Within 24 hours of an exceedance of the limits/performance criteria in this PA or the occurrence of an incident that causes or may cause material harm to the environment the Department of Planning and other relevant agencies of the exceedance / incident must be notified.	4.18
3	A written report must be provided to the Department of Planning and other relevant agencies of an exceedance/incident within 6 days of the incident. The report must describe the date, time and nature of exceedance / incident, identify the cause, describe what action has been taken and proposed measures.	4.18
4	Prescribes criteria for the AEMR.	This report
5-7	Prescribes criteria for the independent environmental audit.	NA
8	Within one month of approval of strategies/plans/programs or the completion of audits or AEMR, copies of the relevant	4.1

Compliance Condition	Project Approval Compliance Requirement (06_0334)	Section of AEMR
	documents must be provided to the relevant agencies and that copies are made publicly available on its website and at the site.	
9	During the project the proponent must make a summary of monitoring results required under this approval publicly available on its website and update these results on a regular basis	4.1
10	A community education program must be prepared and implemented. This program should focus on promoting resource recovery activities, community benefits of composting food and garden waste and the importance of food waste recovery.	3.3

### 1.1.2 NSW EPA Environmental Protection Licence

All operations are regulated under the Environmental Protection Licence No. 5875 (EPL) (2015), which has been summarised in Table 1-3. The EPL has been issued for all extractive scheduled activities. The most recent licence variation occurred on 9 December 2020. An application to amend the requirements of O.14 and O.15 was approved by the EPA given the difficulty in sourcing clean fill material to provide daily cover to the landfill waste area. These conditions have been amended accordingly below.

**Table 1-3: Environmental Protection Licence (EPL no 5875) compliance conditions**

Compliance Condition	EPL Compliance Requirement (No. 5875)	Section of AEMR
Condition P1.1 and 1.2	Groundwater Quality Monitoring (EPA points 1,3-7) Surface Water Quality Monitoring (EPA point 8) Leachate Runoff (EPA point 9)	4.5, 4.6 and 4.7
Condition L1.1	Requirement to comply with section 120 of the POEO Act - prohibition of the pollution of waters.	4.5
L2.1	Lists the type of waste permitted to be received at the TWMC	4.2
L2.2	The total tonnage of waste disposal must not exceed 100,000 tonnes per year.	4.2
L2.3 and L2.4	Prescribes criteria for the disposal and storage of tyres.	4.2
L3.1 and L3.2	Prescribes noise limits.	4.9
L4	Prescribes blasting criteria.	4.10
L5	Prescribes hours of operation.	4.1
O1, O2 and O3	Activities must be undertaken in competent manner (O1), plant and equipment must be maintained and operated in a proper and efficient manner (O2) and activities must be undertaken in a manner which minimises dust emission (O3).	4.1 and 4.11

Compliance Condition	EPL Compliance Requirement (No. 5875)	Section of AEMR
O4	Outlines the emergency response procedures for fires.	4.18
O5.1	Sedimentation basin and leachate holding pond must be maintained to ensure their design capacity is available for stormwater and leachate.	4.5 and 4.7
O5.2	Perimeter of areas where waste has been landfilled must be contoured to prevent stormwater running onto these surfaces from all storm events less than or equal to a 1 in 10 year, 24 hour duration storm event.	4.5
O5.3 -O5.7	Outlines the measures to be implemented to prevent unauthorised entry.	4.1
O5.8	Requires that the litter management program specified in the LEMP be implemented.	4.14
O5.9	Requires that pests, vermin and weeds be controlled.	4.4
O5.10	Outlines staff training requirements	4.1
O6.1 - O6.5	Outlines leachate management and disposal requirements	4.7
O6.6, O6.7 and O6.8	Outlines waste screening and compaction requirements.	4.2
O6.9	Waste disposal must follow the filling plan.	4.3
O6.10 and O6.11	Prescribes requirements for completion of landfill cells.	4.3
O6.12	Requirements for closure plan.	4.14
O6.13	Prescribes criteria for burning of waste.	4.2
O6.14 and O6.15	Prescribes criteria for covering of waste.	4.3
O6.16 and O6.17	Biosolids and green waste must be stored on an impermeable pad with a bunded area capable of capturing all leachate in accordance with the EPL performance conditions.	4.2
M1	Includes criteria for the recording of monitoring data.	4.1
M2	Prescribes requirements to monitor the concentration of pollutants to be discharged.	4.5
M3	Monitoring of concentration of a pollutant discharged must be undertaken in accordance with the Approved Methods Publication unless alternative methods has been approved.	4.5 and 4.6
M4 and M5	Prescribes pollution complaint criteria and telephone complaint criteria.	3



Compliance Condition	EPL Compliance Requirement (No. 5875)	Section of AEMR
M6.1	Remaining disposal capacity of landfill must be monitored.	4.3
R1	Outlines the annual returns document requirements.	4.18
R2	EPA must be notified of incidents of environmental harm.	4.18
R3	A written report must be produced if requested regarding an event (caused, causing or is likely to cause material harm to the environment).	-
R4.1 - R4.2	Criteria for recording fires	4.18
R4.3	The annual report for TWMC must be prepared and submitted within 6 weeks after the end of licence year.	-

All assessments are in relation to the PA, EPL and Environmental Assessment (EA) guidelines. The landfills environmental goals are listed in Environmental Guidelines: Solid Waste Landfills (NSW EPA 2016) and have been reviewed for landfill operations.

### 1.1.3 Environmental Assessment Mitigation and Management Commitments

The PA indicates that the statement of commitments contained in Section 9 of the EA (Balance 2009) have been updated and amended to reflect the revised project description and to take into account submissions received during the EA. Appendix 2 of the PA supersedes and replaces Section 9 of the EA. The revised commitments are included in **Appendix A**.

The PA states that the predictions in the EA (Balance 2009) need to be compared against the monitoring results.

### 1.1.4 Actions required from previous AEMR

The 2022 AMER is the sixth report, with the following identified in the 2021 AMER for action:

In 2021 a community education program was implemented, however it was not approved by the Director General (DG), it was arranged through the RAMJO Waste Group (Riverina & Murray Organisation of Councils). There was no community education program implemented in the 2022 monitoring period.

The EPA audit (2019) found that neither the green waste nor the biosolids are stored on an impermeable bunded area. Since 24 February 2020, the green waste pad has been completed and utilised and includes a bunded area capable of capturing all leachate in accordance with the EPL performance conditions. The majority of biosolids are disposed of directly into landfill, however, biosolids not placed in landfill are spread on a gravel pad to dry. Once sufficiently dried they are transported into landfill. A biosolids pad has been designed, although building will not commence until suitable material has been sourced.

There was no 1.8 m fence surrounding the active tipping area. The construction of this fence was scheduled to start in the 2021/22 financial year and was completed in January 2023.

The monitored noise level LAeq (15 min) exceeded the assessment criterion of 35 LAeq (15 min) across all monitoring periods, at all sensitive receiver sites. However, it was concluded that it is unlikely that the landfill or quarry contributed to monitored noise levels at the sensitive receivers. Machinery



movements associated with the landfill or quarry were not audible at any of the sensitive receivers despite being in operation during the monitoring period, except at Receiver 1, where daily traffic to and from the facility may have partially contributed to the high noise levels (NGH 2021).

It was recommended that a litter management program be implemented, as of 2022 litter is collected on site by staff, however there is no specific plan.

The construction of a sedimentation basin had been completed, however there were no sediment traps installed in 2021. They have since been completed, bringing this up to compliance.

The Griffith Biodiversity Management Strategy (GBMS) as well as the Landfill Operational and Environmental Management Plan (LOEMP) and the Quarry Operational and Environmental Management Plan (QOEMP) are not yet finalised. The GBMS and LOEMP have both been reviewed and are with the Department of Planning and Environment (DPE) for approval.

Based on the recommendations of the EPA, the leachate capture system has undergone a full redesign process. In 2021 GCC completed a final peer review of the new design plan. The leachate capture system has undergone a full redesign this process is completed. Construction cannot go ahead until the High-voltage power has been extended.

A compliance assessment found that the TWMC had a moderate level of compliance with the PA and EPL conditions and EA revised statement of commitments. There has been an overall improvement in compliance since the first AEMR in 2018 and since the 2020 monitoring period. Nineteen non-compliances were identified over the 2021 reporting period.

An independent EPA audit (2019) noted several non-compliances, most of which have been addressed since the audit. A small number of compliances were unable to be adequately assessed, largely due to insufficient information.

On 9 December 2020 GCC obtained approval from the EPA to compact waste in accordance with condition O6.7, O6.14 and O6.15 from the EPL given the difficulty in sourcing clean fill to cover the landfilled waste daily. Covering the landfill at the end of each day is no longer required, provided compaction rates are met.

Compliance for all relevant criteria were recorded for the following categories although some had conditions for which insufficient information was available to adequately assess compliance and / or conditions that were not yet triggered:

- Groundwater;
- Leachate;
- Meteorological Monitoring;
- Noise and Vibration;
- Blasting;
- Air quality – Dust;
- Traffic and transport;
- Dangerous goods and hazardous materials.

There is an absence of the following information and / or monitoring data (this list is not exhaustive and the compliance table in each section should be referred to):

- Odour monitoring data;
- No information regarding landfill cells engineering design other than that they will be constructed to engineering details and surface water and leachate managed as per the PA conditions;

- No information regarding batters with fissures and benches, contaminated soil disposal, soil testing, mulching and edge vegetation;
- No work with regards to Greenhouse Gas Emissions;
- The required information for each dataset was not always provided (e.g. collector's name and time of sampling).

Non-compliance was recorded for the following categories:

- Community relations;
- Operations;
- Waste;
- Landfilling;
- Biodiversity;
- Surface water;
- Air quality – Odour;
- Greenhouse gas emissions;
- Rehabilitation and Landscape Management;
- Heritage;
- Incident management and response;
- Monitoring and recording conditions.

A summary of non-compliance from 2021 with the relevant TWMC approvals is outlined below in Table 1-5 (see Table 1-4 for non-compliance risk colour coding). The EPA audit (2019) noted several non-compliances, many of which have been addressed in the past three years, these are summarised in Table 1-6.

**Table 1-4: Non-Compliance risk status key (NSW Government 2015).**

Risk Level	Colour Code	Description
High	<b>Non- compliant</b>	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence
Medium	<b>Non- compliant</b>	Non- compliance with: <ul style="list-style-type: none"> <li>• Potential for serious environmental consequences, but is unlikely to occur; or</li> <li>• Potential for moderate environmental consequences, but is likely to occur</li> </ul>
Low	<b>Non- compliant</b>	Non- compliance with: <ul style="list-style-type: none"> <li>• Potential for moderate environmental consequences, but is unlikely to occur; or</li> <li>• Potential for low environmental consequences, but is likely to occur</li> </ul>
Administrative non-compliance	<b>Non- compliant</b>	Only to be applied where the non- compliance does not result in any risk of environmental harm (eg submitting a report to government later than required under approval conditions)

This non-compliance risk status key (Table 1-4) is used to assess the risk of the non-compliances and part-non compliances from Section 3 and 4 (colours shown in Table 1-7), to determine the order of importance to be addressed. Areas assigned a higher risk level are suggested to be addressed sooner than those with a lower risk level.

**Table 1-5: Non-compliance risk assessment from previous AEMR (2021)**

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed actions	Timing of proposed actions
<b>Project Approval #06_0334</b>							
<b>Community Involvement</b>							
#06_0334	Condition 10, Schedule 5	A Community Education Program shall be prepared and implemented, with prior approval from the Secretary.	Non-compliant	Whilst community education programs were undertaken during the reporting period. These were not approved by the Director-General. The community education program was arranged through the RAMJO Waste Group (Riverina & Murray Organisation of Councils).	Section 3.3	Nil	NA
<b>Landfilling</b>							

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed actions	Timing of proposed actions
#06_0334	Condition 11, Schedule 3	Composting should be undertaken in accordance with AS 44542003	Non-compliant	Given composting is not undertake at the site, it cannot be undertaken in accordance with the Australia standard. All green waste is mulched and stockpiled north of the asbestos landfill area for cover use.	Section 4.3.3	Nil	NA
#06_0334	Condition 13, Schedule 3	The PA requires that the existing Landfill Environmental Management Plan be updated	Non-compliant	The Landfill Environmental Management Plan was most recently updated in March 1999.	Section 4.3.3	Nil	NA
Air Quality- Odour							
#06_0334	Condition	No emission of any offensive	Non-compliant	No odour monitoring data	Section	Nil	NA

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed actions	Timing of proposed actions
	42, Schedule 3	odour must come from the premises where the licence applies. However, odour emissions are permitted provided they are in accordance with the conditions of the licence or that the only persons affected are workers on site. This is designed to minimize the nuisance effect to acceptable levels.		has been provided. However, no complaints have been made regarding odour in the reporting period.	4.12.3		

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed actions	Timing of proposed actions
<b>Greenhouse Gas Emissions</b>							
#06_0334	Condition 11, Schedule 3	Composting required on site.	Non-compliant	Council has advised that composting will not occur on site.	Section 4.13.3	Composting will not occur in site.	NA
#06_0334	Condition 12, Schedule 3	A feasibility report is required to be prepared within 5 years of the Planning Approval	Non-compliant	No feasibility report has been provided.	Section 4.13.3	NA	NA
<b>Rehabilitation and Landscape Management</b>							
#06_0334	Condition 9, Schedule 3	Specific requirements for the visual amenity and litter control within 6 months of the date of project approval.	Non-compliant	Litter is removed by staff on site. No indication of weekly litter removal, however Council has advised that daily inspections began in 2021.	Section 4.14.3	NA	NA

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed actions	Timing of proposed actions
				There is no 1.8m high mesh fence around the active tipping area. Due to the fluid nature of the active tipping area Council uses litter fences as these are mobile and are able to be relocated when the active tipping area changes (GCC 2020a). The construction of a 1.8m boundary fence around the landfill will begin in the 2021/22 financial year.			
EPL #5875							
Operations							



Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed actions	Timing of proposed actions
#5875	O5.5	The licensee must install and maintain a high wire mesh fence of not less than 1.8 metres around the active tipping area	Non-compliant	There is no 1.8m high mesh fence around the active tipping area. Due to the fluid nature of the active tipping area Council uses litter fences as these are mobile and are able to be relocated when the active tipping area changes (GCC 2020a)	Section 4.1.3	The construction of a 1.8m boundary fence around the landfill will begin in the 2021/22 financial year	2021/22 financial year
Waste							
#5875	O5.8	A litter management program is to be implemented.	Non-compliant	Litter on site is collected by staff. There is no specific Litter Management Program.	Section 4.2.3	Nil	NA
#5875	O6.16 - O6.17	Green waste and biosolids	Non-compliant	The majority of Biosolids are	Section 4.2.3	The green waste pad has been	TBA

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed actions	Timing of proposed actions
		are stored on an impermeable bunded area		<p>disposed of directly into landfill, however, Biosolids not placed in landfill are spread on a gravel pad to dry. Once sufficiently dried they are transported into landfill. The EPA audit (2019) states that neither the green waste nor the biosolids are stored on an impermeable bunded area.</p> <p>The green waste and biosolids waste pads must be impermeable to that required and have a thickness of not less than 600mm</p>		<p>completed and includes a bunded area capable of capturing all leachate in accordance with the EPL performance conditions.</p> <p>A Biosolids pad has been designed, however, building will not commence until suitable material has been sourced</p>	

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed actions	Timing of proposed actions
<b>Monitoring and recording conditions</b>							
#5875	M1.3	The following records must be kept for all samples collected: - Sample date and time Sample location Name of collector	Non-compliant	Monitoring is undertaken by a range of internal and external staff.	Section 4.19.3	Request metadata from all subcontractors and store information with sample data.	Ongoing
<b>EA</b>							
<b>Waste</b>							
-	F	Street sweeper waste to be stockpiled with green waste	Non-compliant	Due to the street sweeper waste being wet, it is disposed of down the side of the landfill or on a cell wall.	Section 4.2.3	Nil	NA
<b>Biodiversity</b>							

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed actions	Timing of proposed actions
-	L	Develop and implement a weed and pest management strategy for the control and eradication of weed species and incorporate into the rehabilitation plan, and QOEMP and LOEMP	Non-compliant	<p>The LOEMP is awaiting approval from the DPE. The required works (action plan) LOEMP has a section outlining the offset land, weed and pest animal monitoring requirements and refers to the relevant plans for details regarding how the work is to be undertaken.</p> <p>Weed and Pest Control Plans have been prepared and the works have commenced.</p>	Section 4.4.3	Nil	TBA

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed actions	Timing of proposed actions
-	Q	Assess the significance of various ephemeral swamps and water bodies as part of the Griffith Biodiversity Strategy	Non-compliant	The draft Griffith Biodiversity Management Strategy was last updated in December 2011. It has been advised from the Environment Health and Sustainability Coordinator that until an Environmental Officer (EO) is appointed on staff at TWMC, this document will remain in its current form. Even with an EO, this project is not likely to be penciled in as a	Section 4.4.3	NA	NA

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed actions	Timing of proposed actions
				priority for review			
Surface Water							
-	D	Install sediment traps at discharge points	Non-compliant	Construction of a sedimentation basin has been completed although Council advised that there are no sediment traps installed.	Section 4.5.3	NA	NA
-	I	The stormwater detention pond will be lined with a flexible membrane and the water quality monitored on a quarterly basis	Non-compliant	The stormwater pond is not lined with a flexible membrane and water quality monitoring is only undertaken twice a year. Construction has been completed for the Stormwater pond, resulting in	Section 4.5.3	Council will start looking at the Stormwater and Sedimentation Ponds in the 22/23 financial year budget.	22/23 financial year

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed actions	Timing of proposed actions
				a more formalised contaminant system. Whilst there is no flexible membrane for the stormwater pond, there has been major formalisation stormwater works up stream. Monitoring more than twice a year is not proposed.			
<b>Greenhouse Gas Emissions</b>							
-	B	Set greenhouse gas targets and incorporated into the landfill operational environmental	Non-compliant	No GHG monitoring has been undertaken or a target set.	Section 4.13.3	NA	TBA

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed actions	Timing of proposed actions
		management plan.					
-	D	Cover active tip face daily with green waste to improve bioreaction process.	Non-compliant	The active tipping cell is not covered daily but it is compacted at the end of each day to alleviate wind blow rubbish. Green waste is not used as a direct cover material, it is only used on the top of the final cover.	Section 4.13.3	Covering the tip face daily is not proposed. In December 2020 Council obtained approval from the EPA to compact waste in accordance with O6.7 given the difficulty in sourcing clean fill to cover the landfilled waste daily. However, this condition remains non-compliant as the goal of improving the bioreaction process remains unaddressed	NA



Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed actions	Timing of proposed actions
<b>Heritage</b>							
-	B	Protect and preserve the two surveyor scarred trees and implement a 20 m exclusion zone maintained around each tree.	Non-compliant	Large 'do not touch' bands have been put around both scar trees to protect them from contractors who may not know the significance of the trees.	Section 4.15.3	Council is currently taking steps to include the two 'scar trees' in the LEP Heritage Plan. The 20 m exclusion zone is yet to be formalised.	TBA

**Table 1-6: Non-compliance from EPA (2019) audit from previous AEMR**

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment/ Action required from previous Annual Review	Where addressed in Annual Review	Proposed Action	EPA Proposed Timing	Timing of Proposed Action
<b>Requested by EPA Audit (2020)</b>								
EPL #5875	O4.1	Have in place and implement fire prevention measures to minimise risk of fire at the premises	Compliant	Combustible material at the landfill is covered at the end of the working day with VENM or other appropriate non-combustible material,	Section 4.1.3	The full area of waste is not covered daily but is compacted at the end of each day. Council progressively covers waste maintaining minimum area exposed to 1,000 to 2,000m <sup>2</sup> . Council states that the system still appears to meet the goals of preventing fires in the waste, controlling vermin and achieving good compaction but is looking at ways	3 months from date of final report.	On 9 December 2020 Council obtained approval from the EPA to compact waste in accordance with O6.7 given the difficulty in sourcing clean fill to cover the landfilled waste daily.

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment/ Action required from previous Annual Review	Where addressed in Annual Review	Proposed Action	EPA Proposed Timing	Timing of Proposed Action
						of covering waste daily.		Compliance was achieved in 2021.
EPL #5875	O5.5	The licensee must install and maintain a high wire mesh fence of not less than 1.8 metres around the active tipping area	Compliant	The licensee must comply with the condition and construct the required 1.8m high meshed fence around the active landfill area	Section 4.1.3	There is no 1.8m high mesh fence around the active tipping area. Due to the fluid nature of the active tipping area Council uses litter fences as these are mobile and are able to be relocated when the active tipping area changes (GCC 2020b). There is fencing to the west of the current landfill that was greater than	6 months from the date of final report.	The 1.8 m high mesh fence around the active tipping area was completed in January 2023.

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment/ Action required from previous Annual Review	Where addressed in Annual Review	Proposed Action	EPA Proposed Timing	Timing of Proposed Action
						1.5m mesh fencing but this was a boundary fence		
EPL #5875	O5.9	Requires that pests, vermin and weeds be controlled.	Compliant	The licensee must review the current noxious weed eradication program for the site (and adjacent Council owned sites). The eradication program should aim to be complete within 6 months.	Section 4.4.3	Council has a contractor who treats noxious weeds on site and a contractor who comes on site twice a year and undertakes pest animal control.	6 months from the date of final report then ongoing.	Ongoing
			Non-compliant	A further program of monitoring and maintenance must also be agreed with the EPA to ensure noxious weeds are kept under control at the site	Section 4.4.3	Council had a Weed Control plan developed in 2019, this will be reviewed (desktop and in the field). Consultation with the EPA required.	6 months from the date of final report then ongoing	Ongoing

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment/ Action required from previous Annual Review	Where addressed in Annual Review	Proposed Action	EPA Proposed Timing	Timing of Proposed Action
			Compliant	<p>The application of daily cover coupled (effective within 1 month) with a vermin control program agreed with the EPA is to be implemented within 3 months.</p> <p>The controls used must have minimal impact on native fauna species.</p>	Section 4.4.3	<p>Noxious weed and feral animal controls occur throughout the year.</p> <p>In December 2020 Council obtained approval from the EPA to compact waste in accordance with O6.7 given the difficulty in sourcing clean fill to cover the landfilled waste daily.</p> <p>Council had a Weed Control plan developed in 2019, this will be reviewed (desktop and in the field)</p>	6 months from the date of final report then ongoing	Ongoing

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment/ Action required from previous Annual Review	Where addressed in Annual Review	Proposed Action	EPA Proposed Timing	Timing of Proposed Action
EPL #5875	O6.14	The completed landfill cells are to follow the prescribed requirements and the criteria for the covering of waste.	Non-Compliant	The licensee must apply approved cover to the appropriate depth to the landfill at the end of the day and similar cover to the animal pits when animal carcasses are disposed of. The licensee must also ensure that asbestos disposed of on site is immediately and properly covered with VENM.	Section 4.1.3	The full landfill area is not covered daily but is compacted at the end of each day. Council progressively covers waste maintaining minimum area exposed to 1,000 to 2,000m <sup>2</sup> . The system still appears to meet the goals of preventing fires in the waste controlling vermin and achieving good compaction (GCC 2020a). It is unknown if the required rate	Immediately	On 9 December 2020 Council obtained approval from the EPA to compact waste in accordance with O6.7 given the difficulty in sourcing clean fill to cover the landfilled waste daily.
EPL #5875	O6.15	The completed landfill cells are to follow the prescribed requirements and the criteria	Non-Compliant	The licensee must ensure that cover material over the landfill is maintained. The licensee upon receipt of a	Section 4.1.3			

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment/ Action required from previous Annual Review	Where addressed in Annual Review	Proposed Action	EPA Proposed Timing	Timing of Proposed Action
		for the covering of waste.		significant quantity of putrescible material from a meat/chicken processing facility or other such facility must cover the material as soon as practicable on the day of receipt. The material should then receive further cover when the daily cover is applied		of compaction is being met.		
EPL #5875	06.16/ 06.17	Green waste and biosolids are stored on an impermeable bunded area	Non-compliant	An impermeable pad with bunding is required to be constructed on the site where biosolids are to be	Section 4.2.3	The majority of Biosolids are disposed of directly into landfill, however, Biosolids not placed in landfill are spread on a	Construction 6 months from date of final report Biosolids	TBA A Biosolids pad has been designed, however, building will not

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment/ Action required from previous Annual Review	Where addressed in Annual Review	Proposed Action	EPA Proposed Timing	Timing of Proposed Action
				<p>“temporarily stored”.</p> <p>Once dried the biosolids must be disposed of to landfill. The two older windrows of biosolids and soil must therefore be transferred to the landfill for burial as soon as is practicable.</p> <p>The licensee must ensure that the biosolids pad has a performance equivalent of a clay liner with a permeability of <math>1 \times 10^{-9}</math> m/s or less and a thickness of no</p>		gravel pad to dry. Once sufficiently dried they are transported into landfill.	transfer to landfill 2 months from date of final report	commence until suitable material has been sourced.



Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment/ Action required from previous Annual Review	Where addressed in Annual Review	Proposed Action	EPA Proposed Timing	Timing of Proposed Action
				less than 600mm.				
EPL #5875	M1.2a)	Monitoring requirements	Compliant	Licensee to keep copy of chain of custody of all samples taken for auditable records. Not all monitoring results were set out as required by the condition (EPA 2019).	Section 4.19.3	Post audit, this information has been recorded.	Ongoing	Completed and ongoing.
EPL #5875	M1.3b)	Monitoring requirements	Compliant	Record time of sampling for each sample on chain of custody or other record.	Section 4.19.3	Time of sampling has been recorded since August 2019 sampling.	Ongoing	Completed and ongoing.
EPL #5875	R2.1		NA	The EPA must be notified of the activation of the PIRMP immediately (as soon as practical) due to a pollution incident,	Section 4.18.3	No incidents of environmental harm were recorded during the reporting period (GCC 2021).	Ongoing	Ongoing

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment/ Action required from previous Annual Review	Where addressed in Annual Review	Proposed Action	EPA Proposed Timing	Timing of Proposed Action
				irrespective of the material harm factor.				
EPL #5875	R2.2		NA	Ensure all written incident reports are received by the EPA within the required 7 day limit.	Section 4.18.3	No incidents of environmental harm were recorded during the reporting period (GCC 2021).	Ongoing	Ongoing
EPL #5875	R4.1f)	Criteria for recording fires	NA	Add observations regarding smoke direction and dispersion to report.	Section 4.18.3	Annual Environmental Performance Report not yet available for 2022, but it is understood that there were no fires in this monitoring period	Ongoing	Ongoing
EPL #5875	R4.1g)	Criteria for recording fires	NA	Provide estimate of amount of waste	Section 4.18.3	Annual Environmental Performance	Ongoing	Ongoing

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment/ Action required from previous Annual Review	Where addressed in Annual Review	Proposed Action	EPA Proposed Timing	Timing of Proposed Action
				combusted.		Report not yet available for 2022, but it is understood that there were no fires in this monitoring period		
EPL #5875	R4.2	Criteria for recording fires	NA	Once emergency services are notified and Licensee's response initiated the EPA must be notified of any fire on the premise.	Section 4.18.3	Annual Environmental Performance Report not yet available for 2022, but it is understood that there were no fires in this monitoring period	Ongoing	Ongoing

NA = not available; TBC = to be confirmed

### 1.1.5 Management plans and monitoring programs/ reports

Several management plans have been prepared for the site. These have been prepared in accordance with the conditions of consent and the PA:

- Air Quality Monitoring Program;
- Annual Tharbogang Offset Monitoring 2016, 2017, 2018, 2019, 2020, 2021 and 2022;
- Blast Management Plan;
- Cultural Heritage Management Plan;
- Landfill & Environmental Management Plan;
- Noise & Vibration Monitoring Program;
- Noise Monitoring Report;
- Landscape & Biodiversity Management Plan (LBMP);
- Soil, Water & Leachate Management Plan;
- Transport Management Plan;
- Waste Monitoring Program;
- Waste Screening & Tracking Program; and
- Biodiversity Management Plan (BMP) (awaiting approval).

### 1.1.6 Compliance assessment

Each relevant section is reviewed to determine compliance with the regulatory framework. The categories presented in Table 1-7 have been allocated to the compliance assessment.

This compliance assessment key (Table 1-7) will be used in each 'review' section of Community relations (Section 3), and Environmental Monitoring and Management (Section 4).

Areas of non-compliance (red), and part-compliance (orange) will be assessed with the 'Non-compliance risk status key' (Table 1-4) to determine the order of importance to be addressed. Areas where insufficient information was available (white) be reviewed by Council and areas that are not currently triggered (grey) require no action until relevant works begin. Where data is available it was recommended that it should be reviewed to identify areas of non-compliance or provide the relevant information to enable the assessment of compliance to be revised.

**Table 1-7: Compliance assessment criteria**

Compliance	Colour	Description
Yes	Green	Meets the criteria specified.
Partly	Orange	Some aspects do not meet the relevant criteria and further improvement is needed.
No	Red	Does not meet the criteria specified.
Undermined	White	Unable to determine with current data.

Compliance	Colour	Description
Not Triggered	Grey	Condition not triggered yet as works in this area have not begun

#### 1.1.7 Independent Audit

An independent audit was not undertaken during this reporting period. Council is currently waiting for DPE to approve the following documents before an independent audit can be undertaken:

- Landscape and Biodiversity Management Plan
- Landfill Operational Environmental Management Plan

An independent environmental audit of the TWMC was undertaken by Property Risk Australia in March 2018. An EPA annual report was undertaken in 2019, as well as a compliance audit (EPA 2019).

#### 1.1.8 Incidents during the reporting period

No official cautions, penalty notices or prosecution proceedings occurred during the previous reporting period.

## 2 Landfill and quarry operations

The following section summarises the work completed, data collected during the reporting period and any work planned for the next monitoring period.

### 2.1 Production data

Waste to landfill was 38,504 tonnes in 2022, 33,017 tonnes in 2021, 35,457 tonnes in 2020, 33,235 tonnes in 2019, 29,129 tonnes in 2018, 31,357 tonnes in 2017 and 25,505 tonnes in 2016. Recycled waste is also reported in this manner, which was 472 tonnes in 2021, 671 tonnes in 2020, 752 tonnes in 2019, 797 tonnes in 2018, 303 tonnes in 2017 and 398 tonnes in 2016. Table 2-1 below includes a breakdown of the waste received at TWMC over the past seven years.

**Table 2-1: Waste Received at TWMC (Tonnes)**

Activity	2016	2017	2018	2019	2020	2021	2022
Waste to landfill	25,505	31,357	29,129	33,235	35,457	33,017	38,504
Waste leaving landfill (e.g. steel, tyres, oil, mattress) - recycling	398.3	303.3	797.1	752.4	671.07	472.44	320.48
Gravel	50,361.9	45,942.9	8,360.6	10,923.6	1,359.0	45,765.8	9,552.4
MSW	8,763.8	8,477.6	8,348.7	8,477.2	9,570	9,740.1	11,161.7
C&D	5,284.8	11,446.0	8,124.8	9,355.0	11,814	9,524.3	13,910.7
Green waste	1,016.8	2,621.4	1,344.6	741.7	1,021	3,727.2	1,689.4
C&I	11,456.4	11,614.2	12,655.9	15,403.0	13,073	13,753.0	13,431.6
Clean fill	0.0	631,330.8	29,393.1	36,958.8	28,396	53,662.2	16,861.6

Quarry extraction figures for the past eight years are included below in Table 2-2.

**Table 2-2: Quarry extraction figures**

Year	Extraction Figures
2015	16,665.6
2016	50,361.9
2017	45,942.9
2018	8,360.6
2019	10,923.6
2020	8,914.4
2021	45,765.8
2022	11,598.32

### 2.2 Work completed this reporting year

The following works were completed:

- High Voltage (HV) Extension Design Completed and Approved by Essential Energy;
- New leachate Design completed, waiting for HV Extension to be completed;
- Landfill Access Rd design near completed;
- $\frac{3}{4}$  (of the 2400m of fence) all post were cemented into the ground all the. The rest of the project was completed in January 2023.
- Culvert Crossing provided access to landfill batter
- Trimming of quarry floor commenced April 2022, completed 30/01/2023

## 2.3 Works scheduled

The following works schedule is an estimate only:

- Extension of High-voltage power and relocation of power poles (2023 calendar year)
- Construction of a new Leachate Containment System: Awaiting construction (2022/23 financial year).
- Landfilling within the existing quarry: the floor of the existing quarry is currently being levelled in preparation for the landfill (2021/22 financial year).
- Upgrading the landfill access road design completed, scheduled construction to commence in the 2024 calendar year
- Extending the weighbridge (2022/23 financial year).

## 2.4 Hours of operation

The licenced hours of operation for the TWMC are defined in the PA and EPL. The EPA was contacted to verify the discrepancy between the operation and blasting hours listed in the PA and EPL and it was advised that the EPL conditions would apply.

Currently the landfill operates from 8:00am to 5:00pm 7 days per week. Licenced quarry operations are presented in Table 2-3.

**Table 2-3: Licenced hours of operation as per the EPL**

Activity	Day	Licenced Operating Hours
Landfilling and Quarrying Operations	Monday - Friday	6:00am to 5:30pm
	Saturday, Sunday and Public Holidays	8:00am to 6:30pm
Blasting	Monday - Saturday	9:00am to 5:00pm
	Sundays and Public Holidays	Not permitted

## 2.5 Environmental Performance

Several monitoring programs and management plans have been prepared for the TWMC, see Section 1.1.5.

The EPL requires that the results from any monitoring conducted by this licence, or, a load calculation protocol, be recorded and retained. To minimise environmental harm, a Pollution Incident Management Plan (PIRMP) (GCC 2022) has been prepared for the site. This plan defines what a pollution incident is, the likelihood of occurrence and pre-emptive actions to be taken. Pollution incidents are categorised as either Air, Water, Noise or Land pollution incidents. Previous risk assessments of the likelihood of each pollution incident have been assessed; they concluded that all pollution incident categories have a low likelihood of occurring and are actively regulated by the EPL.

### **2.5.1 Waste**

Waste is managed in accordance with the TWMC Waste Monitoring Program and Waste Screening & Tracking Program.

Waste brought to the landfill site is weighed and checked at the weighbridge by staff. The staff member allocates the waste into a category and directions are provided to the appropriate area to unload the waste. Data regarding the vehicle registration, customer details and destination of the waste (i.e. landfill, recycling, quarry, service vehicles) is entered into a database.

The TWMC does not receive any trackable wastes nor any waste sludges as they are not permitted under their EPL, except for asbestos. Asbestos is received but is only trackable when conveyed across state borders which is unlikely to be brought to TWMC (CPE 2011b/c).

For vehicles taking recovered or processed materials away from the TWMC, the procedure is similar to that used for vehicles entering except when the vehicle is heavier upon exiting. The difference in entry and exit weight is the weight of materials leaving the site. The material type is documented so a record of material movements can be kept. For quarry materials, an invoice is also generated (CPE 2011b).

All weighbridge data is stored in an electronic database. A record of the training provided for all staff and the competencies achieved are kept on their personal file (CPE 2011a).

Results and review of the waste environmental performance is addressed in Section 4.2.

### **2.5.2 Landfill and Operational Environmental Management Plan (LOEMP)**

A Landfill Operational and Environmental Management Plan (LOEMP) has been developed and will be superseding the Landfill and Environmental Management Plan (LEMP) (GCC 1999). This has been developed for TWMC to provide an operational design model to document work practices. This plan sets out work practices and priorities towards achieving environmental goals, compliance with statutory obligations, public safety, waste minimisation, conserving of land resources, provision of a quality service in a cost effective manner, monitoring of operations and impacts upon the environment and progressive site rehabilitation and post closure development. The landfill is intended for the reception and disposal of wastes classified as 'Class 1 Inert Waste' and 'Class 1 Solid Waste'. The LEMP was prepared in 1997 and revised in 1999, and the LOEMP is currently with the DPE for approval.

Results and review of the landfills environmental performance is addressed in Section 4.3.

### **2.5.3 Soil, Water and Leachate Management**

Surface waters from the quarry floor/catchment runoff is diverted to a detention basin to the east of the garbage depot leachate detention basis. A further 3<sup>rd</sup> stormwater siltation basin is located downstream of the quarry and leachate detention basins. The 3<sup>rd</sup> basin is filled infrequently and is usually dry. Surface intercept and diversion berms have been provided to the east of the landfill. Further bunding has also been provided, in conjunction with trenches to the northern alignment of the "old" putrescible pits (trenches) in the western slopes of the Waste Depot. (GCC 1999).



The soil at the site is comprised of colluvial and residual sandy clay. Sandy gravelly clay is specifically found on lower slopes and clayey sandy gravel to sandy gravel on higher ground. The general geological lithology profile of the soil is determined to be weathered conglomerate from 0.5 to 3.0 metres below ground level (mbgl), fresh conglomerate from 3.0 to 6.0 mbgl and siltstone from 6.0 to 30.0 mbgl (Geolyse, 2015).

The geology of the site is Late Devonian in age (Geolyse, 2015). Its geology is primarily comprised of sandstone and siltstone with conglomerate bands (Geolyse, 2015). The two-main near-horizontal stratigraphic sequences at the site are the Mailman Gap Conglomerate member and the underlying Jimberoo Member (Coffey Mining Pty Ltd, 2008). The elevation of the site varies between 120 and 140 m Australian height datum (AHD). Surface elevation of Tharbogang Swamp down slope of the site is approximately 110 m AHD (Geolyse, 2015).

A Soil, Water and Leachate Management Plan (SWLMP) (CPE Associates 2011a) has been prepared to inform the management of surface water, groundwater, leachate, erosion and sedimentation at TWMC. Data is collected at monitoring points upstream of the site, the sediment basin and for the site. Boreholes, leachate ponds and Tharbogang swamp are monitored biannually to identify potential impacts from TWMC activities. The *TWMC Groundwater Annual Environmental Performance Report 2018-19* provides detail regarding the methods used to monitor groundwater (Stygoecologia 2019).

Groundwater monitoring aims to provide long-term data from which accurate interpretation of groundwater levels and water quality can be determined. Activities that may be causing adverse impacts are identified and modified. Groundwater monitoring was undertaken at nine locations. These sites consist of 6 groundwater bores that are distributed at strategic locations around the landfill area and general facility and 3 surface water sites (Stygoecologia 2019). Borehole 2 is dry and no longer requires monitoring. The parameters required to be collected are shown in Table 2-4. Monitoring must be completed in accordance with the approved Methods Publication unless otherwise approved by the EPA.

**Table 2-4: Borehole Pollutants required for analysis by the Environmental Protection Licence (EPL 2015)**

Location	Pollutant	Units of Measures	Frequency
1, 3, 4, 5, 6 & 7	Alkalinity, Ammonia, Calcium, Chloride, Chlorinated volatile compounds, conductivity, Fluoride, Iron, Magnesium, manganese, Nitrate, Potassium, Sodium, Sulphate, Total Phenolics, Total organic carbon, pH	All mgL-1 except conductivity (pSCm-1) and pH (pH).	Bi-annually
Sedimentation Pond (Pt 8)	Alkalinity (as calcium carbonate), Calcium, Chloride, Chlorinated volatile compounds, Conductivity, Fluoride, Iron, Magnesium, Manganese, Nitrate, Potassium, Sodium,	All mgL-1 except conductivity (pSCm-1) and pH (pH).	Bi-annually

Location	Pollutant	Units of Measures	Frequency
	Sulphate, Total Phenolics, Total Organic carbon, Total suspended solids, pH		
Leachate Pond (Pt 9)	Alkalinity (as calcium carbonate), Ammonia, Calcium, Chloride, Chlorinated volatile compounds, Fluoride, Iron, Magnesium, Manganese, Nitrate, Potassium, Sodium, Sulphate, Total Phenolics, Total Organic carbon, Total suspended solids, pH	All mgL <sup>-1</sup> except pH (pH).	Bi-annually

All stormwater at TWMC is contained on site. Surface water impacts include contaminated runoff and an increase in erosion in disturbed areas. There are six sources of water which need to be considered; potable water, surface drainage water, ground water, potentially contaminated stormwater, underdrain water and landfill leachate. Separate storage ponds are required for leachate and quarry/landfill runoff; these are stored in ponds as specified in the EPA guidelines for aqueous liquid treatment ponds. Landfill leachate is isolated from all other sources of runoff and contained to allow the water to evaporate. A leachate pond with a 500 KL capacity has been constructed at TWMC. Under the current landfill expansion, this pond will be expanded to a 620 KL capacity. It will be pumped back to landfill rehabilitation areas where it will be used to irrigate rehabilitated vegetation areas or to the active landfill to promote the bioreactor process. The rehabilitation areas have been designed to ensure that there is no runoff from these areas. This system will promote bioremediation of any pollutants contained in the leachate.

TWMC runoff is captured in sedimentation ponds. The storages have been designed to fully contain runoff from an ARI 1:100 year, 72 hour storm. There are three ponds on site. A sediment pond with a current capacity of 0.8 ML and two stormwater detention ponds, with a capacity of 7.0 ML and 7.8 ML. These are proposed to undergo further expansion.

Results and review of the surface water, groundwater and leachate environmental performance is addressed in Sections 4.5, 4.6 and 4.7.

## 2.5.4 Meteorological Monitoring

Meteorological monitoring is collected by the meteorological station at Griffith Water Reclamation Plant. Use of this station was approved by DPE & EPA in September 2011 as it complied with the requirements of the PA being in the vicinity of the TWMC. The station monitors rainfall, wind speed and wind direction in accordance with the *Approved Methods for Sampling of Air Pollutants in New South Wales guidelines*.

The mean annual rainfall for the Griffith region is 406.7 mm (BOM 2023). The annual mean daily evaporation is recorded at 4.8 mm. (Site name: Griffith CSIRO. Site number: 075028) (BOM 2023). Mean

monthly rainfall across 2022 varies between 28.1 mm (February) and 40.8 mm (October). Mean monthly average air temperature varies between 8.1 °C (July), and 24.7 °C (January).

Results and review of the meteorological environmental performance is addressed in Section 4.8.

### 2.5.5 Biodiversity

The biodiversity offset requirements for the PA are addressed in the Landscape and Biodiversity Management Plan (ELA 2011).

Annual offset monitoring has been completed by Ecoplaning for the 2017, 2018, 2019, 2020, 2021 and 2022 monitoring periods. Monitoring of the offset site complied with the Conservation Agreement.

Quarterly inspections are conducted in accordance with the Conservation Agreement and inform ongoing site management of the biodiversity offset area. Annual biodiversity monitoring and quarterly inspections are combined in an annual report.

Results and review of the biodiversity environmental performance is addressed in Section 4.4.

### 2.5.6 Noise and Vibration

Noise and vibration impacts and exceedances relate to blasting activities and operation of the quarry plant (Balance 2009). Noise criteria is provided by the NSW Government which includes the *Industrial Noise Policy 2000* (INP), the ANZECC guidelines (2000) and the *Environmental Criteria for Road Traffic Noise for on-road traffic noise* (NSW EPA 1999).

A Noise Impact Statement was completed by Noise and Sound Services (2008). A Noise and Vibration Monitoring Plan (NVMP) was prepared by GHD in 2013 and five noise monitoring locations identified. Monitoring of vibration and airblast overpressure is to be undertaken for the first three blasts undertaken on site and annual blast monitoring. Attended vibration monitoring is not required but will be undertaken subject to any vibration related complaints.

Noise monitoring of Tharbogang Quarry Operations was undertaken by GHD in 2022 using six sensitive receivers in close proximity to quarry operations. The monitoring locations (Residential and Quarry), were the same as 2021, however, it should be noted that, "Quarry Location 1" was named as "Quarry Location 2" in 2021, whilst "Quarry Location 2" was named as "Quarry Location 1" in 2021. Monitoring locations can be seen in Figure 2-1. Monitoring was conducted during operating hours on the 29<sup>th</sup> and 30<sup>th</sup> November 2022. The landfill site and quarry were in operation during the time of the monitoring (GHD 2022).

The results and a review of the noise monitoring program conducted during the reporting period are presented in Section 4.9.



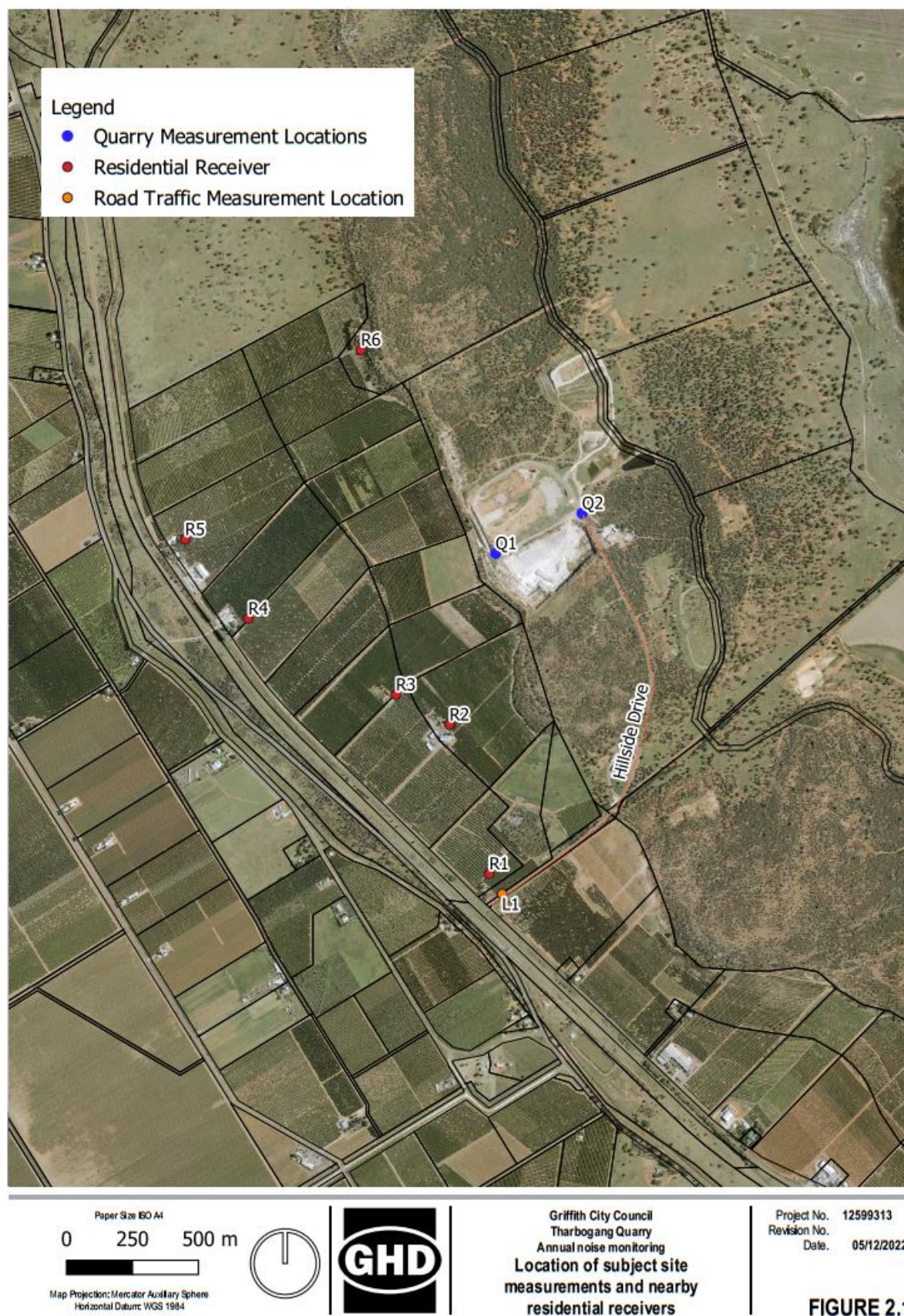


Figure 2-1: Location of noise sensitive receivers (monitoring locations) (GHD 2022)

### 2.5.7 Blasting

All blasting operations are monitored through both overpressure and ground vibrations at the closest residents to the quarry. Monitoring of these metrics is required for every blast in accordance with EPL requirements. Operations regarding blasting are outlined in the *Blasting Management Plan* (GCC n.d.), required under Section 37 (Schedule 3) of the Project Approval. A copy of the following information, relating to blasting is kept in Griffith City Council's Document Management System:

- Explosive inventory worksheet,
- Blast Pre Check,
- Toolbox Talk
- Dangerous Good Shipping Documents,
- Blast Monitor results,
- Photo of Monitor,
- Notice of Blast,
- Orica Delivery Docket,
- Blast Pattern.

The frequency of blasting is to be approximately once per month. In accordance with the EPL, blasting can be undertaken between 9:00 and 17:00 Monday to Saturday and is not permitted on Sunday or Public Holidays.

### 2.5.8 Air Quality- Dust and Odour

Quarrying and landfilling may generate dust and odour. Dust baseline surveys were carried out in June 2007 (Coffey Geotechnics 2007) to determine background dust levels and comprised four sampling events over approximately one month at one site. Air quality monitoring locations are shown in Figure 4-39. Air quality monitoring has been undertaken monthly from September 2018.

#### 2.5.8.1 Dust

Based on the sampling carried out at TWMC and surrounding area in 2007, all recorded dust levels were below the EPA goal (4 g/m<sup>2</sup>/month) (Balance 2009: p103-104, Table 7.9 & Figure 5.4).

A dust suppression system has been installed at the quarry and has been operational since early 2013. Additional dust abatement is undertaken by a Council water cart.

In early 2015 Council established two 22,000 L water tanks (along with water refilling capabilities) that were put in strategic locations around the landfill site so that water carts and other water dependent vehicles do not have far to travel to refill.

The pump that services the water tanks and dust suppression in the quarry was replaced in late 2017.

To further minimise dust, operations cease when weather conditions are not favourable. This includes periods of high winds and low visibility.

In January 2018, 500 m of previously gravelled road was sealed. This newly sealed section is the access road to the current landfill. There is now a total of 1.8 kms of sealed internal roads on site at TWMC.

New air quality monitoring locations have been established and monitoring commenced at the locations shown in Figure 4-39 in 2018.



Dust gauges measure the level of particulate matter in the ambient air. The NSW EPA Air quality guidelines are 4g/m<sup>2</sup>/month. Weather conditions during monitoring periods are also recorded. Sampling is to be undertaken in accordance with *AS3580.10.1 - Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric method* (2003). Analysis of samples is typically completed by ALS, a NATA accredited laboratory as per *Australian Standard AS3580.10.1*.

In 2019, a designated water tanker with a 15,000 L capacity was purchased, the plant items has both firefighting and dust suppression capabilities.

#### **2.5.8.2 Odour**

An odour impact assessment was completed by in 2007 (The Odour Unit 2007). This report found that the proposed expansion should have no adverse odour impacts from the expansion of the landfill.

Air Quality monitoring results are available in Section 4.11 and Section 4.12.

#### **2.5.9 Rehabilitation and Landscape Management**

Rehabilitation and Landscape management primarily refers to the rehabilitation of a landfill site once it has reached capacity and the landscaping required as part of the rehabilitation process. Currently, no rehabilitation of landfill areas is being undertaken. Once completed the rehabilitation areas will be designed to ensure that there is no runoff from these areas. Other landscape management in the form of weed removal has been undertaken in this reporting period (information supplied by Griffith City Council). This is covered in more detail within the biodiversity management section of this report.

Rehabilitation and landscape management results are available in Section 4.14.

#### **2.5.10 Heritage**

A survey for Aboriginal Heritage Cultural Material was undertaken on 25-26 July 2007 by Griffith Local Aboriginal Land Council (LALC) (Balance 2009: Appendix F). Further assessment was undertaken in May 2013, for the preparation and implementation of the *Cultural Heritage Management Plan* (Black Mountain Projects 2013). No known items of Aboriginal Heritage have previously been identified within the current or proposed development area onsite. However, one scarred tree occurs outside the proposed expansion area. In the event of any Aboriginal artefacts becoming uncovered, all work must cease, and the Griffith LALC and National Parks and Wildlife Service must be contacted.

Heritage monitoring results are available in Section 4.15.

#### **2.5.11 Traffic and Transport**

Council has advised that daily traffic and road inspections began in 2021. Noise criteria for traffic movement is provided by the NSW EPA (1999) and a Traffic Impact Assessment undertaken by GHD in 2007. This assessment concluded that the existing road network is adequate to meet the current and future needs of the site. On site, access ways are always to be kept clear and unrestricted. Further, only authorised personnel are permitted to enter and move around the centre site. Overall, it was determined that there are likely to be no impacts to the road network or road users anticipated from the project expansion.

Traffic and transport results are available in Section 4.16.

### **2.5.12 Incident Management and Response**

Emergency responses are undertaken in accordance with the Council's 'procedure for incident management'. Incidents and accidents, including near misses which involve equipment, vehicles or materials are required to be reported to the supervisor immediately. A formal investigation and reporting of all incidents and accidents must be carried out as soon as possible.

The Pollution Incident Response Management Plan (PIRMP) (GCC 2022) prepared for TWMC provides guidelines that meet the requirement of the POEO Act and the procedures to be followed in the event of a pollution incident.

Fire breaks are maintained by landfill operation staff with landfill plant. If a fire starts in a landfill cell the burning waste will be separated with landfill plant. The water cart will be brought in and used to extinguish the fire. The landfill has on site a 5,000 L water cart that has a hydraulic pump/spray unit. The landfill operations staff can also call on the Rural Fire Service and other council plant available, if required. The Rural Fire Service responds to any landfill fires and other council departments provide resources when required.

There were no fire incidents over the reporting period. An assessment of the relevant criteria, the monitoring results and a compliance assessment are presented in Section 4.18.



### 3 Community Relations

This section of the AEMR summaries community relations during the reporting year and, where applicable, provides comparison to previous years. There are five adjoining landholders around the quarry. The adjoining land to the east, north and north-west is owned by Council. Community relations are addressed in the PA, EPL and the EA.

The PA specifies several conditions regarding community relations for the site. Notification must be made to affected landholders and tenants if any impacts are generated which are greater than the relevant criteria (Condition 1, Schedule 4). During this period, quarterly results shall be provided to the landholders and tenants until compliance is reached. Further, a community education program must be prepared and implemented (Condition 10, schedule 4).

The EPL prescribes criteria for recording of pollution complaints (Condition M4) as well as for the operation of a telephone complaints line (M5). Under the EPL, a legible record of all complaints made in relation to pollution arising from any activity which is covered by the EPL.

Complaint records must be kept for a minimum of 4 years and provided upon request to any EPA officer. Additionally, a telephone complaints line must be operated during operating hours for the purpose of receiving any complaints from members of the public regarding activities conducted at the premises, by vehicles or from the mobile plant. The number must be made available to the public.

The EA recommended that ongoing and inclusive consultation with nearby landholders (A) is maintained, and that all community concerns are responded to and recorded on a complaints register (B).

#### 3.1 Complaints received this reporting year

No complaints were received during 2022 annual reporting period. The Customer Service Call Centre is used as a telephone complaints line and all complaints are recorded on Council's Complaint Management System.

#### 3.2 Comparison to previous year

No complaints were received during the 2017, 2018, 2019, 2020, 2021 or 2022 annual reporting period.

#### 3.3 Community Involvement

No community involvement occurred during 2022 annual monitoring period.

#### 3.4 Review

A compliance assessment has been undertaken to determine how the relevant criteria has been implemented at TWMC (Table 3-1). Further information is required to adequately assess the compliance in some cases.

**Table 3-1: Community relations compliance assessment.**

Condition	Review
Project Approval	

Condition	Review
Condition 1, Schedule 4	No notification was required as no impacts occurred which were greater than the specified criteria.
Condition 10, Schedule 5	A community program was not implemented for this monitoring period.
<b>EPL</b>	
M4	No complaints were received within the reporting period. A 'Received Request Statistics' (i.e. complaints log) has been kept from July 2010 to current.
M5	No telephone complaints were received during the reporting period. All complaints are recorded on Councils Complaint Management System.
<b>EA</b>	
A	No blasts occurred during this monitoring period.
B	No complaints have been received for the monitoring period.

## 4 Environmental Monitoring and Management

This section summarises and reviews the environmental monitoring data obtained over the monitoring period (1 January 2022 to 31 December 2022 unless otherwise specified). Any trends in the monitoring results occurring over the life of the project are identified. These results are analysed against relevant impact assessment criteria, previous results and predictions in the EA. Green in each compliance assessment table in the sections below indicates compliance, orange partial compliance, red non-compliance, grey condition not triggered at this stage and white insufficient data to confirm compliance.

### 4.1 Operations

Operations refers to the general day to day work completed at the site that are not specific to any other category

#### 4.1.1 Monitoring

The following conditions are specified in the relevant legislation which relate to the general operation of Tharbogang Waste Management Centre.

Under the project approval:

- Current operations may be undertaken until the 31 December 2035 (Condition 7, Schedule 2).
- In a calendar year, no more than 315,000 tonnes of material shall be extracted from the quarry site (Condition 8, Schedule 2).
- All equipment owned and operated by the site must be maintained and operated correctly (Condition 12, Schedule 2).
- The area surrounding the landfill site is to be kept secure and locked when unattended (Condition 8, Schedule 3).
- The quarry and landfill must only operate within the specific hours listed by the project approval and EPL (Condition 29, Schedule 3).
- Annual production data must be recorded using the standard form for that purpose and included in this AEMR (Criteria 61, Schedule 3).
- All strategies/plans/programs, completed audits, AEMRs and other relevant documents must be provided to the relevant agencies and copies made publicly available on the website and physical copies at the site (Condition 8, Schedule 5).
- A summary of monitoring results must be made publicly available on the website which must be regularly updated (Condition 9, Schedule 5).

Criteria regarding the operation of the site is also specified within the EPL:

- Hours of operation (L5),
- All activities must be undertaken in a competent manner (O1),
- All equipment must be maintained in a proper and efficient condition and manner (O2)
- The licensee must take all practicable steps to control entry to the premises (O5.2),
- The licensee must install and maintain a stockproof perimeter fence around the premises (O5.4),
- The licensee must install and maintain a high wire mesh fence of not less than 1.8 metres around the active tipping area (O5.5)

- The licensee must install and maintain lockable security gates at all access and departure locations (O5.6),
- The licensee must ensure that all gates are locked whenever the landfill is unattended (O5.7), Staff training requirements (O5.10), and
- The criteria for the record keeping of monitoring data (M1).

#### Environmental Assessment (EA):

- Visual inspections of engineering works on a daily basis (A),
- Install operational backflow device on potable water (B),
- Identify, map and colour code all pipelines (C),
- Conduct site inductions and periodic refresher training for all employees, contractors and transport contractors (D), and
- Operator to maintain a logbook of extraction quantities (E).

### 4.1.2 Results

Quarry extraction quantities have been provided for the past four years and are shown in Table 2-2.

All equipment owned and operated on site is inspected daily by operation staff. Maintenance is also carried out by Council Workshop staff, when appropriate to do so.

If a breakdown occurs, then council workshop staff are called. Workshop staff will then decide if the factory service mechanics will be called to assist in rectifying the breakdown.

The landfill site currently operates from 8.00am - 5.00pm (7 days/week).

Council has advised that staff have appropriate licences, permits and signed log books. Council's Human Resources department monitor and implement training as required.

### 4.1.3 Review

The compliance of the site with regards to operations is presented in Table 4-1, below.

**Table 4-1: Operations compliance assessment**

Condition	Review
<b>Project Approval</b>	
Condition 7, schedule 2	Current operations are within the 2035 requirements.
Criteria 12, Schedule 2	Equipment is inspected daily and maintenance carried out by staff.
Condition 8, Schedule 3	All outer access gates to the Waste Management Site have padlocks on them (GCC 2020a).
Condition 29, Schedule 3	Site operates within specified hours.
Condition 61, Schedule 3	Production data is included in Section 2.1 of this report
Condition 8, Schedule 5	The following plans are provided on the council website: <ul style="list-style-type: none"> <li>• Waste Monitoring Program</li> <li>• Waste Screening &amp; Tracking Program</li> <li>• Landfill &amp; Environmental Management Plan</li> </ul>

Condition	Review
	<ul style="list-style-type: none"> <li>• Soil, Water &amp; Leachate Management Plan</li> <li>• Noise &amp; Vibration Monitoring Program</li> <li>• Air Quality Monitoring Program</li> <li>• Transport Management Plan</li> <li>• Cultural Heritage Management Plan</li> <li>• Landscape &amp; Biodiversity Plan</li> <li>• Blast Management Plan</li> <li>• Pest Animal Control Plan</li> <li>• Weed Control Plan</li> <li>• Pollution Incident Response Management Plan</li> <li>• Pre-Incident Plan (Fire) - PIP</li> </ul> <p>The following plans are not provided on the website:</p> <ul style="list-style-type: none"> <li>• Compliance Audit (EPA 2019)</li> <li>• Independent Environmental Audit (Property Risk Australia 2018)</li> <li>• Conservation Agreement</li> </ul>
Condition 9, Schedule 5	<p>The following results are provided on the council website:</p> <p>As well as the following results and reports:</p> <ul style="list-style-type: none"> <li>• Annual Offset Monitoring (Reports for years 2017 – 2022)</li> <li>• Annual Environmental Management Report (AEMR) (Reports for years 2017 – 2021)</li> <li>• Noise Monitoring Report (Reports for years 2018 - 2022)</li> <li>• EPA Annual Return (Reports for years 2016/17 – 2021/22)</li> <li>• Air Quality Monitoring Analysis Results (Reports for years 2018/19 – 2022/23)</li> <li>• Groundwater Results (Reports for years 2015/16 – 2022/23)</li> </ul>
<b>EPL</b>	
L5	Site operates within specified hours.
O1	All practicable steps appear to be in place to ensure all activities are undertaken in a competent manner.
O2	<p>The EPA audit states that some plant and equipment was not maintained in a proper and efficient condition and was not operated in a proper and efficient manner.</p> <p>Staff undertake daily 'plant assessor' checks for all the plant on site. These are carried out on an iPad and are sent automatically to the workshop for action if required.</p>

Condition	Review
O5.3	All practicable steps to control entry into the site have been taken. All outer access gates to the Waste Management Site have pad locks on them (GCC 2020a).
O5.4	The perimeter fence line is kept in a serviceable condition (GCC 2021) and Council has advised that daily inspections began in 2021.
O5.5	The 1.8 m high mesh fence around the active tipping area was completed in January 2023.
O5.6	Lockable gates have been installed at all access points. All outer access gates are secured and maintained, there is a CCTV system at the Waste Transfer Station, Front Gate and the Weighbridge which is all integrated to a central server (GCC 2021).
O5.7	Gates are locked when landfill is unattended. The Waste Management Site is secured by the last employee to leave every afternoon.
O5.10	A record of the training provided for all staff and the competencies achieved are kept on their personal file (CPE 2011a). Staff have appropriate licences, permits and signed log books. Council's Human Resources department monitor and implement training as required (GCC 2021).
M1	Monitoring data has been recorded following the correct protocol set out in this condition.
M3	Field calibration reports from Envirodata have been provided demonstrating compliance with approved methods.
<b>EA</b> <b>(See section 4.1.1 for description of 'condition')</b>	
A	Council has advised that daily inspections of erosion and sediment controls began in 2021.
B	Council's Water and Sewer Department has confirmed that there is a back flow prevention device on the potable water supply.
C	Water, sewer and electrical lines are easily identifiable onsite, and Council has mapped the location of these within their GIS mapping.
D	Council provided the Waste Departments WHS records which includes details of all those inducted and other training and the date of completion.

Condition	Review
E	<p>The “plant assessor” app has replaced log books. This app is used before and after the operation of plant equipment and data is automatically sent to the workshop.</p> <p>All gravel that leaves the quarry goes over the weighbridge which is where the information for the extractive record is kept.</p>
<b>Not Triggered</b>	
Condition 8, Schedule 2	No information regarding extraction quantities has been provided as this condition has not yet been triggered. The PA only applies to pits 101 and 103 in which quarrying has not commenced.
O5.5	Landfilling activities within the existing quarry have not commenced and therefore, this requirement has not yet been triggered.

## 4.2 Waste

### 4.2.1 Monitoring and Management Criteria

Waste criteria is provided by the PA, EPL and EA. Under the PA, all waste outputs generated by the site should be disposed of at a suitably licenced facility (Condition 2, Schedule 3). The waste generated during the construction process must be classified and disposed of accordingly (Condition 3, Schedule 3). No more than 35,000 tonnes of general soil waste must be received over a calendar year (Condition 8, Schedule 2). Further, suitable procedures should be in place to ensure that the site does not accept prohibited waste. Staff should keep appropriate documentation of waste and receive adequate training to recognise and handle hazardous or unapproved waste (Condition 4, Schedule 3).

Only waste authorised under the EPL shall be received by the site (L2.1), which must not exceed 100,000 tonnes per year (L2.2). The EPL also includes specific criteria for the disposal of tyres (L2.3 and L2.4), that a litter management program is implemented (O5.8) and criteria for the screening, disposal, burning and covering of waste (O6.6, O6.7, O6.8, O6.9, O6.13 - O6.15). Biosolids and green waste must be stored on an impermeable pad with a bunded area capable of capturing all leachate in accordance with the EPL performance conditions (O6.16 - O6.17).

Waste minimisation has been assessed by the EA, which provided the following mitigation and management commitments:

- Construct a waste transfer station (A),
- Re-direct recyclables for processing (B),
- Record the waste stream and amount received, recovered, recycled and disposed of in landfill (C),
- Implement procedures for refusing prohibited wastes (D),
- Construct defined asbestos disposal zone (E),
- Street sweeper waste to be stockpiled with green waste (F),
- Monitor and manage waste prior to disposal into landfill cell and implement other measures outlined in Table 7.13 of the EA (G), and



- Operator to maintain a logbook of waste deliveries (H).

#### 4.2.2 Results

The waste transfer station was officially opened August 2016. Two waste management programs have been developed for the site. These plans dictate how waste should be monitored with the *Waste Monitoring Program* (CPE Associates 2011b) and how the screening of waste should be undertaken with the *Waste Screening Procedures* (CPE Associates 2011c). An Asbestos Procedure (WM-PR- 013) has also been prepared that outlines the procedure for accepting and managing asbestos on site (Appendix B, GCC 2018).

Waste data has been provided for calendar years. The results for the past seven years are presented in Table 4-2. Current waste compaction is estimated to be at 630 kgm<sup>-3</sup> and is compacted using the 26 tonne Tana Compactor (EPA 2019).

**Table 4-2: Waste monitoring results**

Year- EPA reporting period	Waste to landfill (Tonnes)	Waste Recycled (Tonnes)
2022	38,504	320
2021	33,017	472
2020*	35,478	671
2019	33,235	752
2018	29,129	797
2017	31,538	303
2016	25,505	398

\*= reporting period 11 September 2019 – 10 September 2020

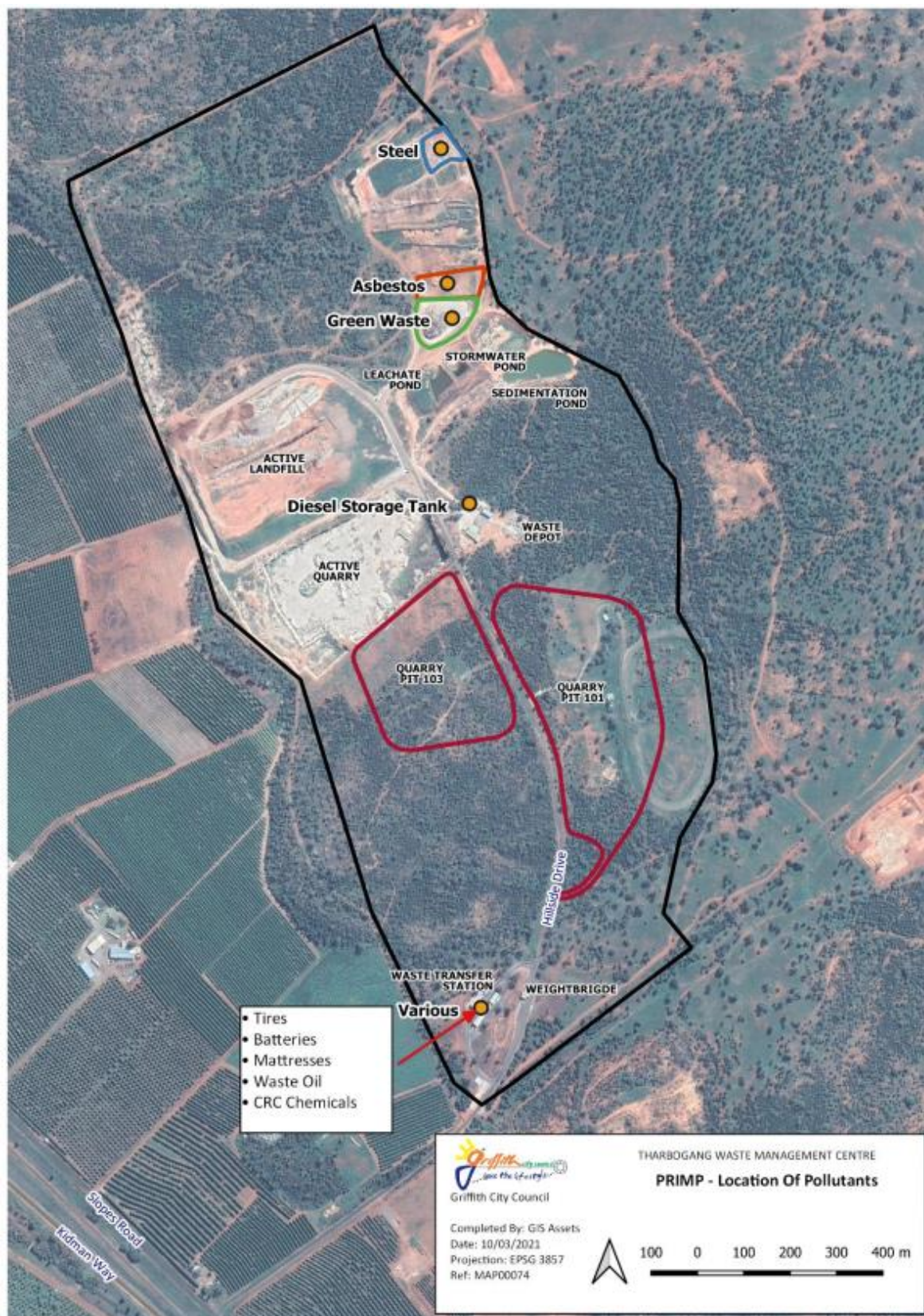


Figure 4-1: Location of Pollutants/ Waste Materials

### 4.2.3 Review

An assessment of the monitoring results against the regulatory framework is presented in Table 4-3. Construction of the waste transfer station was completed in August 2016. However, the remaining waste criteria specified within the PA, EPL and EA was unable to be assessed as no records have been provided. The location for disposal and storage of pollutants / waste is shown in Figure 4-1.

**Table 4-3: Waste Compliance Assessment**

Condition	Review
<b>Project Approval</b>	
Condition 2, Schedule 3	<p>The EPL for the facilities where products from TWMC get recycled include:</p> <ul style="list-style-type: none"> <li>• Mattress and Tyre Recycling: Transport Licence - 20568; Cootamundra Depo Licence (where our product goes) - 21294</li> <li>• Batteries Recycling - EPA Licence - 20006</li> <li>• Waste Oil (motor) - Transport Licence 7100; Facility Licence 854</li> <li>• Ewaste - EPA Licence 20661</li> <li>• MGB - EPA Licence – 20661</li> <li>• Steel - Victorian EPA Licence - 1451</li> </ul>
Condition 3, Schedule 3	<p>The waste generated during the construction process is classified and disposed of accordingly. This is included in the amounts shown in the 'Full Weighbridge Data Calendar Year' spreadsheet provided by Council.</p>
Condition 4, Schedule 3	<p>Two large signs are installed at the weighbridge on of which outlines what can be dumped at the TWMC and the Waste Screening Procedures document outlines measures to screen waste loads within the weighbridge and WTS.</p> <p>A training log for all staff was provided by Council.</p> <p>Council has advised that all staff have undergone the following training:</p> <ul style="list-style-type: none"> <li>• Asbestos</li> <li>• DrumMuster</li> <li>• Community Recycling Centre</li> </ul> <p>These all assist with identifying waste or products that are not allowed to be disposed of on site. Evidence of the training is in the Waste Department WHS records provided by Council.</p>
<b>EPL</b>	
L2.1	<p>Only waste permitted under this section of the licence is to be accepted on site and there are signs regarding this at the weighbridge.</p> <p>136.96 tonnes of "Drilling/Suction Sludge" is listed as received in this monitoring period, however, receipt of waste sludges are not permitted under the licence (CPE 2011c).</p>
L2.2	<p>The full weighbridge data provided shows that the annual total waste did not exceed 100,000 tonnes per year.</p>
L2.3 and 2.4	<p>Prior to 2018, recycling of tyres was an ad hoc management. However, all tyres disposed of on site have been recycled since 2018.</p>



Condition	Review
O5.8	Litter on site is collected by staff. There is no specific Litter Management Program.
O6.6	Procedures are in place to prevent and screen for waste not permitted on site. When waste is brought to the landfill, loads are checked at the weighbridge by the weighbridge staff. Which waste category the load fall in is determined by the weighbridge operator, the public is then directed to the appropriate areas to unload waste (GCC 2021).
O6.7	Current waste compaction is estimated to be at $630 \text{ kgm}^{-3}$ and is compacted using the 26 tonne Tana Compactor. This is less than the $650 \text{ kgm}^{-3}$ rate required. With the purchase of the new compactor, it is thought that greater compaction is being achieved but not known.
O6.8	Compaction rate of landfill waste (excluding cover material) is unknown.
O6.9	A filling plan has been designed and has been submitted to the local EPA office.
O6.13 - O6.15	<p>The EPA annual return report states that burning of green waste has not occurred for some time and is used for mulch.</p> <p>The EPA audit (2019) states that the stockpile is greater than 20 m diameter and therefore, burning would be non-compliant as it exceeds the allowed 10 m diameter (condition O6.13). Green waste is instead shredded and stockpiled north of the asbestos landfill area.</p> <p>The full area of waste is not covered daily but is compacted at the end of each day. Council progressively covers waste maintaining minimum area exposed to <math>1,000 \text{ m}^2</math> to <math>2,000 \text{ m}^2</math>. Council states that the system still appears to meet the goals of preventing fires in the waste, controlling vermin and achieving good compaction.</p> <p>On 9 December 2020 Council obtained approval from the EPA to compact waste in accordance with O6.7 given the difficulty in sourcing clean fill to cover the landfilled waste daily.</p>
O6.16 - O6.17	<p>The majority of biosolids are disposed of directly into landfill, however, biosolids not placed in landfill are spread on a gravel pad to dry. Once sufficiently dried they are transported into landfill.</p> <p>The EPA audit (2019) states that neither the green waste nor the biosolids are stored on an impermeable bunded area. The green waste and biosolids waste pads must be impermeable to that required and have a thickness of not less than 600mm.</p> <p>The Green waste pad construction was concluded on the 24/2/20 and has been in use ever since (GCC 2020a).</p> <p>The green waste pad includes a bunded area capable of capturing all leachate in accordance with the EPL performance conditions.</p> <p>A biosolids pad has been designed, however, building will not commence until suitable material has been sourced.</p>
EA	
(See section 4.2.1 for description of 'condition')	

Condition	Review
A	Waste transfer station has been completed.
B	The waste monitoring results provided indicates that waste is being redirected for recycling. Backflow prevention devices are installed on potable water supply lines and it is a Council policy to do so.
C	The waste stream and amount received, recovered, recycled and disposed of in landfill is recorded on a spreadsheet for each year and includes data from 2009 - 2022.
D	Procedures for refusing prohibited waste include a waste transfer station and inspections of waste entering the site.
E	Asbestos is currently accepted on site, however, loads have to comply with restrictions, set out in Appendix B (Balance 2009). Asbestos is buried on site separately from other waste north of the leachate and sedimentation ponds.
F	Due to the street sweeper waste being wet, it is disposed of down the side of the landfill or on a cell wall.
G	Procedures for refusing prohibited waste include a waste transfer station and inspections of waste entering the site.  Two large signs are installed at the weighbridge on of which outlines what can be dumped at the TWMC and the Waste Screening Procedures document outlines measures to screen waste loads within the weighbridge and WTS.
H	All logbooks are taken to the workshops to enable data to be entered into specific software.

## 4.3 Landfilling

### 4.3.1 Monitoring and Management Criteria

Landfilling criteria is specified within the relevant legislation.

Within the PA (Condition 7, Schedule 3), the site manager is required to:

- Minimise the exposed and active tip face at the landfill,
- Progressively revegetate all completed areas of the landfill and stabilise any exposed areas that are not required for operational purposes for a period greater than 90 days,
- Minimise the tracking of mud and water from the site on public roads,
- Fill the landfill cells in a systematic manner,
- Maximise landfill compaction rates,
- Cover the active area with at least 0.15 m of soil (or a suitable alternative material, as approved by DECCW) at the end of daily waste disposal and compaction activities,
- Progressively cap the landfill cells with the approved capping layer, which shall comprise (from top to bottom):
  - 0.15 m of topsoil,
  - A 0.85 m thick layer of uncompacted soil,
  - A sealing layer, comprising compacted clay at least 0.5 m thick and have permeability less than  $k = 10^{-8} \text{ ms}^{-1}$ , and
  - A seal bearing layer, comprising 0.3 m thick layer of compact, and
- Revegetate the covered landfill cells following the capping of each cell once they reach their final design height, and
- Establish and maintain a landfill incident response register and assessment of potential risks.

The PA also requires that the existing *Landfill Environmental Management Plan* be updated (Condition 13, schedule 3). It also specifies that all composting should be undertaken in accordance with *AS 4454-2003* (Condition 11, Schedule 3).

Additionally, the EPL requires that the disposal of waste is managed in accordance with the progressive filling plan are outlined in the LEMP (1997) (O6.9), that completed landfill cells follow the prescribed requirements (O6.10 and O6.11) and the criteria for the covering of waste (O6.14 and O6.15). The EPL also requires that the remaining disposal capacity of the landfill be monitored (M6).

The revised EA's mitigation and management commitments relating to landfilling are as follows:

- Cap and rehabilitate the landfill on completion (A)
- Construct appropriately engineered landfill cells lined within impermeable liner and a drainage layer (B),
- Establish and maintain a landfill incident response register and assessment of potential risks (C), and
- Install leachate collection system for landfill cells (to protect Groundwater Dependent Ecosystems) (D)

### 4.3.2 Results

The information provided in Table 4-4 outlines the landfill progress to date. A number of management actions are ongoing or partially complete at this stage.

### 4.3.3 Review

An assessment of the monitoring results against the regulatory framework is presented in Table 4-4. The *Landfill Environmental Management Plan* was most recently updated in March 1999. Under the PA, an additional update to this plan is required, which has not been completed. No information regarding composting of waste is provided, nor is there information regarding landfill design.

No indication of the remaining disposal capacity of the landfill has been provided for this reporting period. The EPA audit states that the licensee must cover all exposed waste at end of day with VENM or other EPA approved alternative, to depth required (NSW EPA 2016). This includes landfill and animal pits. Green waste is not an appropriate cover material. Further, the licensee must also ensure that asbestos disposed of on site is immediately and properly covered with VENM (EPA 2019).

**Table 4-4: Landfilling compliance assessment**

Condition	Review
<b>Project Approval</b>	
Condition 7, Schedule 3	<ul style="list-style-type: none"> <li>There is only one active cell at this time. Given the landfill is not at its completion height, only the outer sides can be rehabilitated at this stage and this is done through capping and spreading of mulched Green Waste.</li> <li>Council has engaged Talis Consultants to work on a Closure and Rehabilitation Plan for the existing landfill. The plan covers the works required for revegetation of the site and was approved on 1 December 2020.</li> <li>80% of the access road into the active cells is sealed. Further road sealing will occur next financial year (21/22).</li> <li>No mud leaves the site.</li> <li>Cells are filled in a systematic manner - once a cell is filled, the next cell is used. It is always covered.</li> <li>The full waste area is not covered daily, however, it is compacted at the end of each day. Council progressively covers waste maintaining minimum area exposed to 1,000 m<sup>2</sup> to 2,000 m<sup>2</sup>. The system still appears to meet the goals of preventing fires in the waste, controlling vermin and achieving good compaction (GCC 2020a).</li> <li>On 9 December 2020 Council obtained approval from the EPA to compact waste in accordance with O6.7 given the difficulty in sourcing clean fill to cover the landfilled waste daily.</li> <li>There is a register for all incident reports. This is championed by the WH&amp;S team.</li> </ul>
Condition 11, Schedule 3	Composting is not undertaken on site. All green waste is mulched and stockpiled north of the asbestos landfill area for cover use.
Condition 13, Schedule 3	The LEMP was most recently updated in March 1999 (Barton 1999), however, an LOEMP has been developed and will supersede the LEMP. The LOEMP is currently with the DPE for approval.
<b>EPL</b>	

Condition	Review
O6.9, O6.10 and 6.11	A filling plan has been designed and has been submitted to the local EPA office.
O6.14 and O6.15	<p>The full landfill area is not covered daily, however, it is compacted at the end of each day. Council progressively covers waste maintaining minimum area exposed to 1,000 m<sup>2</sup> to 2,000 m<sup>2</sup>. The system still appears to meet the goals of preventing fires in the waste, controlling vermin and achieving good compaction (GCC 2020a).</p> <p>On 9 December 2020 Council obtained approval from the EPA to compact waste in accordance with O6.7 given the difficulty in sourcing clean fill to cover the landfilled waste daily. Therefore, compliance was achieved from 2021.</p> <p>It is unknown if the minimum compaction rate is being achieved.</p>
M6	<p>Surveys are carried out regularly on the current landfill which provides information of the remaining air space of the landfill.</p> <p>Air Quality Monitoring is carried out monthly at four sites across Tharbogang Waste Management Centre.</p> <p>The EPA annual return states that surveys are carried out regularly on the current landfill which provides information of the remaining air space of the landfill.</p>
<b>EA</b> (See section 4.3.1 for description of 'condition')	
B	The new landfill has been constructed. A Landfill Void Detailed Design has been provided by Council.
D	<p>A leachate collection system and holding ponds have been developed for the existing Landfill. The leachate ponds have been 'roughed out' and they will be formalised and engineered when the new Landfill development occurs. Leachate currently remains diverted solely to existing leachate ponds.</p> <p>All leachate is kept on site and evaporated. There has been no leachate disposed of. What leachate is generated, is contained and natural evaporation takes place (GCC 2020a).</p> <p>The collection of leachate running off the landfill cell and leaching out of the cell front collects in the leachate overflow pond to the east of the landfill before being pumped to the leachate pond further to the east. Due to the high evaporation rate and drought conditions, there is little to no leachate collected at this time and leachate that does enter the leachate pond is left to evaporate.</p> <p>The leachate capture system has undergone a full redesign process. The designs are complete, and council is waiting for the HV Extension to be completed before beginning construction.</p>
<b>Not Triggered</b>	
A	Not triggered: Landfill cells are not completed and do not require rehabilitation.



Condition	Review
C	Not triggered. Council must prepare this prior to undertaking landfilling activities within the existing quarry.

## 4.4 Biodiversity

### 4.4.1 Monitoring and Management Criteria

Biodiversity criteria is provided by the PA, EPL and EA.

Under the PA:

- Pests, vermin and noxious weeds found on site must be managed and regular inspection undertaken for their presence (Condition 10, Schedule 3).
- The offset requirements specified in Table 4-5 must be implemented (Condition 45, Schedule 3).
- The Proponent shall revise the Biodiversity Offset Strategy outlined in the response to submissions (dated Feb 2010) within 3 months of the date of approval, in consultation with DECCW, aiming to (Condition 46, Schedule 3):
  - Ensure that adequate resources are dedicated towards the implementation of the strategy,
  - Provide appropriate long-term security for the offset areas to the satisfaction of the Director-General.
- The offset strategy must be implemented prior to any vegetation clearance on site (Condition 47, Schedule 3).

**Table 4-5: Biodiversity Offset Requirements (EA 'Condition A')**

Vegetation Community	Ratio	Area Cleared (ha)	Offset Area (ha)
Bimble Box-Pine ( <i>Eucalyptus populnea</i> )	1:12.5	12.2	152.5
Dwyer's Red Gum-Currawong ( <i>Eucalyptus dwyeri</i> )	1:10	3	30
<b>Total</b>		15.2	182.5

The EPL addresses the requirement to control pests, vermin and weeds (O5.9).

The current and predicted impacts to flora and fauna have been assessed as a part of the EA. Mitigation and management commitments are as follows:

- Develop and implement Griffith Biodiversity Management Strategy (A)
- All retained areas of native vegetation on Lot 201 and 202 (that is areas not subject to the proposed and envisaged future clearing for quarry operations) will be protected in perpetuity as part of the offset package and rezoned to Environment and Conservation or Environmental Management (B),

- Revegetate and enhance (where possible) to create a contiguous corridor with Lot 201 on the western boundary (C),
- Maintain and enhance a 40m riparian zone on either side of the ephemeral drainage line (D),
- Collect, store and/or propagate seeds for rehabilitation purposes (to be stipulated in the detailed rehabilitation plan (E),
- Relocation of hollow trees and woody debris to corridors and areas not designated for clearing (F),
- Clearing of hollow-bearing trees will be undertaken outside of the main bird breeding periods and trees will be inspected for resident fauna by a suitably qualified ecologist. Appropriate action will be taken prior to removal should the presence of fauna be confirmed (G),
- Undertake detailed flora and fauna assessments of proposed offsets (H),
- Refine the offset package of the PA to the satisfaction of the DoP (now DPE) and implement it prior to the commencement of the new quarrying activities in order to compensate for the native vegetation to be cleared (I),
- Enhance onsite vegetation in areas not designated for clearing through direct seeding, thinning, grazing exclusion, weed and fire management (J),
- Develop and implement a weed and pest management strategy (K),
- Develop and implement a weed and pest management strategy for the control and eradication of weed species and incorporate into the rehabilitation plan, and QOEMP and LOEMP (L),
- Monitor success of revegetation and enhancement works onsite and in offset areas (M),
- Prepare a detailed rehabilitation plan for the quarry and landfill components to achieve the rehabilitation outcomes identified in the EA (N),
- Performance monitoring and completion criteria will be designed to demonstrate that the rehabilitation outcomes identified in the EA and rehabilitation plan are met (O),
- Progressively clear vegetation for each quarry pit (P),
- Assess the significance of various ephemeral swamps and water bodies as part of the Griffith Biodiversity Strategy (Q).

#### 4.4.2 Results

A summary of the key observations and completed management actions from the Tharbogang Quarry and Landfill Offset Monitoring report (Ecoplanning 2023) is presented below. A conservation area has been developed for the site (ELA 2011) and monitoring is regularly undertaken. For further information refer to the Tharbogang Quarry and Landfill Offset Monitoring report (Ecoplanning 2023).

The following survey techniques were employed:

- Photo points; eight monitoring photo points have been established. Assessment of the presence of weeds, erosion and the vegetation condition is completed annually and compared to previous years.
- Biobanking monitoring sites; floristic data are collected at six sites in accordance with the Biobanking Assessment Methodology (2014) and compared with baseline (2015), data from 2018 and benchmark data.

- Fauna monitoring: Surveys for microchiropteran bats are completed using Anabat equipment. At each 2 ha site, a 20 min bird survey was conducted in the morning and at dusk over two days.
- Walk through assessment: Traversed on foot to record opportunistic sightings, weed species, evidence of pests, regeneration and threatened species.

The following management actions have been undertaken within the Conservation Area during the reporting period (Table 4-6 taken from Ecoplanning 2023):

- Monitoring of photo points and biobanking monitoring plots. No significant deviations from the baseline monitoring occurred during the monitoring period, however, native species richness did increase to the highest values since monitoring began (Ecoplanning 2023).
- Three weed management operations occurred between March 2022 – January 2023.
- Primary target species included *Opuntia stricta* (Prickly Pear), while also finding and targeting *Lycium ferocissimum* (African Boxthorn), *Bryophyllum delagoense* (Mother of Millions) and a type of ceroid cactus (species unknown) (MA & WM Robb Environmental Management Services 2022a, b & REMS 2023).
- Previous weed treatment is evident with many weeds found dead or not found during the survey. Weed treatment includes herbicide application and mechanical removal. In 2021 it was recommended that *Opuntia stricta* be mechanically removed rather than sprayed, many tonnes were mechanically removed.
- Since the previous monitoring year, there has been an increase in weed abundance, particularly *Asphodelus fistulosus* (Onion Weed).
- There was evidence of rabbit and fox scats during the monitoring program (Ecoplanning 2022), however, no evidence of feral cats or goats was observed. No feral animal controls were conducted within the conservation area.
- All trails were in fair to good conditions and all fencing was observed to be in working order.
- Quarterly inspections of the Conservation Area were conducted in March, June, September and December 2022 by Riverina Agriconsultants. The only actions arising from the quarterly inspections were to monitor and control weeds and to monitor erosion in drainage lines (Ecoplanning 2023).

Recommendations included:

- Continue to monitor weeds and conduct secondary treatment for *Lycium ferocissimum*, *Opuntia* sp. and *Marrubium vulgare* as required.
- Consider digging out small *Opuntia* sp. and disposing of them in the landfill rather than spraying.
- Maintain quarterly inspections. Monitoring weed growth along the northern perimeter track.
- Continue to conduct annual monitoring in September 2023.
- Foxes appear to be in low numbers, however, they might not be detected as readily when ground cover is high and when high rainfall is more likely to cause scats to break down more quickly. Despite little evidence for foxes, pest management should be conducted in the offset area and coincide with management practices around the landfill for maximum effectiveness.

No pest control activities were conducted in this monitoring period.

**Table 4-6: Completed management actions for year 7 (2022) of the required monitoring period (Ecoplanning 2023)**

Management Action	Timing	Status
Monitoring Biobanking monitoring plots and photo points	Year 7	Complete - results of monitoring are provided
Recommend weed management thresholds and commence weed management actions in the Conservation Area in Year 1	Years 1 - 5	Weed management occurred during 2022
Pest animal control (local co-ordination with LLS and OEH)	Years 1 – 10	No pest animal control actions were undertaken.
	Years 1 - 4 Initial Rabbit Control	No pest animal control actions were undertaken. No Rabbits, evidence of Rabbits, were observed during the survey.
	Years 1-10 Fox Control	Pest animal control actions were undertaken. No evidence of foxes was observed in the Conservation Area during quarterly inspections. Fox scats were observed during annual monitoring.
	Years 1 - 10 Feral Goat Control	No pest animal control actions were undertaken. No Feral Goats, or evidence of Feral Goats were observed during monitoring.
	Years 1 - 10 Feral Cat Control	Pest animal control actions were undertaken. Evidence of feral cats was observed during quarterly inspections.
Fire management hazard reduction burn	Years 1 - 10	No fire management actions were undertaken.
Maintain vehicle access to Conservation Area for fire management, weed and fencing management.	Year 2-10 Maintain tracks and fire breaks	Tracks were inspected during the monitoring period. No action was required
Fencing, gates and signage	Year 1	The boundary of the Conservation Area has been fenced and signage erected. Western fence line completed in 2017. The northern boundary fence completed in 2018.

Management Action	Timing	Status
	Year 2-10 - maintain fences and gates	Fences and gates re-inspected during monitoring.
Quarterly inspections and stock management data	Years 1 - 10	Inspections were conducted in December 2021, March, June and September 2022. No pest control (vertebrate) documented No grazing occurred in year 7
Annual Reports for Monitoring Program	Years 1 -10	Monitoring was conducted in September 2022.

Note: Biobanking monitoring data can be found in the Tharbogang Quarry and Landfill Offset Monitoring Report (Ecoplanning 2023).

#### 4.4.3 Review

An assessment of the monitoring results against the regulatory framework is presented in Table 4-7.

**Table 4-7: Biodiversity compliance assessment**

Condition	Review
<b>Project Approval</b>	
Condition 10, Schedule 3	No pest control activities were conducted in the monitoring period, however it is recommended that despite little evidence for foxes, pest management should be conducted in the offset area (Ecoplanning 2023). Targeted weed management, particularly of <i>Opuntia stricta</i> (Prickly pear), occurred between March 2022 – January 2023 (MA & WM Robb Environmental Management Services 2022a, b, REMS 2023, & Ecoplanning 2023). Measures have been undertaken to control pests, feral animals and invasive weeds at the site and are undertaken regularly. Whilst their effectiveness may not be immediate, it is likely that over time changes will become evident. Quarterly monitoring is undertaken.
Condition 45, Schedule 3	Offsetting requirements have been implemented.
Condition 46, Schedule 3	The TWMC Landscape and Biodiversity Management Plan - Rehabilitation and Biodiversity Offset Strategy Plan (ELA 2011) incorporates the BOS and addresses this condition.

Condition	Review
Condition 47, Schedule 3	Table 4-6 outlines the tasks relevant to this condition that have been completed to date as per the 2016, 2017, 2018, 2019, 2020 and 2021 Annual Biodiversity Offset Monitoring reports.
<b>EPL</b>	
O5.9	Pests are currently managed at site although ongoing work is required.
<b>EA</b> (See section 4.4.1 for description of 'condition')	
A	The Biodiversity Management Strategy is included in the TWMC Landscape and Biodiversity Management Plan - Rehabilitation and Biodiversity Offset Strategy Plan (ELA 2011).
B	An in-perpetuity Conservation Agreement was placed over the land in 2015.
H	Detailed flora and fauna assessments have been undertaken.
K	The TWMC Landscape and Biodiversity Management Plan - Rehabilitation and Biodiversity Offset Strategy Plan (ELA 2011) incorporates the weed and pest management strategies and addresses this condition.
L	<p>The LEMP was most recently updated in March 1999 (Barton 1999), however, an LOEMP has been developed and will supersede the LEMP. The LOEMP is currently with the DPE for approval. The LOEMP has a section outlining the offset land, weed and pest animal monitoring requirements and refers to the relevant plans for details regarding how the work is to be undertaken.</p> <p>Weed and Pest Control Plans have been prepared and the works have commenced.</p> <p>The licensee has advised that QOEMP is not required.</p>
M	The LBMP states that throughout most of the BOA, no broadscale revegetation work is required due to its high resilience although some supplementary plantings may be required. Direct seeding and tubestock revegetation was proposed within Management Zone 1 (MZ 1) should natural

Condition	Review
	regeneration of the overstorey be absent after five years (ELA 2011). The management works are currently in year 7. An assessment of the proportion of overstorey regeneration indicates that direct seeding and tubestock revegetation is not required within MZ 1 as natural regeneration has occurred to some degree (Ecoplanning 2021). Annual monitoring of revegetation and enhancement works onsite and in offset areas should continue.
N	A rehabilitation plan has been developed - TWMC Landscape and Biodiversity Management Plan - Rehabilitation and Biodiversity Offset Strategy Plan (ELA 2011).
O	Outlined in the TWMC Landscape and Biodiversity Management Plan - Rehabilitation and Biodiversity Offset Strategy Plan (ELA 2011).
Q	<p>The draft Griffith Biodiversity Management Strategy must be finalised and include an assessment of the significance of various ephemeral swamps and waterbodies in the Griffith region.</p> <p>The Griffith Biodiversity Management Strategy (GBMS) has been reviewed and is currently with the DPE for approval.</p>
<b>Not Triggered</b>	
C	No information regarding revegetation and enhancement to create a contiguous corridor with Lot 201.
D	No information regarding a 40m riparian zone on either side of the ephemeral drainage line
E	No information regarding seeds for rehabilitation has been provided.
F	No information regarding relocation of hollow trees and woody debris
G	No information regarding the removal of hollow-bearing trees outside the main bird breeding period has been provided.
I	<p>Offset areas have been acquired and a Conservation Agreement reached in 2015.</p> <p>However, PA states that prior to the commencement of each quarry pit the offset package is to be refined to the satisfaction of</p>

Condition	Review
	the DPE and implemented prior to the commencement of the new quarrying activities. The quarry works have not commenced yet.
J	No information regarding vegetation enhancement in areas not designated for clearing.
P	Clearing for the quarry pits has not commenced.

## 4.5 Groundwater

### 4.5.1 Monitoring and management criteria

Monitoring of groundwater levels in six boreholes which range in depth between 5 m to 20.6 m.

As with surface water, the PA recommends that a Soil, Water and Leachate Management Plan must be prepared and implemented, which must include a site water balance, erosion and sediment control plan, stormwater management scheme, surface water monitoring program and surface water response plan (Condition 20-26, Schedule 3).

The EPL specifies that ground water monitoring must be undertaken at six boreholes on site (P1.1) which must comply with section 120 of the *POEO Act* (L1.1) and that specific pollutants are monitored for (M1). Previously there were seven boreholes to be monitored, however, Borehole 2 is dry and no longer requires monitoring under an EPL variation in 2015. The EPL states that monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area must be done in accordance with the Approved Methods Publication unless another method has been approved in writing by the EPA before any tests are conducted (M3). The *TWMC Groundwater Annual Environmental Performance Report 2018-19* provides detail regarding the methods used to monitor groundwater (Stygoecologia 2019). It states that for groundwater monitoring, *Threshold Criteria are primarily sourced from Australian and New Zealand guidelines for fresh and marine water quality (ANZW 2018) 95% trigger values and National Environment Protection (Assessment of Site Contamination) Measure (NEPM) 2013. Other indicative threshold values (N/A) were calculated as the 80<sup>th</sup> percentile value of recorded values from 2014-2019 field data and is used as an Interim working level in absence of reliable trigger values* (Stygoecologia 2019). Table 1 of the Stygoecologia (2019) report outlined the relevant trigger values for each analyte.

The EPL (M2) also states that for each monitoring/discharge point or utilisation area specified in the EPL (by a point number), the licensee must monitor (sampling completed by the Council Officer, and analysis completed by ALS on behalf of the council) the concentration of each pollutant specified in Column 1 of the EPL table. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns.

Finally, the EA has assessed the current and future groundwater impacts. The following mitigation and management commitments have been made:

- Install two new groundwater monitoring bores west of the site (A),
- Licence new groundwater monitoring bores (B),



- Establish and implement groundwater monitoring program in accordance with DECCW requirements (C), and
- Conduct ongoing groundwater monitoring post closure and action non-compliances (D).

The analytes and threshold criteria for groundwater monitoring sites are included in Table 4-8 below and taken from Stygoecologia 2019.

**Table 4-8: Analytes, threshold criteria for groundwater monitoring sites (Stygoecologia 2019)**

Water chemistry parameter	ANZECC Trigger Values for freshwater	Tharbogang trigger values
Depth (m)	N/A	N/A
pH (pH Unit)	6.5-8.5	6.5-8.5
Alkalinity (mg/L)	N/A	744
Fluoride (mg/L)	N/A	0.7
Chloride (mg/L)	N/A	2794
Sulphate (mg/L) SO <sub>4</sub>	N/A	513
Sp. Conductance (gS/cm)	350	350
Suspended Solid (mg/L)	N/A	138
Total Org Carbon-filtered (mg/L)	4	4
Total Phenol (mg/L)	0.32	1
Dissolved Iron (mg/L)	0.3a	0.3
Dissolved Manganese (mg/L)	1.9b	1.9
Dissolved Calcium (mg/L)	N/A	102
Dissolved Magnesium (mg/L)	N/A	184
Dissolved Potassium (mg/L)	410c	410
Dissolved Sodium (mg/L)	N/A	1775
Ammonia (as N) (mg/L) N	0.9b	0.9
Total Oxidised Nitrogen (as N) (mg/L)	0.4	0.4
Volatile Organics (ug/L)	N/A	50

N-A - 80% of recorded values is used as an Interim working level, in absence of reliable trigger values –a - Interim working level, in absence of reliable trigger value–b - Trigger value may not protect key species from chronic toxicity, refer to ANZECC & ARMCANZ (2000) for further guidance–c - Poor (acceptable) drinking water criteria, World Health Organisation Guidelines for Drinking-water Quality 2009.

#### 4.5.2 Results

GCC has prepared a management plan for Groundwater: *Tharbogang Waste Management Centre: Soil, Water & Leachate Management Plan (v2.0)* (CPE Associates 2011a) and NGH prepared the *Tharbogang Landfill Groundwater Analysis Report 2022* (NGH 2022).

Groundwater boreholes are located throughout the site (Figure 4-2: Groundwater Borehole Monitoring Sites and Leachate Control). Borehole depths are recorded bi-annually, the results from the 2022 reporting period are shown in Table 4-9 and Figure 4-3. The pollutants which are required to be monitored during the reporting period are identified in Table 4-10 and a summary of the results

presented in Table 4-11. The trends for each pollutant over time are shown in Figure 4-4 to Figure 4-19. Bore 1 is the up-gradient well and provides the background pollutant levels. Bore 1 is surrounded by irrigated agriculture to the west and south. However, the impact on groundwater from agriculture would be minimal as the western areas are located down-gradient to Bore 1. Leachate from buried green waste and animal waste is not intercepted and located down-gradient from the leachate collection and storage system. Bore 7 is located down-gradient of the buried green waste and animal waste (GCC 2021).

The following results are taken from the Groundwater Analysis Report (NGH Pty Ltd 2022):

#### “Standing Water Level (mBGL)

- BH4, BH5 and BH6 SWLs fluctuated through June 2021 - September 2022 in comparison to the other boreholes. The 2021/2022 SWL results for all boreholes are consistent with long-term averages except for an increase observed in BH4 in September 2021.

#### pH

- pH levels were slightly alkaline to alkaline within all boreholes ranging from 7.39 – 8.42. All boreholes showed lower pH results than the previous reporting period. High rainfall recorded in Griffith could explain the lower levels in pH in all boreholes. Landfilling activities are not considered to influence the pH levels of the groundwater (Geolyse, 2015).
- The 2021/2022 pH results for all boreholes are consistent with long-term averages and BH1.

#### Alkalinity (mg/L)

- BH4, BH6 and BH7 indicated high alkalinity levels in comparison to the other boreholes ranging from 624mg/L – 1310mg/L from May 2022 to September 2022. This is likely due to higher clay content of the substrate (Ecoplanning 2019).
- The 2021/2022 alkalinity values for all boreholes are relatively consistent with the long-term averages. BH4 is significantly higher than BH1, and BH3 is significantly lower than BH1, all other boreholes are consistent with BH1.

#### Fluoride (mg/L)

- Fluoride levels are relatively low through all boreholes, except for BH6 which returned with a result of 1.3 mg/L, the drinking water criteria value is 1.5 mg/L (NEPM 1999).
- The 2021/2022 fluoride results for all boreholes are consistent with the long-term averages and BH1.

#### Chloride (mg/L)

- BH4 indicated significantly high levels of chloride present (4320mg/L – 5100mg/L) between September 2021 to September 2022. The trend of chloride levels (2015 – 2022) indicates that the chloride levels are consistently greater in BH4 than the other boreholes. BH4 is located down-gradient of the quarry, leachate pond and sedimentation pond.
- The 2021/2022 chloride results for all boreholes are slightly above the long-term averages. BH4 is significantly higher than BH1 and BH3 is significantly lower than BH1, all other boreholes are consistent with BH1.

#### Sulphate (mg/L)

- BH1 and BH4 indicated a high level of sulphate present in comparison to the other boreholes. BH1 ranged from 482mg/L – 560mg/L and BH4 ranged from 618mg/L – 687mg/L.
- The sulphate drinking water criteria value is 500mg/L (NEPM 1999). All boreholes generally have met this threshold through the 2021/2022 year, except for BH1 and BH4 which exceeded the threshold from June 2021 to September 2022 and BH3 and BH6 which exceeded the threshold in May 2022.
- The 2021/2022 sulphate results for all boreholes are relatively consistent with the long-term averages. BH3 and BH5 are significantly lower than BH1 and all other boreholes are consistent with BH1.

#### Conductivity (µS/cm)

- BH4 indicated a high level of conductivity through the year, ranging from 15,900 – 18,000µS/cm. BH5 observed the lowest levels of conductivity ranging from 7,320 – 5,950µS/cm.
- The 2021/2022 conductivity results for all boreholes are slightly higher than the long-term averages. BH4 is significantly higher than BH1 and BH3 is significantly lower than BH1, all other boreholes are consistent with BH1.

#### Total Suspended Solids (TSS) (mg/L)

- BH6 observed a spike in the TSS results of 1,200mg/L in September 2021 results. All other samples ranged from <5mg/L to 178mg/L.
- The 2021/2022 TSS results for all boreholes are consistent with long-term averages. Results appeared to fluctuate across each month in comparison to BH1. TSS is not a suitable parameter for groundwater.

#### TOC (mg/L)

- BH4 observed higher levels of TOC in comparison to the other boreholes, ranging from 15mg/L to 47mg/L. All other boreholes observed TOC ranging from <1mg/L to 43mg/L.
- The elevated concentrations of TOC in BH4 could likely be due to metabolic by-products resulting from microbial breakdown of organic matter present in the landfill (Geolyse, 2015), which are then displayed down-gradient. It could also be a result of leaching of hydrocarbon-based contaminants from the landfill (Geolyse, 2015).
- The 2021/2022 TOC results for all boreholes are consistent with long-term averages. BH4 and BH5 observed slightly higher results than BH1, all other boreholes are consistent with BH1.

#### Total Phenolics (mg/L)

- All samples returned below the laboratory limit of reporting (<1.0mg/L). The GILs (NEPM 1999) for freshwater criteria for Total Phenols is 0.32mg/L.
- The 2021/2022 total phenolic results for all boreholes are consistent with long-term averages and BH1.

#### Dissolved Iron (mg/L)

- BH6 observed a spike in September 2021 with a result of 5.18mg/L and has since decreased to 3 mg/L in September 2022. All other results ranged from 0.32mg/L to 5.06mg/L.
- The 2021/2022 dissolved iron results for all boreholes are consistent with long-term averages and BH1.

#### Dissolved Manganese (mg/L)

- BH3 and BH6 observed a spike in May 2022 with results ranging from 1.03mg/L to 2.31mg/L and remained consistent in September 2022. BH4 observed a spike in September 2022 with a result of 1.28mg/L. All other results ranged from 0.004mg/L to 0.367mg/L.
- The concentrations of manganese in groundwaters are dependent upon several factors such as rainfall chemistry, aquifer lithology, geochemical environment, groundwater flow paths and residence time (IMnI 2013). Manganese can leach through overlying soils and minerals in underlying rocks as well as from the minerals of the aquifer itself (IMnI 2013).
- BH3 is above the 0.5mg/L threshold of the GILs for drinking water and the 1.9mg/L threshold for fresh waters (NEPM 1999), all other boreholes are below threshold.
- The 2021/2022 dissolved manganese results for all boreholes have slightly increased in comparison with the long-term averages. BH3, BH4 and BH6 observed slightly higher results than BH1, all other boreholes are consistent with BH1.

#### Dissolved Calcium (mg/L)

- BH6 and BH7 have a significantly higher concentration of dissolved calcium in comparison to the other boreholes, ranging from 48mg/L to 559mg/L.
- The elevated levels in BH7 suggest higher clay content in the substrate surrounding the bore (Ecoplanning, 2019). BH7 is located down-gradient of the buried green waste and animal waste.
- All other samples ranged from 7.0mg/L to 232mg/L.
- The 2021/2022 dissolved calcium results for all boreholes are consistent with long-term averages. All boreholes observed are consistent with results of BH1 except BH3 results were slightly lower of 10mg/l and 7.0mg/L.

#### Dissolved Magnesium (mg/L)

- Results ranged from 16mg/L to 601mg/L with the highest concentrations observed in BH7. BH7 is located down-gradient of the buried green waste and animal waste. Dissolved magnesium levels for all other boreholes are consistent with the levels in up-gradient BH1.
- The 2021/2022 dissolved magnesium results for all boreholes are consistent with long-term averages. All boreholes observed are consistent with results of BH1 except BH3 results were slightly lower.

#### Dissolved Potassium (mg/L)

- BH4 and BH7 observed higher levels of dissolved potassium in comparison to the other boreholes. BH7 is located down-gradient of the buried green waste and animal waste. BH4 is located down-gradient of the sedimentation pond, leachate pond and quarry.
- Results ranged from 10.00mg/L to 176mg/L. The 2021/2022 dissolved potassium results for all boreholes are consistent with long-term averages. BH4 and BH7 observed slightly higher results than BH1, all other borehole results are consistent with BH1.

#### Dissolved Sodium (mg/L)

- BH4 observed higher levels of dissolved sodium in comparison to the other boreholes, ranging from 827mg/L to 3120mg/L. BH4 is located down-gradient of the sedimentation pond, leachate pond and quarry.
- The 2021/2022 dissolved sodium results for all boreholes are consistent with long-term averages. BH4 observed higher results than BH1, and BH3 lower, all other boreholes are consistent with BH1.

#### Ammonia (mg/L)

- BH6 observed a high level of ammonia in May 2022 with a result of 48.5mg/L with a decrease in September 2022. BH7 observed overall higher results than all other bores ranging from 0.14mg/L to 9.94mg/L. BH5 observed a peak in September 2022 with a result of 7.90mg/L. Results within the other boreholes are generally consistent with and ranged from 0.1mg/L to 1.85mg/L.
- The observed decrease in ammonia concentrations is likely related to oxidation of ammonia into nitrate/nitrite, and/or downgradient dissipation (Geolyse 2015). Previously elevated records were the result of either an increase in sewage discharge into the Waste Treatment Facility or the application of fertilisers on the surround landscape or from leaching of the green waste area following rainfall events (Ecoplanning 2019).
- BH7 is geographically isolated from the leachate dam (pond) or the sewage discharge locations and is directly adjacent to the green waste and animal burial area (Ecoplanning 2019). This could indicate that a rainfall event stimulated overland flow that contained ammonia or fertilisers and leached into the bore from the surface (Ecoplanning 2019). BH7 is located down-gradient of the buried green waste and animal waste.
- There is not a GIL value for ammonia for drinking water. However, the GILs for ammonia for fresh waters is 0.9mg/L.
- Ammonia results were relatively consistent with the previous reporting period and has since decreased to similar results reported in 2014. BH5, BH6 and BH7 observed significantly higher results than BH1, all other boreholes are consistent with BH1.

#### Total oxidised Nitrogen (mg/L)

- BH7 observed high levels of Total Oxidised Nitrogen (TON) in comparison to the other boreholes, ranging from 361mg/L to 1170mg/L. BH7 is located down-gradient of the buried green waste and animal waste.
- The GIL level for nitrate for drinking water is 50mg/L (NEPM 1999) exceeding criteria values in BH7. All other boreholes were below criteria values ranging from 0.02mg/L to 27mg/L.
- The 2021/2022 TON results for all boreholes are consistent with long-term averages. BH7 observed significantly higher results than BH1, all other borehole results are lower than BH1.

#### Volatile Organics (µg/L)

- All samples returned below the laboratory limit of reporting (<50 µg/L).
- The 2021/2022 volatile organic results for all boreholes are consistent with long-term averages and BH1.”



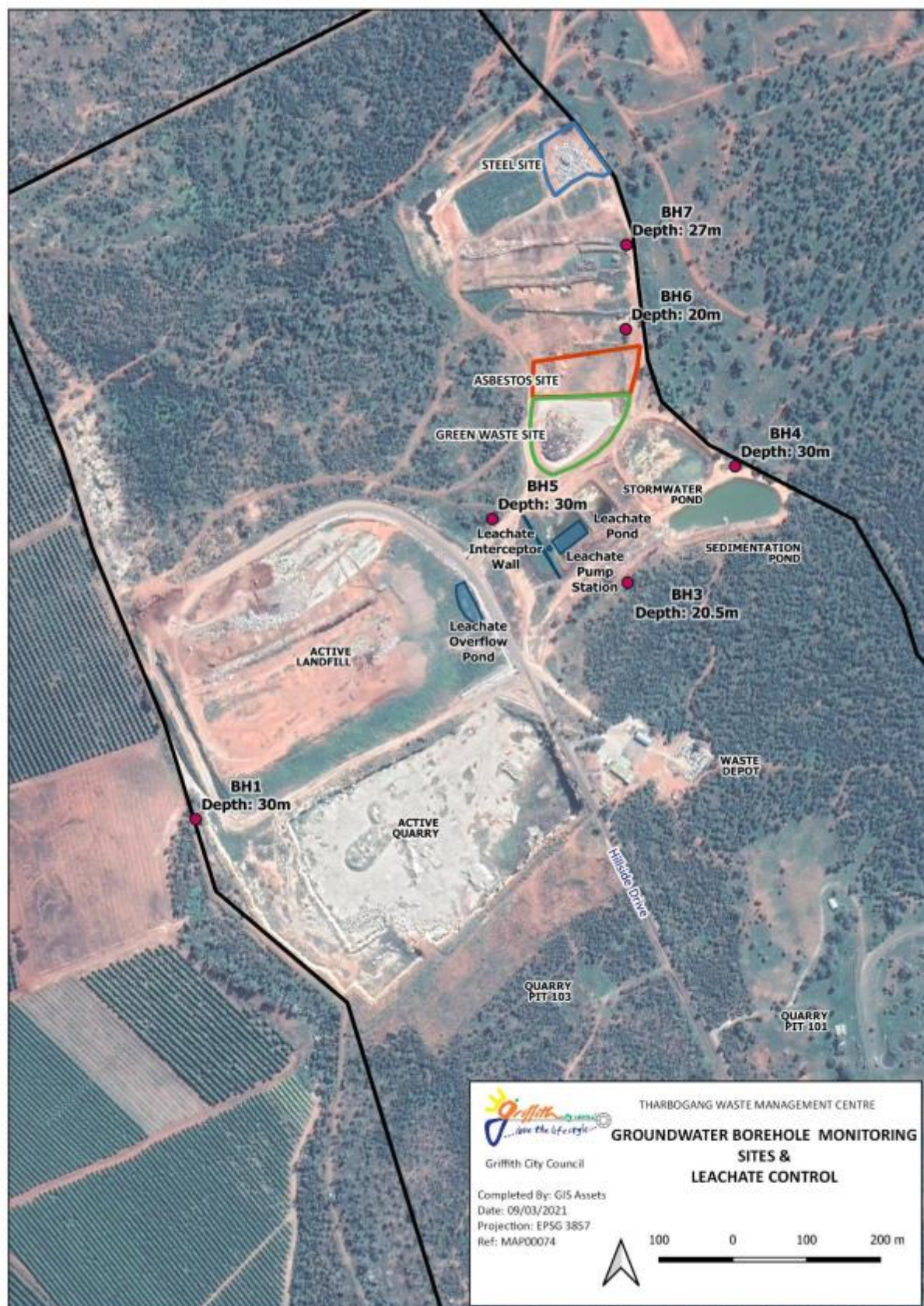
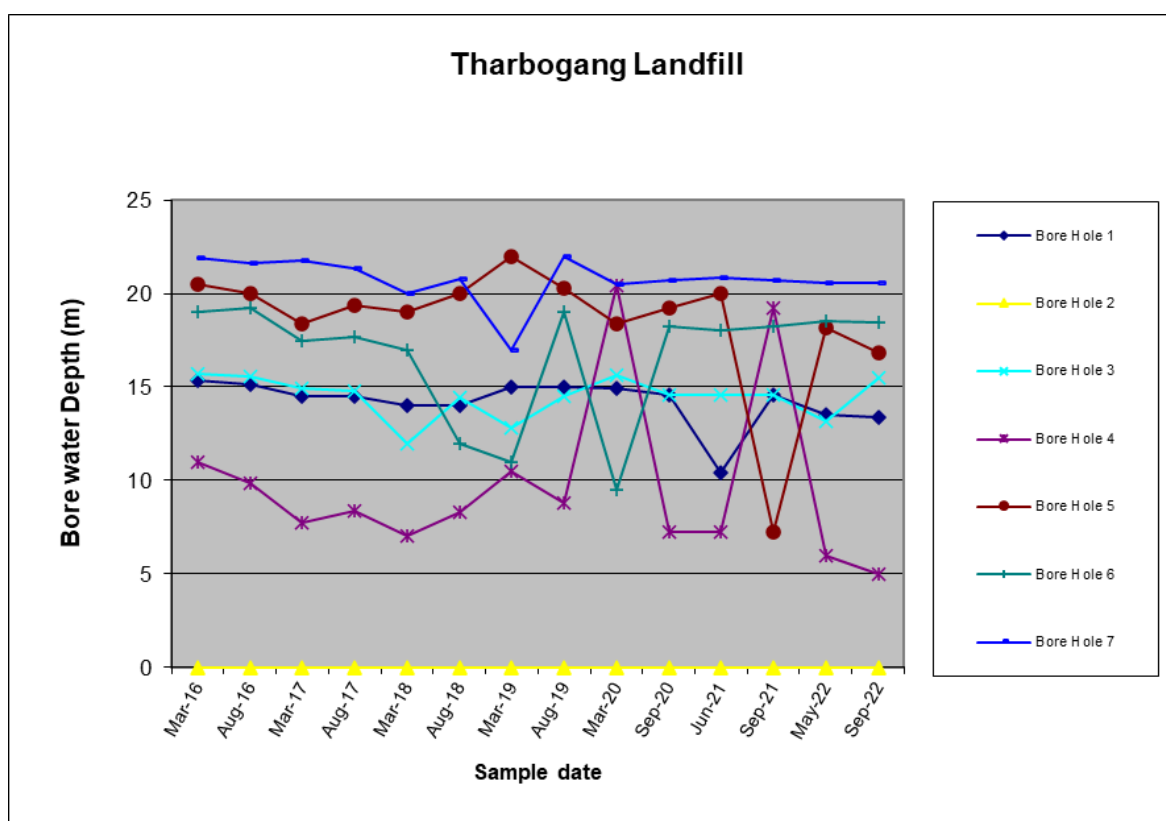


Figure 4-2: Groundwater Borehole Monitoring Sites and Leachate Control



**Table 4-9: Bore water depths during the monitoring period**

Monitoring Point	Bore water Depth (m)	
	May-22	Sept-22
Borehole 1	13.5	14.59
Borehole 2	0.0	0.0
Borehole 3	13.2	15.5
Borehole 4	6	5
Borehole 5	18.2	16.8
Borehole 6	18.5	18.48
Borehole 7	20.6	20.6



**Figure 4-3: Bore water depths recorded for all sites since May 2016**

**Table 4-10: Pollutant Monitoring required by the EPL and completed during the reporting period**

Pollutant	Borehole Number 1-7	
	Frequency	Completed
Alkalinity (as calcium carbonate)	Bi-annual	Y
Ammonia	Bi-annual	Y
Calcium	Bi-annual	Y
Chloride	Bi-annual	Y
Chlorinated volatile compounds	Bi-annual	Y
Conductivity	Bi-annual	Y
Fluoride	Bi-annual	Y
Iron	Bi-annual	Y
Magnesium	Bi-annual	Y
Manganese	Bi-annual	Y
Nitrate	Bi-annual	Y
Potassium	Bi-annual	Y
Sodium	Bi-annual	Y
Sulphate	Bi-annual	Y
Total Phenolics	Bi-annual	Y
Total organic carbon	Bi-annual	Y
Total Suspended solids	<b>Not required</b>	Y
pH	Bi-annual	Y

N: Not required

**Table 4-11: Summary of groundwater results during the monitoring period**

Monitoring Point	Date	Alkalinity (mg/L)	Ammonia (as N) (mg/L) N	Dissolved Calcium (mg/L)	Chloride (mg/L)	Volatile Organics (ug/L)	Sp. Conductance (uS/cm)	Fluoride (mg/L)	Dissolved Iron (mg/L)	Dissolved Magnesium (mg/l)	Dissolved Manganese (mg/L)	Total Oxidised Nitrogen (as N) (mg/L)	Dissolved Potassium (mg/L)	Dissolved Sodium (mg/l)	Sulphate (mg/L)	Total Phenol (mg/L)	Total Org Carbon-filtered (mg/L)	Suspended Solid (mg/L)	pH
Trigger Value		744	0.9	102	2794	50	350	0.7	0.3	184	1.9	0.4	410	1775	513	1	4	138	6.5-8.5
Borehole 1	May-22	331	0.58	12	446	<50	1,900	0.7	4.4	19	0.065	25.4	10	344	25	<1.0	2	92	8.13
	Sep-22	595	0.03	28	1450	<50	6,480	0.9	0.32	140	0.088	27	73	1,060	361	<1.0	43	11	7.71
Borehole 2	May-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sep-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Borehole 3	May-22	1,240	0.06	149	4,140	<50	14,200	0.6	5.06	248	2.21	0.03	126	2,480	560	<1.0	24	15	7.78
	Sep-22	313	<0.01	10	441	<50	1,940	0.8	2.04	19	0.047	0.82	10	395	32	<1.0	8	11	7.51
Borehole 4	May-22	624	0.03	133	1,550	<50	6,130	0.6	0.34	179	0.132	0.02	59	827	174	<1.0	15	22	8.04

Monitoring Point	Date	Alkalinity (mg/L)	Ammonia (as N) (mg/L) N	Dissolved Calcium (mg/L)	Chloride (mg/L)	Volatile Organics (ug/L)	Sp. Conductance (uS/cm)	Fluoride (mg/L)	Dissolved Iron (mg/L)	Dissolved Magnesium (mg/l)	Dissolved Manganese (mg/L)	Total Oxidised Nitrogen (as N) (mg/L)	Dissolved Potassium (mg/L)	Dissolved Sodium (mg/l)	Sulphate (mg/L)	Total Phenol (mg/L)	Total Org Carbon-filtered (mg/L)	Suspended Solid (mg/L)	pH
Trigger Value		744	0.9	102	2794	50	350	0.7	0.3	184	1.9	0.4	410	1775	513	1	4	138	6.5-8.5
	Sep-22	1,310	0.22	232	5,100	<50	18,000	0.6	2.31	414	1.280	0.22	147	3,120	687	<1.0	47	7	7.63
Borehole 5	May-22	814	<0.01	64	1,750	<50	7,320	1	2.57	114	0.032	9.38	60	1,290	276	<1.0	7	124	7.99
	Sep-22	601	7.90	108	1,320	<50	5,540	0.7	0.50	167	0.134	7.90	54	784	158	<1.0	18	12	7.58
Borehole 6	May-22	905	48.5	559	899	<50	12,300	0.5	3.17	686	1.03	1.02	222	959	549	<1.0	36	143	8.42
	Sep-22	910	3.28	58	1,620	<50	7,350	1.2	3.00	120	0.031	3.28	60	1,360	279	<1.0	18	178	8.15
Borehole 7	May-22	261	0.19	48	112	<50	869	0.3	0.66	23	0.136	1,170	52	79	13	<1.0	46	21	7.77
	Sep-22	1,000	0.14	430	939	<50	11,100	0.7	1.29	601	0.677	863.00	176	1,000	463	<1.0	40	42	7.69

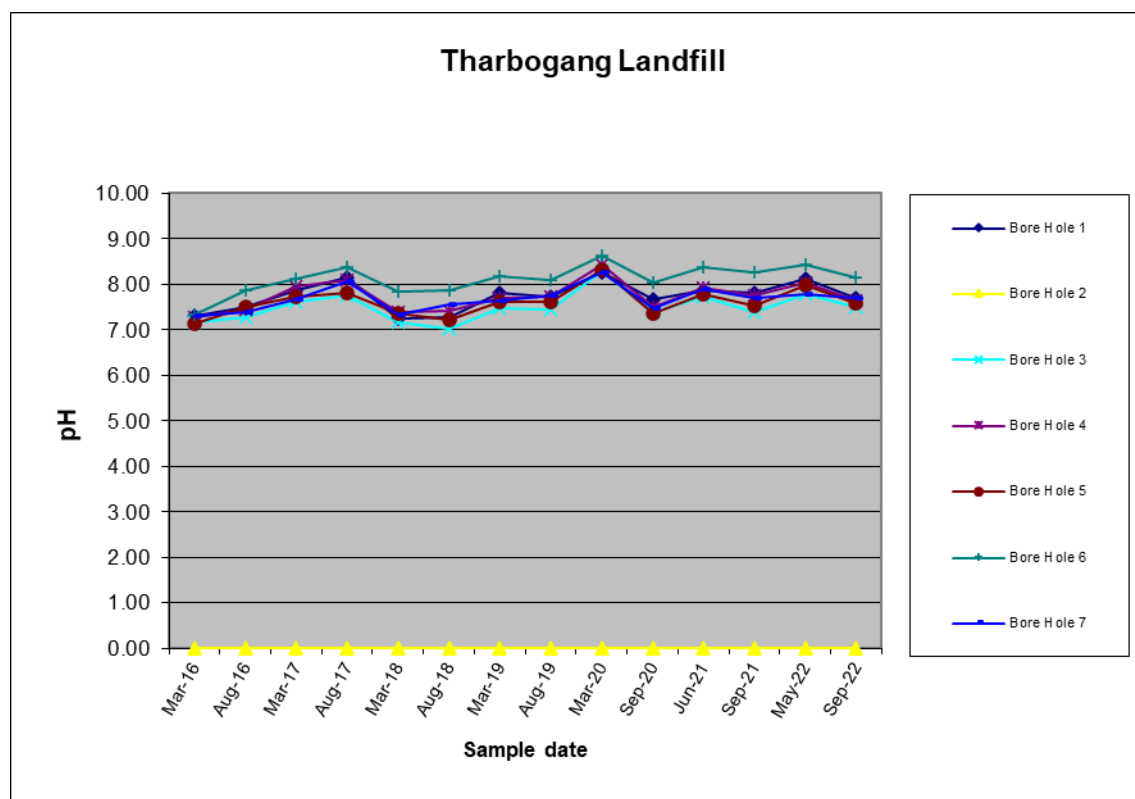


Figure 4-4: pH Trends

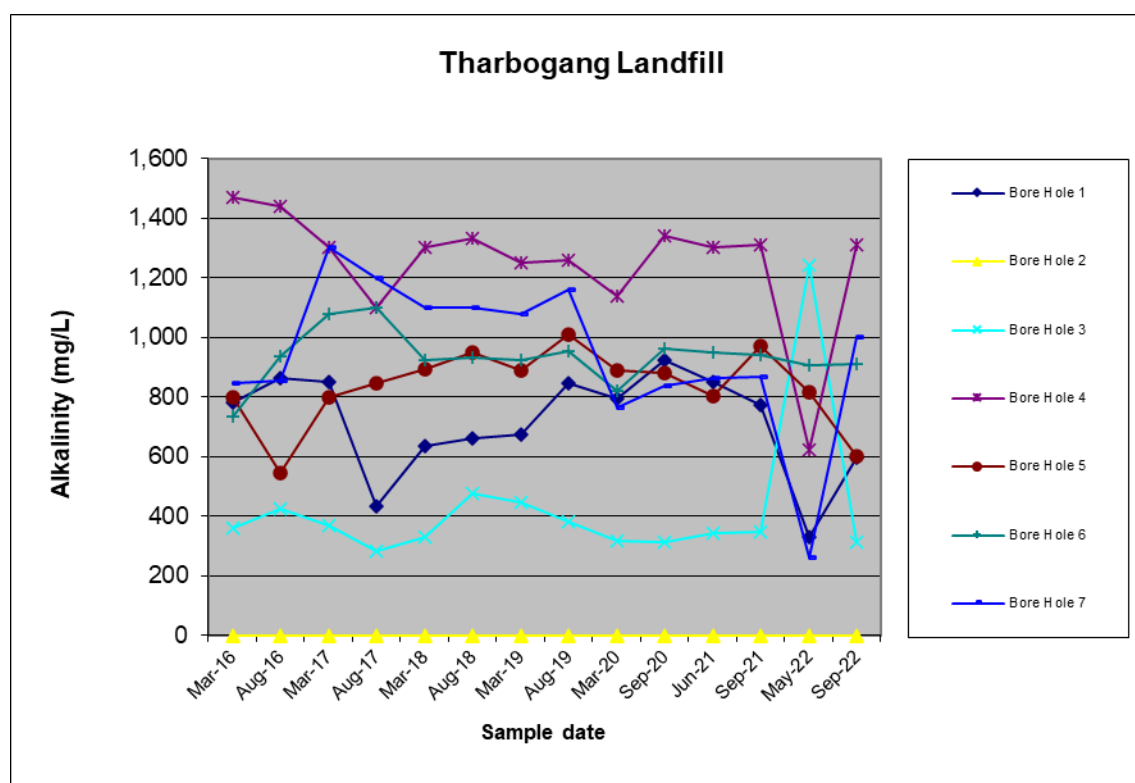


Figure 4-5: Alkalinity trends (mg/L)

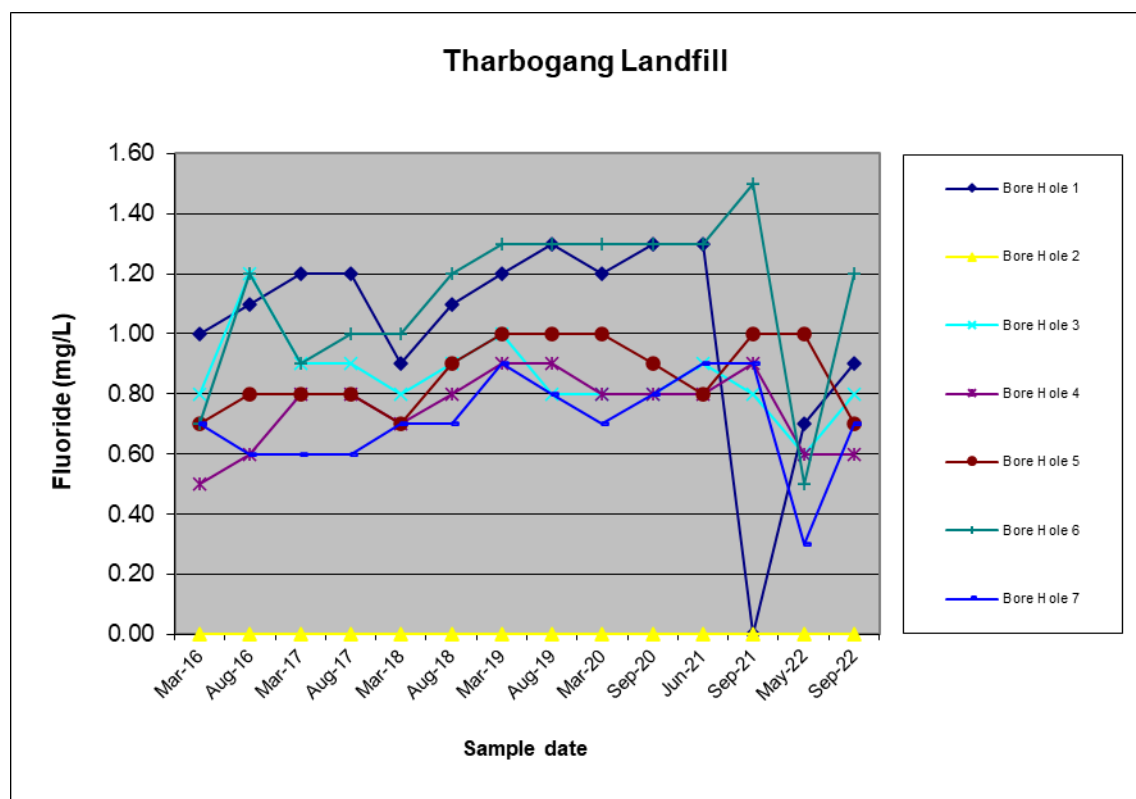


Figure 4-6: Fluoride Trends (mg/L)

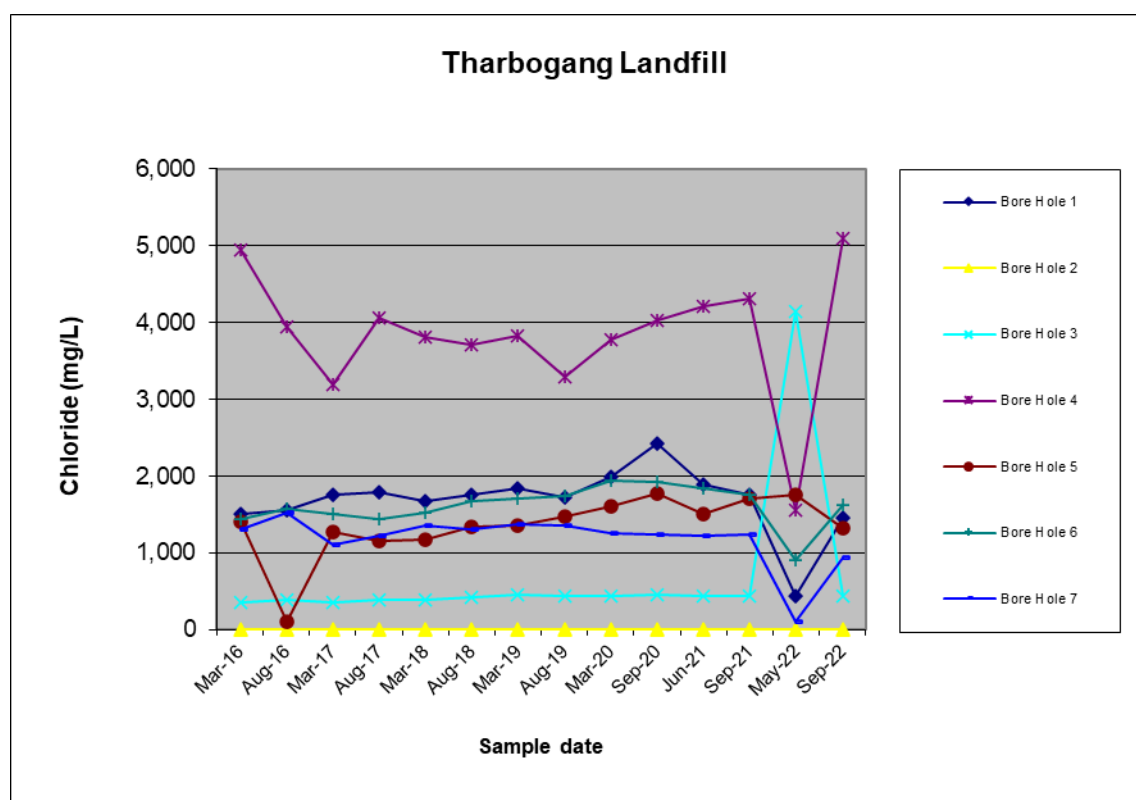


Figure 4-7: Chloride trends (mg/L)

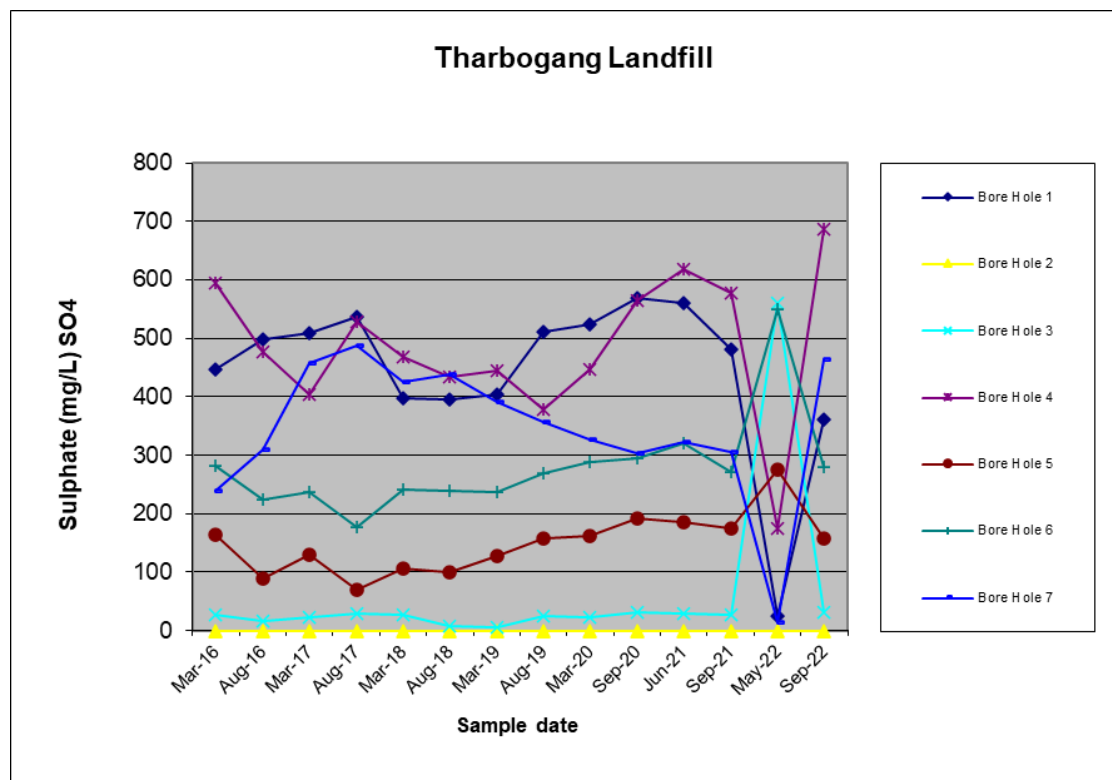


Figure 4-8: Sulphate rends (mg/L)

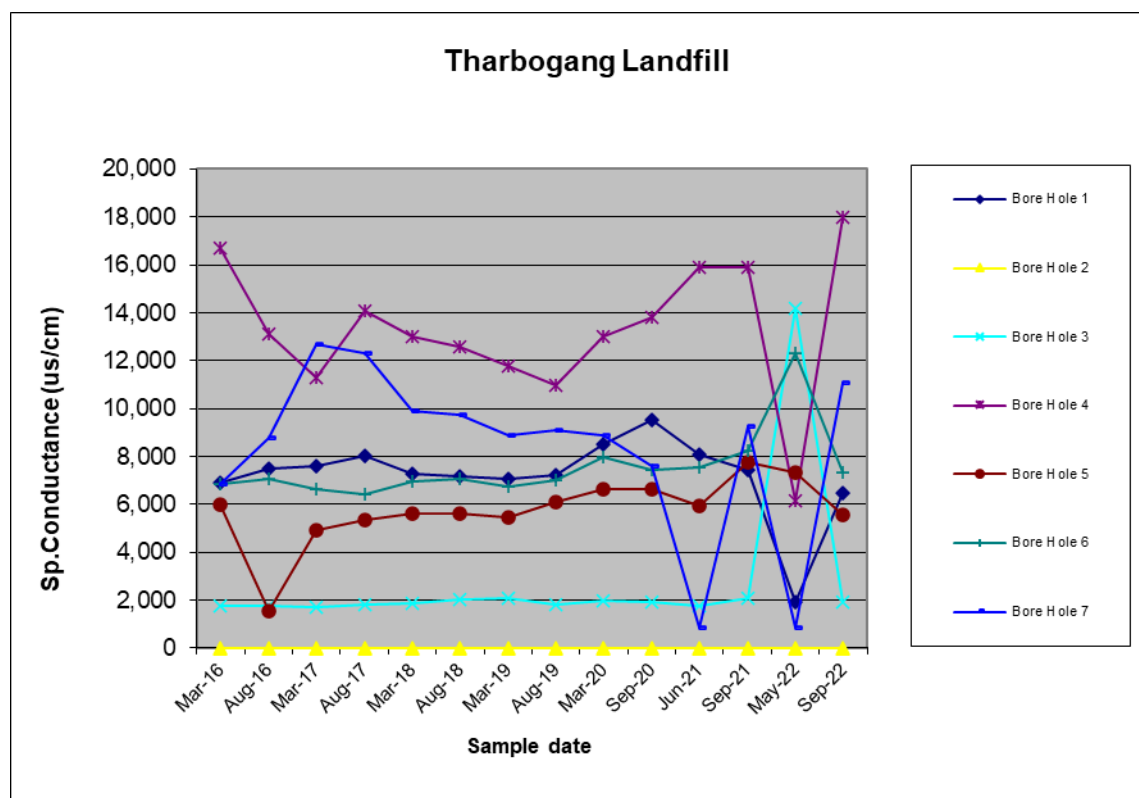


Figure 4-9: Conductivity trends (uS/cm)



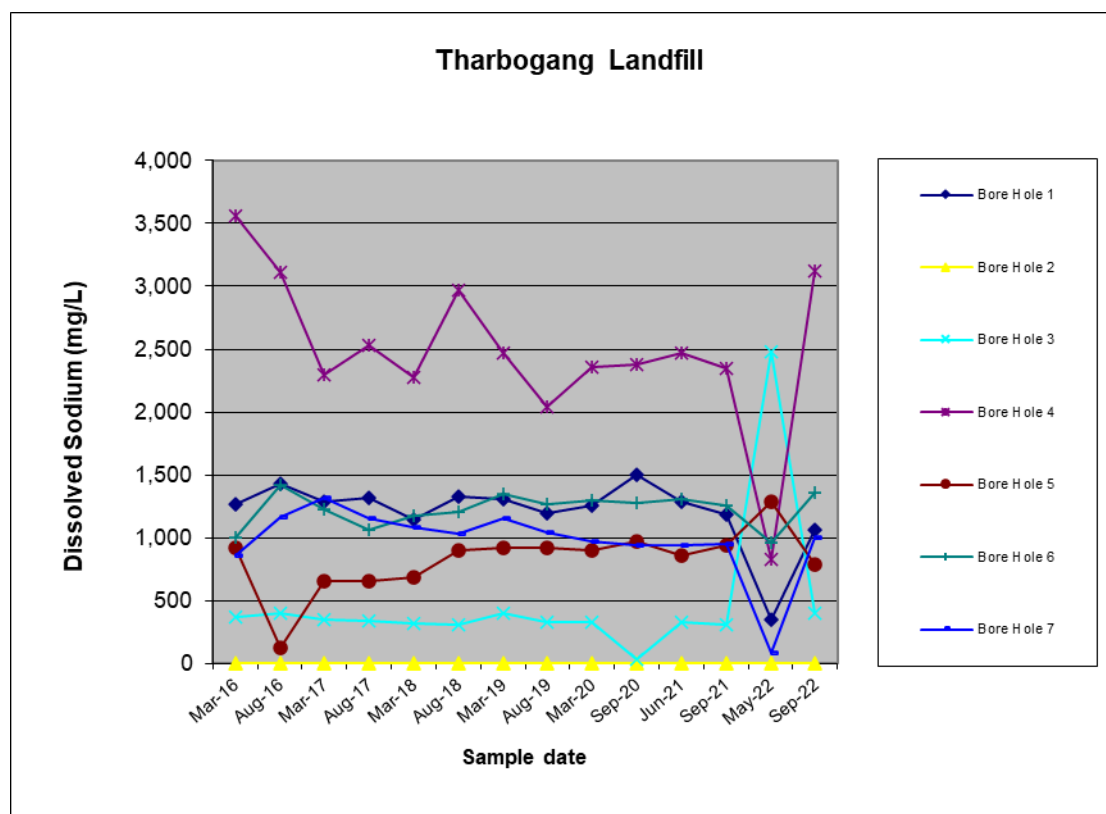


Figure 4-10: Sodium trends (mg/L)

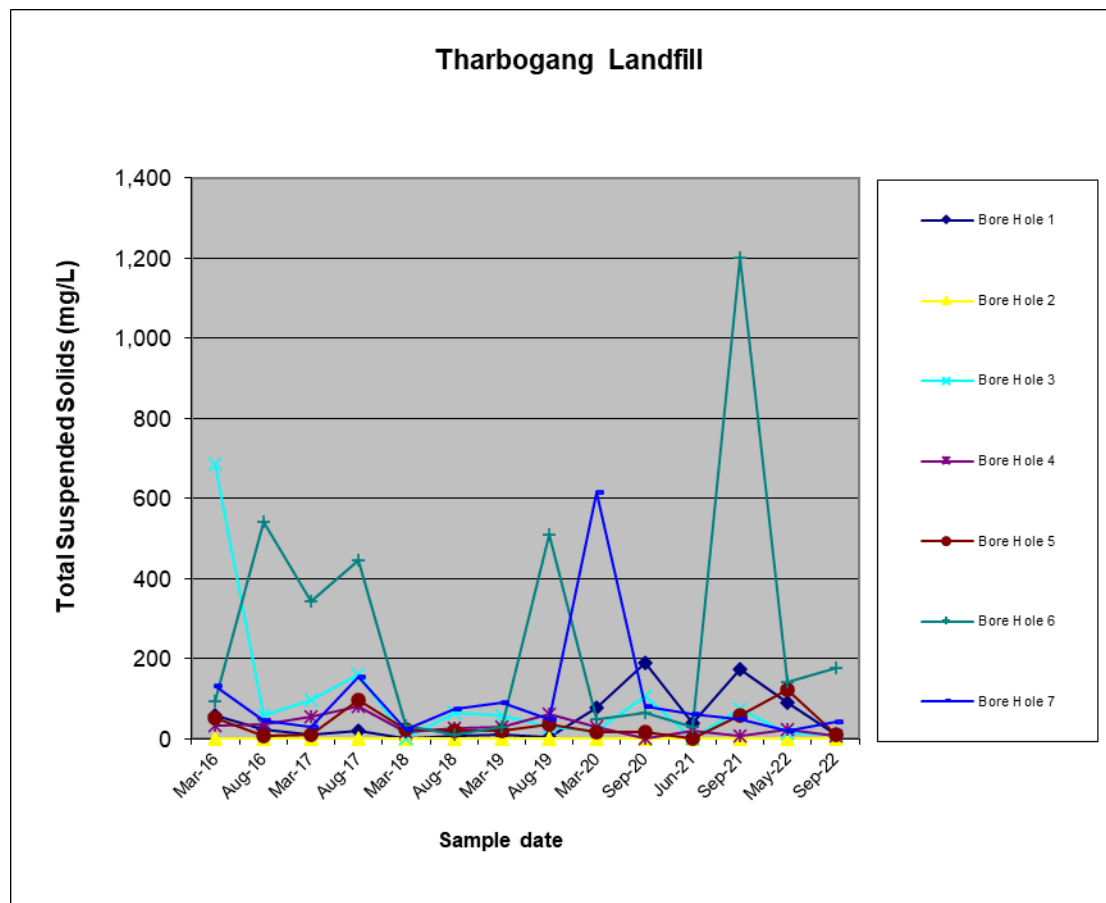


Figure 4-11: Suspended solids trends (mg/L)

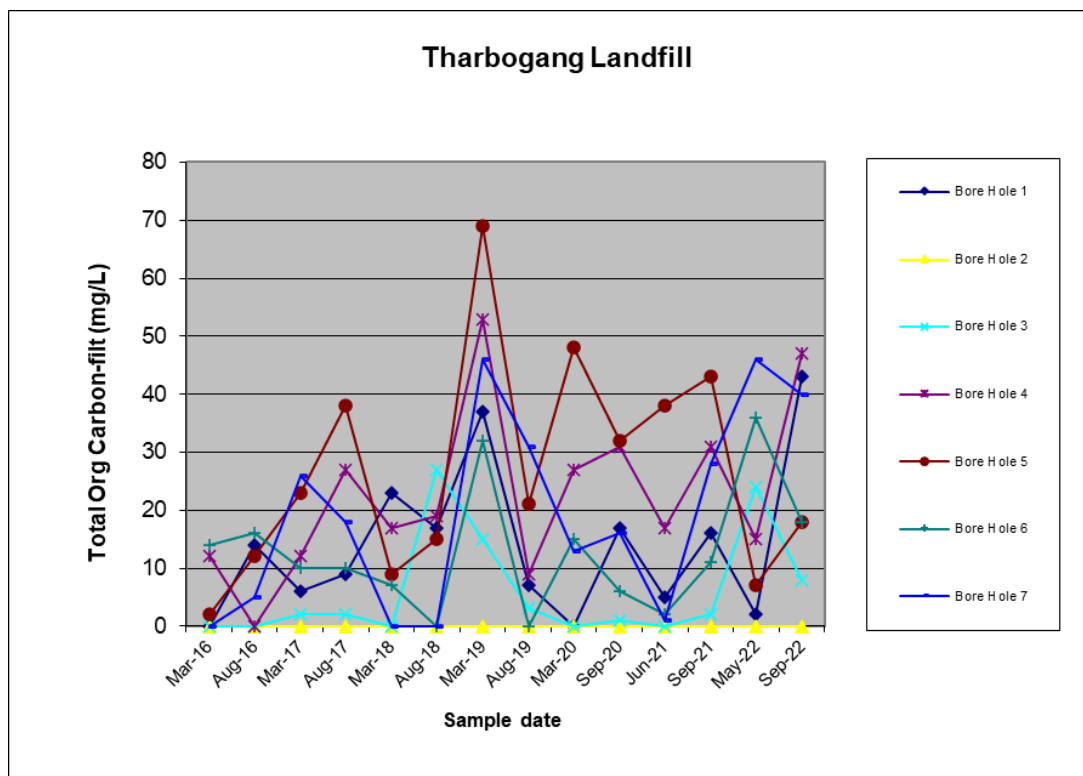


Figure 4-12: Total organic carbon trends (mg/L)

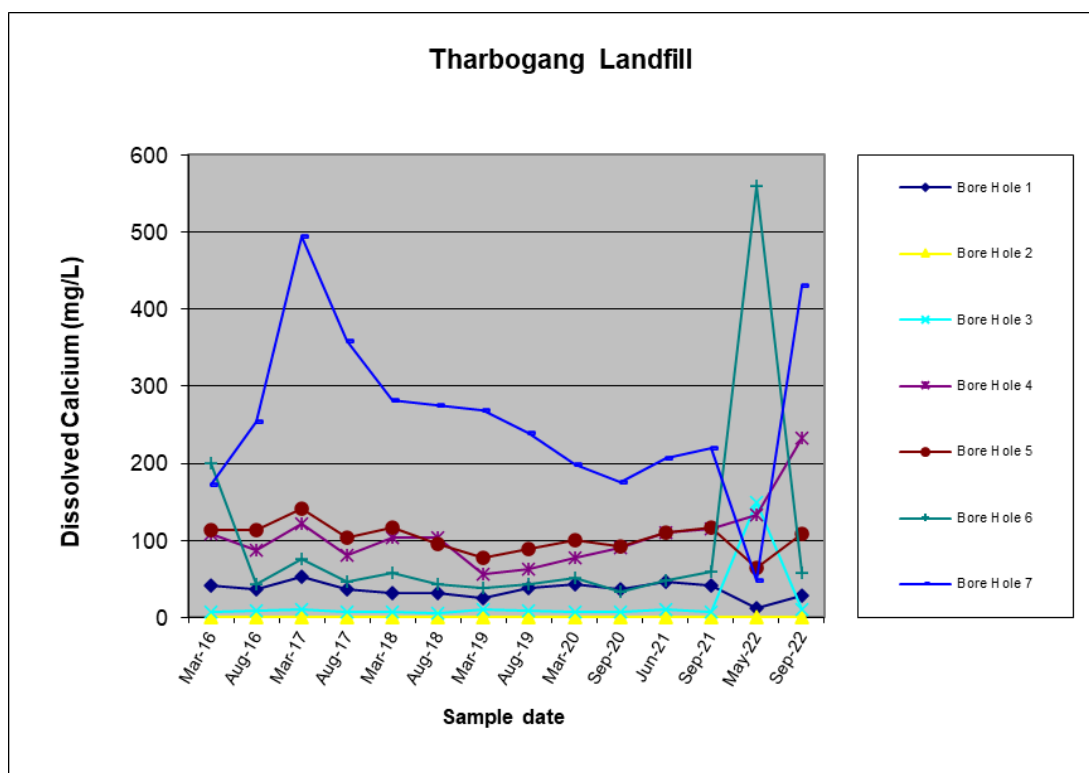


Figure 4-13: Dissolved calcium trends (mg/L)

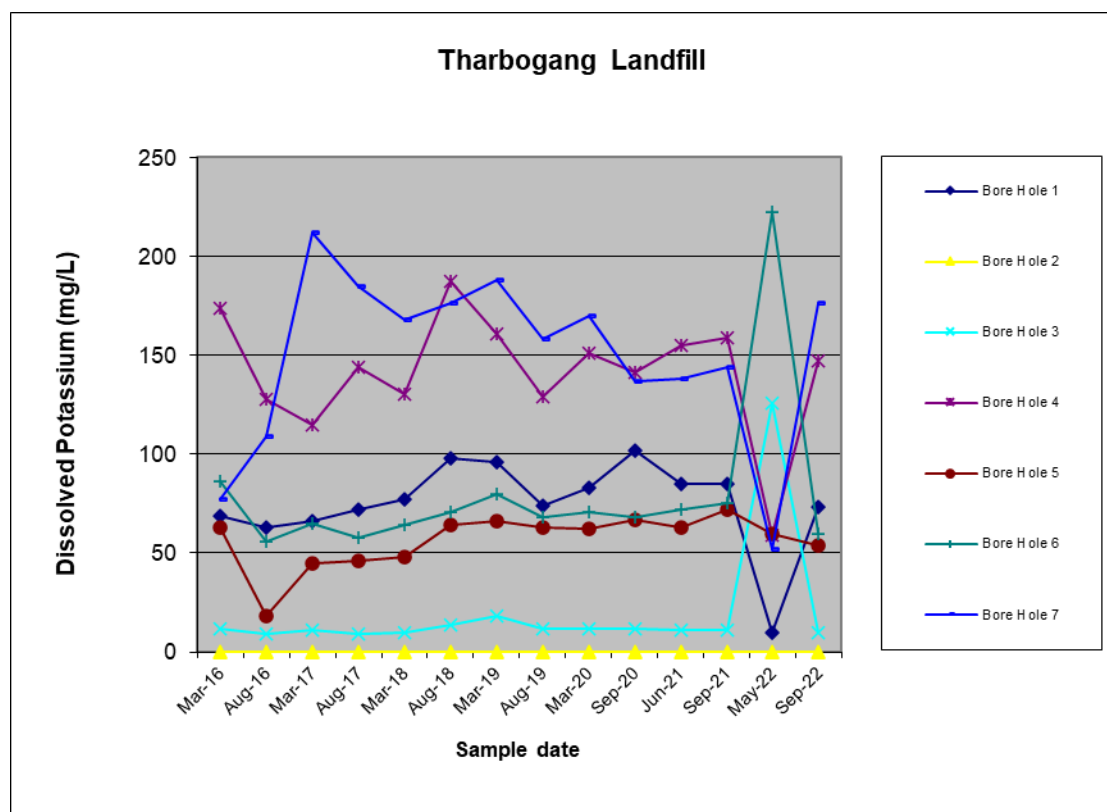


Figure 4-14: Potassium trends (mg/L)

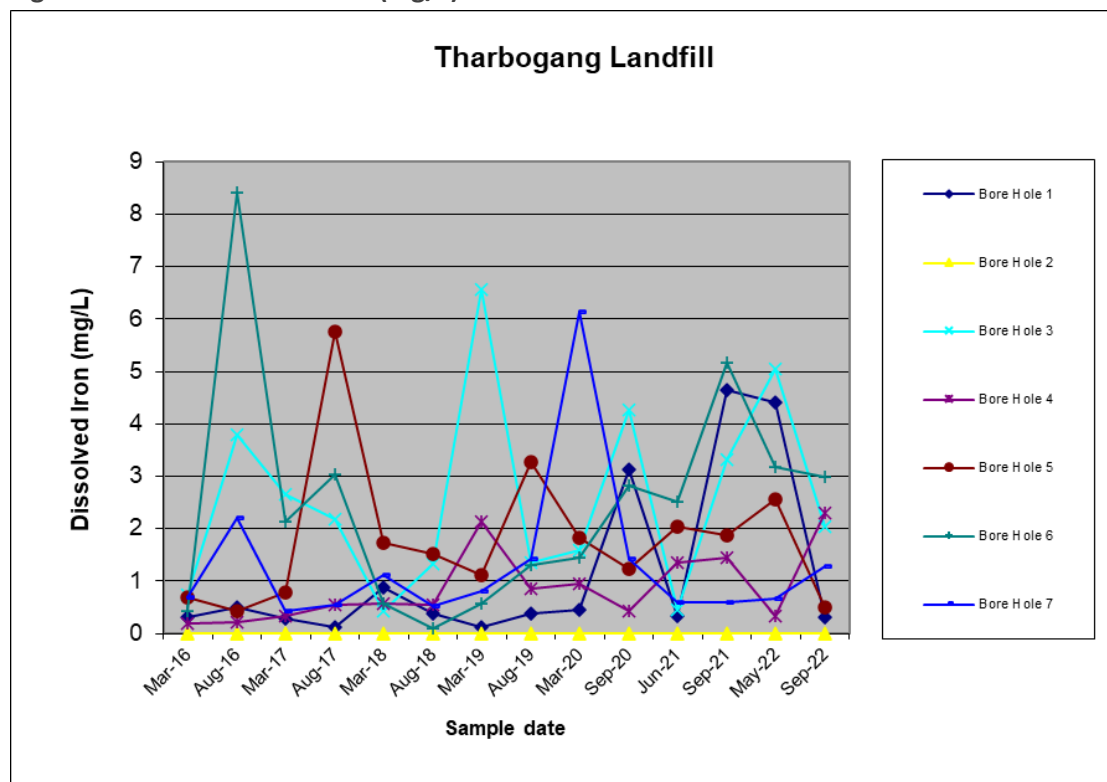


Figure 4-15: Iron trends (mg/L)

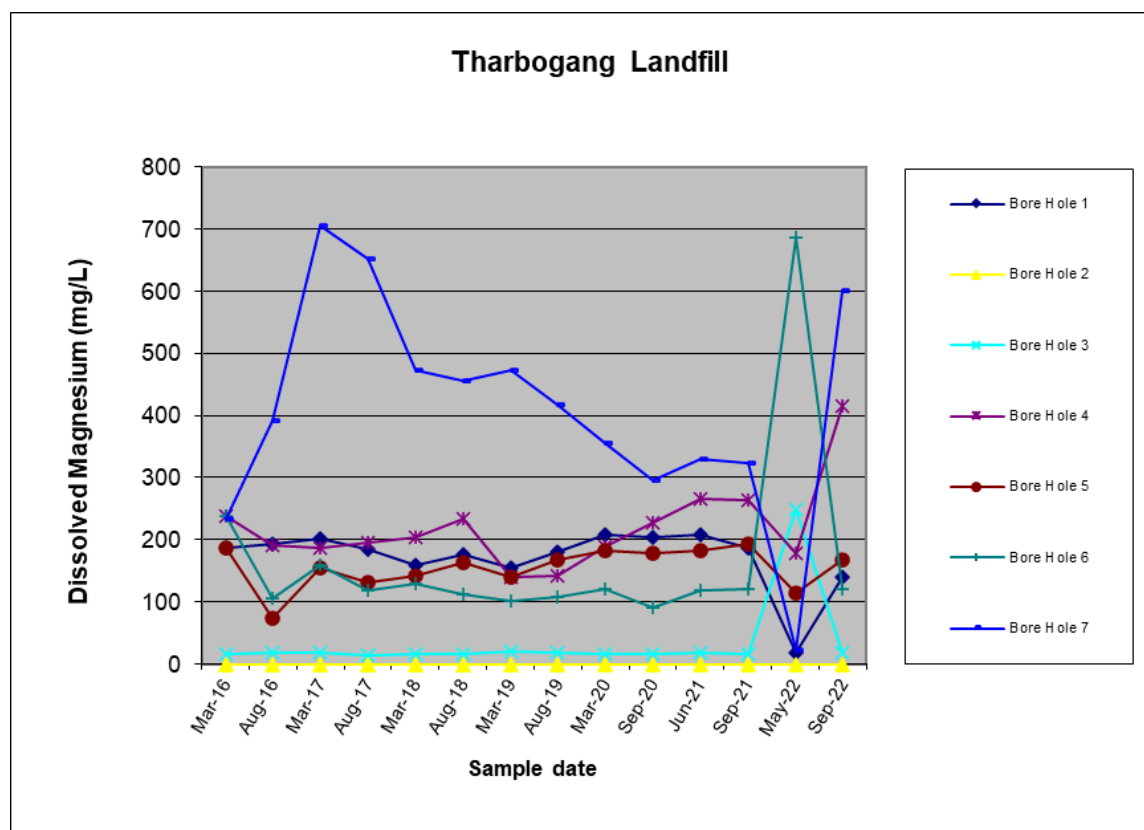


Figure 4-16: Magnesium trends (mg/L)

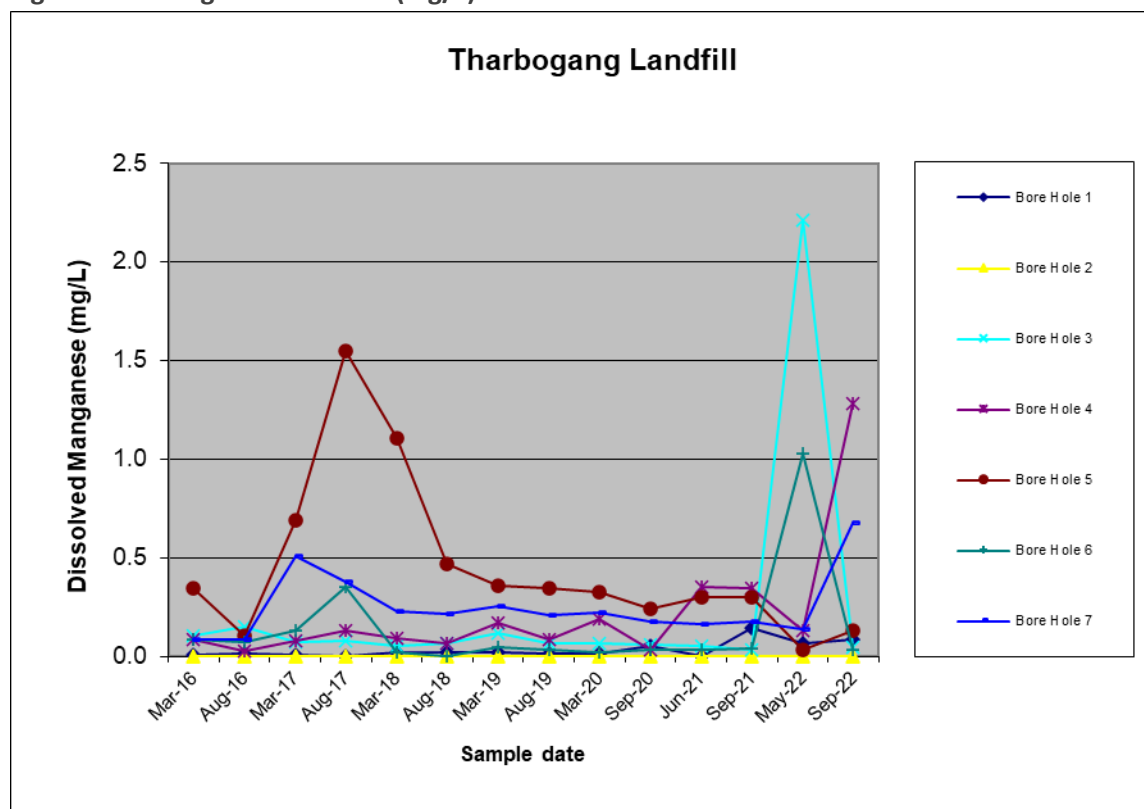


Figure 4-17: Manganese trends (mg/L)

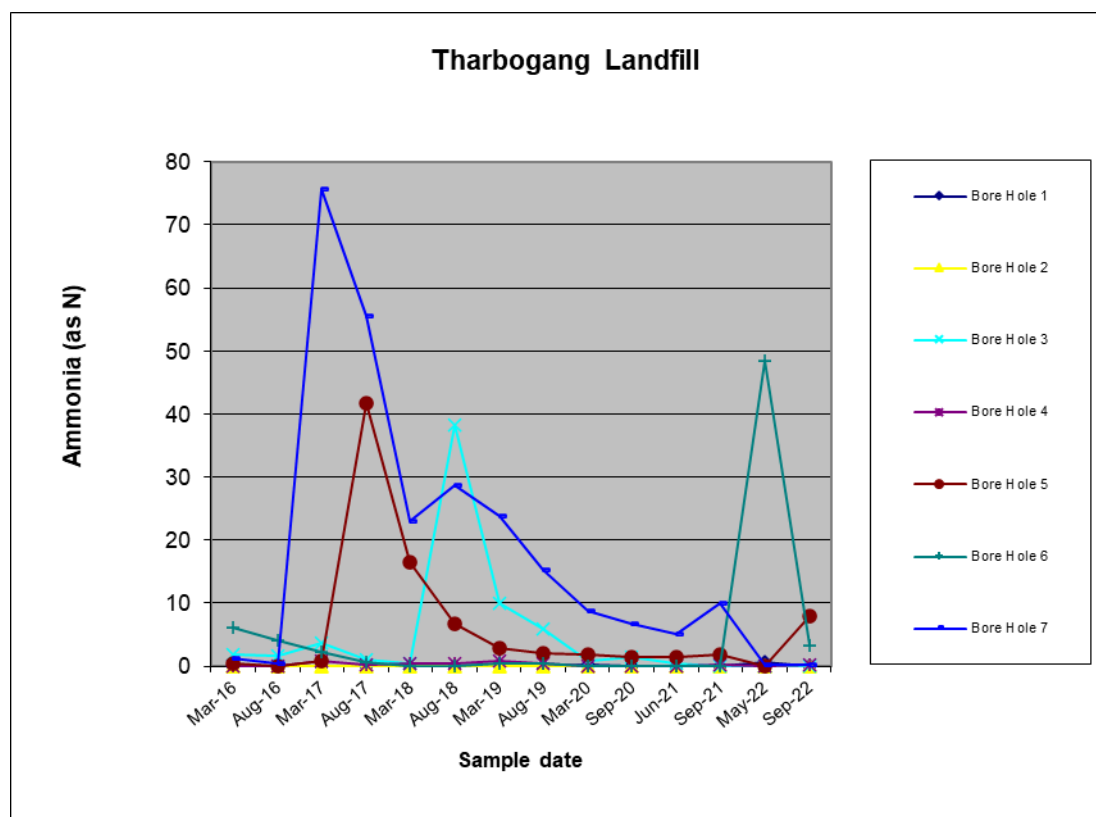


Figure 4-18: Ammonia trends (as N mg/L)

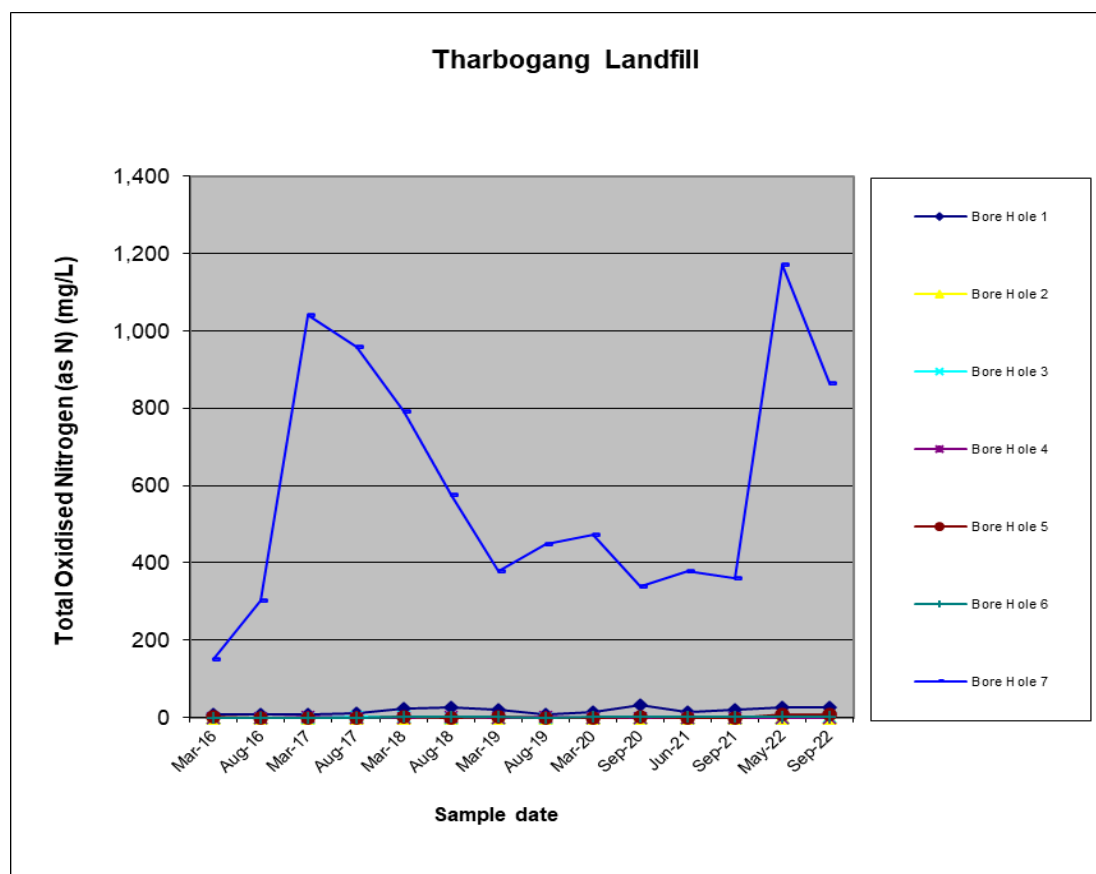


Figure 4-19: Total Oxidised Nitrogen (as N mg/L)

The site appears to be largely compliant regarding all aspects relevant to the licence conditions listed below in Section 4.5.3. Assessment of the monitoring data shows that Bore 2 and Tharbogang Swamp was dry over the entire assessment period.

A hydrological investigation was carried out by Geolyse in 2015 which, amongst other things, undertook a comparison of analyte concentrations from boreholes upgradient of the landfill footprint with corresponding concentrations at downgradient boreholes and assessing for increasing or decreasing trends in contaminant concentrations.

No additional boreholes have been installed. However, the hydrological investigation carried out by Geolyse (2015) concluded that *installation of additional piezometers and/or implementing a more rigorous groundwater monitoring program to (a) replace non-viable monitoring location BH2, and/or (b) demarcate the extent of nondelineated impacts (known or potential), is not considered necessary.* It further concluded that based on the groundwater flow direction at the site's downgradient boundary tending towards the north, it is considered unlikely that groundwater impacts from Tharbogang WMC would be adversely affecting the groundwater quality of Tharbogang Swamp.

*Geolyse (2015) recommended the current biannual groundwater monitoring programme be continued at the site to continue to assess for adverse impacts to groundwater quality. Inclusion of TPH/TRH in the groundwater monitoring parameters as a discrete event may allow for better characterisation of such impacts, however long-term TPH/TRH monitoring is not considered to be necessary (unless significantly elevated concentrations are identified).*

*Geolyse (2015) report concluded that the existing groundwater monitoring programme and network at the site satisfactorily characterises groundwater impacts at the site that may be attributable to landfilling activities.*

Subsequent groundwater monitoring has been undertaken by Stygoecologia and NGH. In 2019, Stygoecologia suggested that many of the historical spikes in nutrient levels could be attributed to natural background levels due to the higher clay content of the substrate or in some cases high rainfall events.

In their most recent report, NGH (2022) produced the following key findings:

- Depth to groundwater has fluctuated in the last four years. Upward trends and peaks in the data for the last year correlates with increases in monthly rainfall.
- Groundwater results for BH4, BH6 and BH7 observed parameters that were higher than BH1, all other boreholes were relatively consistent with BH1.
- pH patterns have remained stable for all bores and were consistent with rainfall events.
- Elevated levels of dissolved calcium and magnesium were recorded BH6 and BH7. These levels are similar to results from peaks in August 2017.
- Sulphate, fluoride, alkalinity, chloride, and specific conductance levels have fluctuated through the 2021/2022 period for all bores.
- Elevated ammonia levels over the past four years have been steadily decreasing. Elevated ammonia levels can be observed in BH5 and BH6. Elevated ammonia levels in BH3 and BH7 have been decreasing through the 2021/2022 period.
- Total oxidised nitrogen levels remain elevated in BH7 through the 2021/2022 period, consistent over the last 4 years.

### 4.5.3 Review

An assessment of the monitoring results against the regulatory framework is presented in Table 4-12.

**Table 4-12: Groundwater compliance assessment**

Condition	Review
<b>Project Approval</b>	
Condition 20-26, Schedule 3	A Soil, Water and Leachate Management Plan has been developed.
<b>EPL</b>	
P1.1	Monitoring of EPA points 1, 3-7 and ponds 8 and 9 was completed in May and September 2022.
L1.1	No pollution of waters under the POEO Act has occurred.
M1	<p>Monitoring results have been recorded and retained correctly.</p> <p>All records are legible and the date, time, location and person collecting have been recorded.</p> <p>The Sample Receipt Notification and Chain of Custody for all samples are saved in Council's document management system.</p> <p>All six boreholes at Tharbogang Waste Management Centre were sampled twice as per EPL requirements in:</p> <ul style="list-style-type: none"> <li>• May 2022;</li> <li>• September 2022.</li> </ul>
M2	All required pollutants have been monitored.
M3	<p>No indication as to whether monitoring followed the Approved Methods Publication.</p> <p>Council has advised that testing is carried out by Council staff with suitable water and ground water sampling experience and the Contactor (Australian Laboratory Services) who analyses the groundwater samples has had their analysis techniques approved by the EPA.</p>
<b>EA</b>	
<b>(See section 4.5.1 for description of 'condition')</b>	
C	A Groundwater Monitoring Program has been included in the Soil, Water and Leachate Management Plan.



Not Triggered	
A	No new boreholes have been installed in the past 10 years. However, a hydrogeological investigation carried out by Geolyse (2015) concluded that <i>installation of additional piezometers and/or implementing a more rigorous groundwater monitoring program to (a) replace non-viable monitoring location BH2, and/or (b) demarcate the extent of nondelineated impacts (known or potential), is not considered necessary.</i>
B	No new bores have been required in accordance with the Hydrogeological Investigation carried out by Geolyse in 2015.
D	Not applicable at this stage.

## 4.6 Surface Water

### 4.6.1 Monitoring and Management Criteria

Surface water criteria is provided by the PA, EPL and EA. The PA specifies the following conditions:

- Discharging water must comply with Section 120 of the POEO Act, unless provided for by an EPL (Condition 14, Schedule 3).
- Stormwater must be controlled and diverted through appropriate erosion and sediment control/pollution measures (Condition 15, Schedule 3).
- *Sewerage on site shall be managed and comply with the Environment and Health Protection Guidelines - On site sewerage management for Single Households (1998) (Condition 16, Schedule 3).*
- All water that has come in contact with waste must not be discharged from the site (Condition 17, Schedule 3).
- A Soil, Water and Leachate Management Plan must be prepared and implemented, which must include a site water balance, erosion and sediment control plan, stormwater management scheme, surface water monitoring program and surface water response plan (Condition 20-26, Schedule 3).

Surface water criteria addressed under the EPL comprises a surface water quality monitoring point (EPA point 8 and 9) (M2) and the requirement to comply with the POEO Act, prohibiting the pollution of waters (L1.1). The EPL states that monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area must be done in accordance with the Approved Methods Publication unless another method has been approved in writing by the EPA before any tests are conducted (M3).

Surface runoff is also addressed by the EPL. The sedimentation basin and leachate holding ponds must be maintained to ensure their design capacity is available for stormwater and leachate (O5.1). Additionally, the perimeter of the areas where waste has been landfilled must be contoured to

prevent stormwater running onto these surfaces from all storm events less than or equal to a 1 in 10 year 24 hour duration storm event (O5.2).

Finally, the following mitigation and management commitments were made in the EA and revised for the PA. The EA (Balance 2009) has previously assessed the surface water impacts. They identified an increase in potentially contaminated runoff from additional landfill as well as increased erosion and sediment laden runoff from disturbed areas. This is due to additional landfill and additional quarry pits and associated infrastructure. Operations have not commenced within pits 101 and 103 and the EA recommends further improvement to the Soil, Water and Leachate Management Plan:

- Preparation of a surface water management plan to the satisfaction of NSW Office of Water. This should include measures to ensure that contaminated runoff will not leave the site (A),
- Construct diversion drains and bunds around perimeter of the quarry pits (B),
- Install pumps to divert surface water to settlement and stormwater detention ponds (C),
- Install sediment traps at discharge points (D),
- Incorporate energy dissipation and erosion protection measures in surface water diversions (E),
- Install table drains, culvert pipes and silt traps on all new roads (F),
- Undertake all engineering works to minimise erosion and soil contamination; (G),
- Ensure all water storages are engineered for peak weather events (1 in 100 year 72 hour rainfall event) (H),
- The stormwater detention pond will be lined with a flexible membrane and the water quality monitored on a quarterly basis; (I)
- Install operational backflow device on potable water supply pipeline (J),
- Identify, map and colour code all pipelines on site (K),
- Construct surface water diversions around the landfill (L),
- Construct / install stormwater and sedimentation controls (M),
- Install closed leachate collection system and surface water controls around landfill (N),
- Install sedimentation dam (pond) and drainage channels to direct water from quarries (O),
- Periodically check and empty sediment trap at settlement dam (pond) (P), and
- Visual inspection of engineering works on a daily basis (Q).

#### 4.6.2 Results

Griffith City Council has prepared a management plan for surface water: *Tharbogang Waste Management Centre: Soil, Water & Leachate Management Plan (v2.0)*. This plan forms an important part of the greater environmental monitoring plans for the site and formally addresses the water quality monitoring requirements.

The pollutants which are required to be monitored during the reporting period are identified in Table 4-13 and a summary of the results presented in Table 4-14. The trends for each pollutant over time are shown in Figure 4-20 to Figure 4-35.

The following areas are to be monitored bi-annually at Tharbogang:

- Leachate Pond
- Sedimentation Pond
- Tharbogang Swamp

Surface water monitoring was undertaken in May and September 2022 within the Leachate Pond and Sediment Pond (results supplied by Griffith City Council). However, no monitoring was undertaken for Tharbogang Swamp as the swamp was dry. Monitoring of the leachate and sedimentation ponds is undertaken in accordance with the specific assessment criteria.

Peak weather events (1 in 100 year 72 hour rainfall events) require water quality monitoring of leachate retention ponds and other water storage areas. January and October both had some flooding in this area. October 2022 had the highest October rainfall since first recording in this area in 1958.

Contour banks are maintained to divert any runoff. As part of the stormwater redesigned and construction project, new cut off drains, culverts and piped drains were constructed. The drainage swale that delivers the stormwater runoff into the Sedimentation Pond was reinstated and the swale outlet was desilted in the process (GCC unpublished).

#### Alkalinity

- All ponds sampled were below the trigger values for this monitoring period.

#### Ammonia

- The Sedimentation Pond was within normal limits for Ammonia in this monitoring period, the Leachate Pond has fluctuated over the past few years and was above the trigger value of 0.9 mg/L at 5.13 mg/L in May 2022 before dropping within normal levels in September.

#### Calcium

- All ponds sampled were below the trigger values for this monitoring period.

#### Chloride

- All ponds sampled were below the trigger values for this monitoring period.

#### Volatile Organics

- All ponds sampled were below the trigger values for this monitoring period.

#### Conductivity

- The Leachate Pond has previously fluctuated above the trigger values, reaching a peak of 188,000  $\mu\text{S}/\text{cm}$  in March 2018. Conductivity levels were above the trigger values for both May and September 2022. The Sedimentation Pond has lower levels than the Leachate Pond and is fairly stable, however both samples were above the trigger value for this monitoring period.

#### Fluoride

- Both ponds sampled were below the trigger value for this monitoring period.

#### Iron

- The Sedimentation Pond and the Leachate Pond both had a slight increase from May to September 2022, and all samples from this monitoring period were above the trigger value.

#### Magnesium

- All ponds sampled were below the trigger values for this monitoring period.

#### Manganese

- Both the Leachate Pond and the Sedimentation Pond had an increase in Manganese from May to September 2022, however, both remained within acceptable ranges for this monitoring period.

#### Total Oxidised Nitrogen

- The Leachate Pond remained relatively stable and within ranges for this monitoring period.
- The Sedimentation Pond increased slightly from May to September 2022 with both samples exceeding the trigger value.

#### Potassium

- All ponds sampled remained stable and below the trigger values for this monitoring period.

#### Sodium

- All ponds sampled remained stable and below the trigger values for this monitoring period.

#### Sulphate

- All ponds sampled remained stable and below the trigger values for this monitoring period.

#### Total Phenol

- All ponds sampled remained stable and below the trigger values for this monitoring period.

#### Total Org Carbon

- The Leachate Pond and Sedimentation Pond were both above the trigger values for this monitoring period.

#### Suspended Solid

- All ponds sampled remained stable and below the trigger values for this monitoring period.

#### pH

- The Leachate Pond was within acceptable limits for this monitoring period.
- The Sedimentation Pond exceeded the trigger values in May 2022 with a pH of 8.78, and then decreased to 8.38 in September which was within acceptable limits.

**Table 4-13: Pollutant Monitoring required by the EPL and completed during the reporting period**

	Leachate Pond		Sedimentation Pond		Tharbogang Swamp	
	Frequency	Completed	Frequency	Completed	Frequency	Completed
Alkalinity (as calcium carbonate)	Bi-annual	Y	Bi-annual	Y	-	-
Ammonia	Bi-annual	Y	Bi-annual	Y	-	-
Calcium	Bi-annual	Y	Bi-annual	Y	-	-
Chloride	Bi-annual	Y	Bi-annual	Y	-	-
Chlorinated volatile compounds	Bi-annual	Y	Bi-annual	Y	-	-
Conductivity	<b>Not required</b>	Y	Bi-annual	Y	-	-
Fluoride	Bi-annual	Y	Bi-annual	Y	-	-
Iron	Bi-annual	Y	Bi-annual	Y	-	-
Magnesium	Bi-annual	Y	Bi-annual	Y	-	-
Manganese	Bi-annual	Y	Bi-annual	Y	-	-
Nitrate	Bi-annual	Y	Bi-annual	Y	-	-
Potassium	Bi-annual	Y	Bi-annual	Y	-	-
Sodium	Bi-annual	Y	Bi-annual	Y	-	-
Sulphate	Bi-annual	Y	Bi-annual	Y	-	-
Total Phenolics	Bi-annual	Y	Bi-annual	Y	-	-
Total organic carbon	Bi-annual	Y	Bi-annual	Y	-	-
Total Suspended solids	Bi-annual	Y	Bi-annual	Y	-	-
pH	Bi-annual	Y	Bi-annual	Y	-	-

Table 4-14: Summary of surface water results during the monitoring period

Monitoring Point	Date	Alkalinity (mg/L)	Ammonia (as N) (mg/L) N	Dissolved Calcium (mg/L)	Chloride (mg/L)	Volatile Organics (ug/L)	Sp. Conductance (uS/cm)	Fluoride (mg/L)	Dissolved Iron (mg/L)	Dissolved Magnesium (mg/l)	Dissolved Manganese (mg/L)	Total Oxidised Nitrogen (as N) (mg/L)	Dissolved Potassium (mg/L)	Dissolved Sodium (mg/l)	Sulphate (mg/L)	Total Phenol (mg/L)	Total Org Carbon filt- (mg/L)	Suspended Solid (mg/L)	pH
Trigger Value		744	0.9	102	2794	50	350	0.7	0.3	184	1.9	0.4	410	1775	513	1	4	138	6.5-8.5
Leachate Pond	May-22	465	5.13	28	535	<0.50	2,270	0.5	0.54	46	0.108	0.13	137	341	5	<1.0	103	48	7.27
	Sep-22	609	0.09	30	528	<0.50	2,730	0.3	0.75	51	0.232	0.01	148	366	8	<1.0	89	9	8.27
Sedimentation Pond	May-22	321	0.59	50	154	<0.50	1,080	0.5	0.48	32	0.118	0.43	53	114	8	<1.0	44	<5	8.78
	Sep-22	269	0.15	50	114	<0.50	953	0.3	0.66	24	0.367	1.7	52	76	27	<1.0	36	10	8.38
Tharbogang Swamp	May-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sep-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

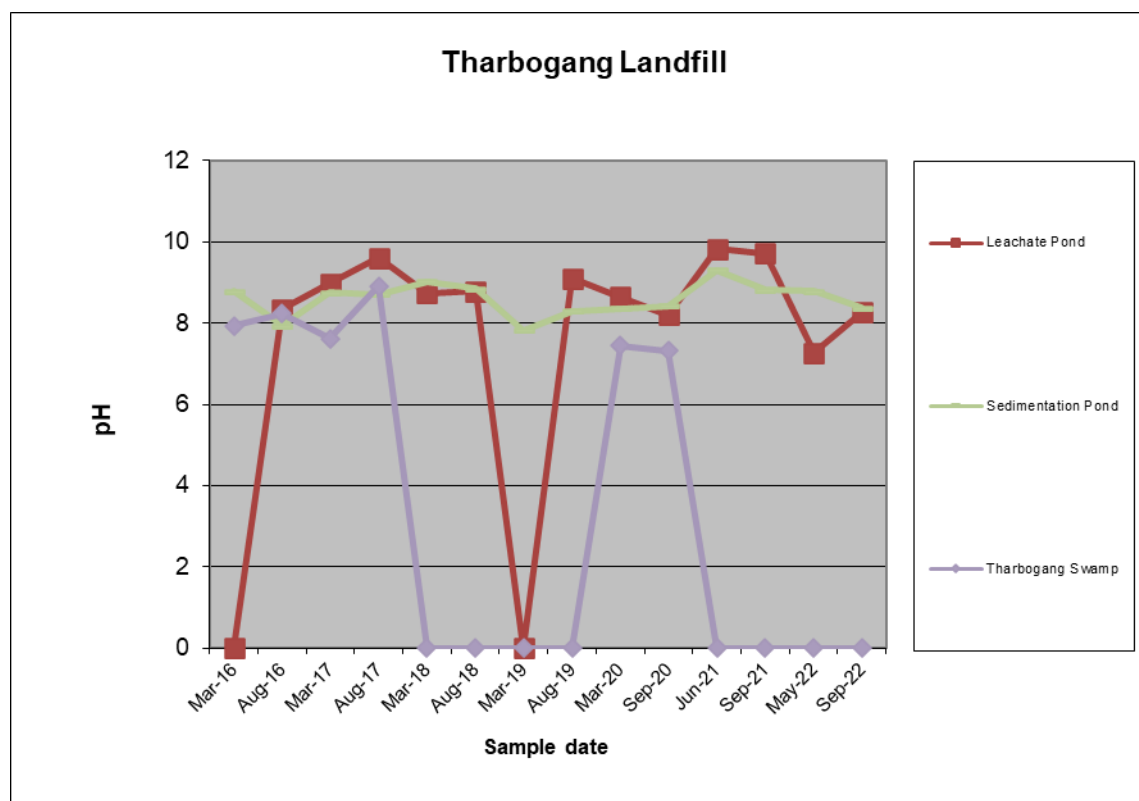


Figure 4-20: pH trends

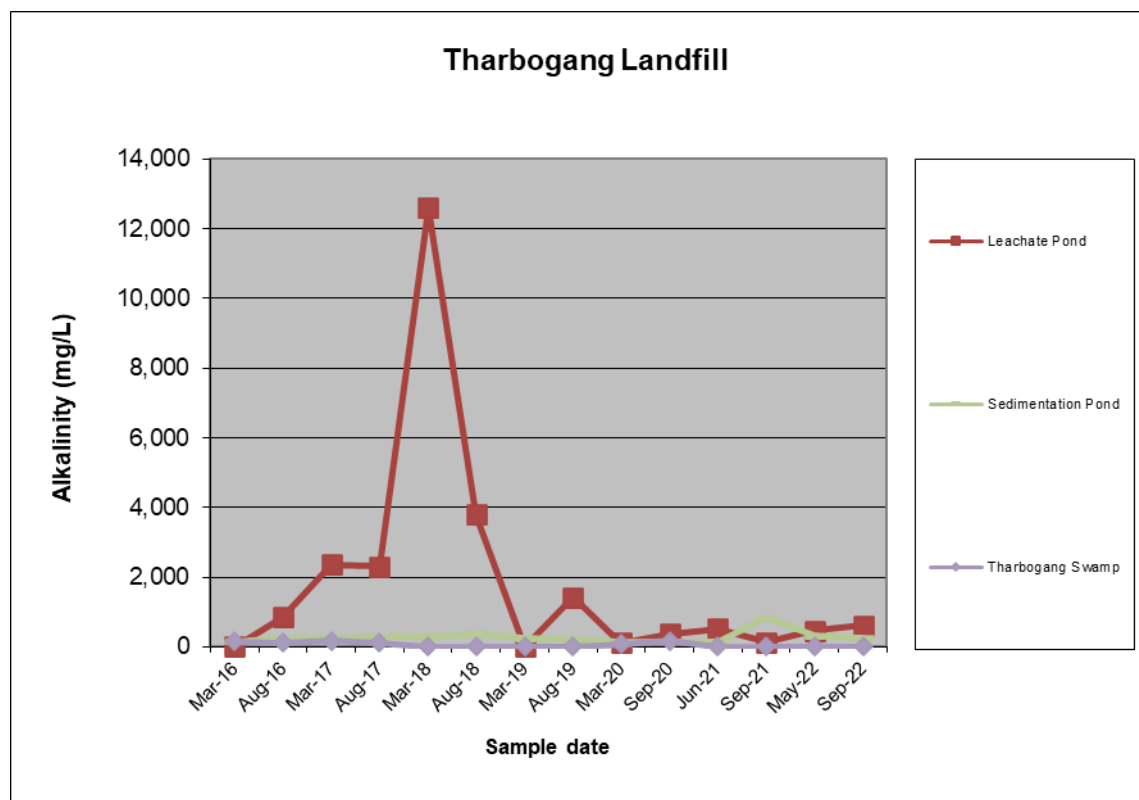


Figure 4-21: Alkalinity trends (mg/L)



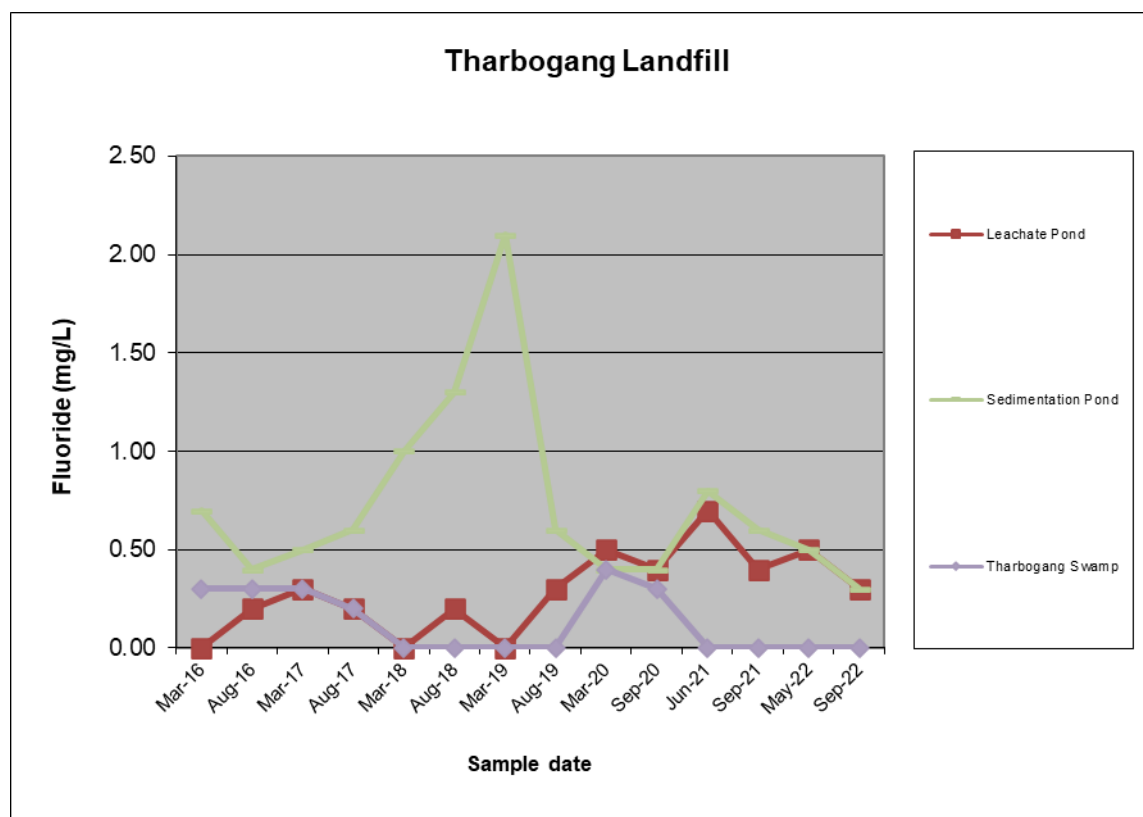


Figure 4-22: Fluoride trends (mg/L)

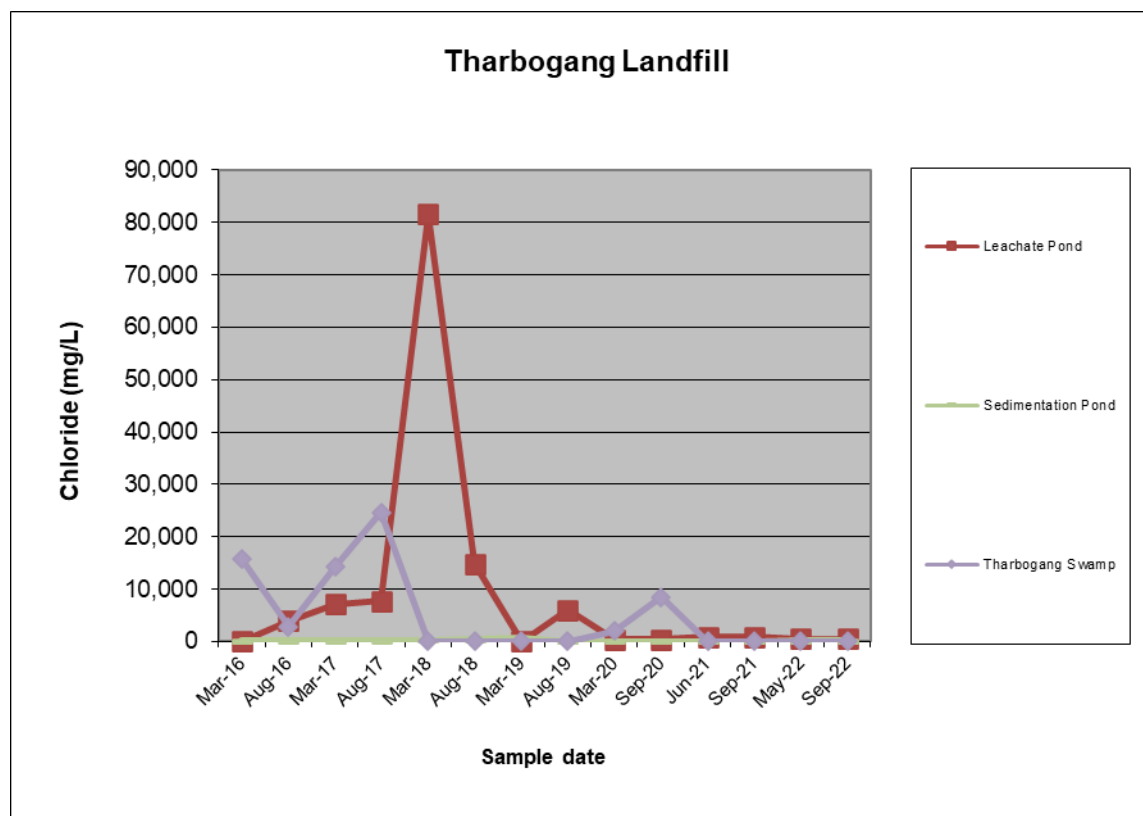


Figure 4-23: Chloride trends (mg/L)

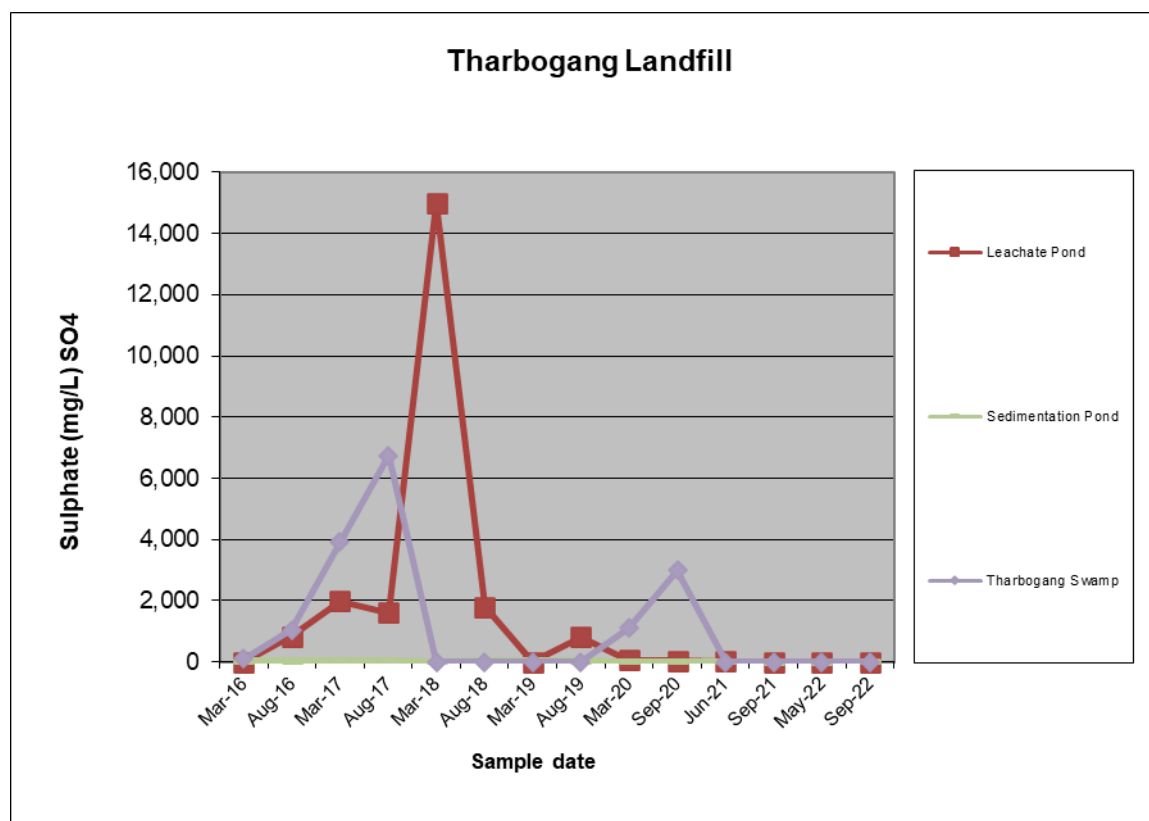


Figure 4-24: Sulphate trends (mg/L)

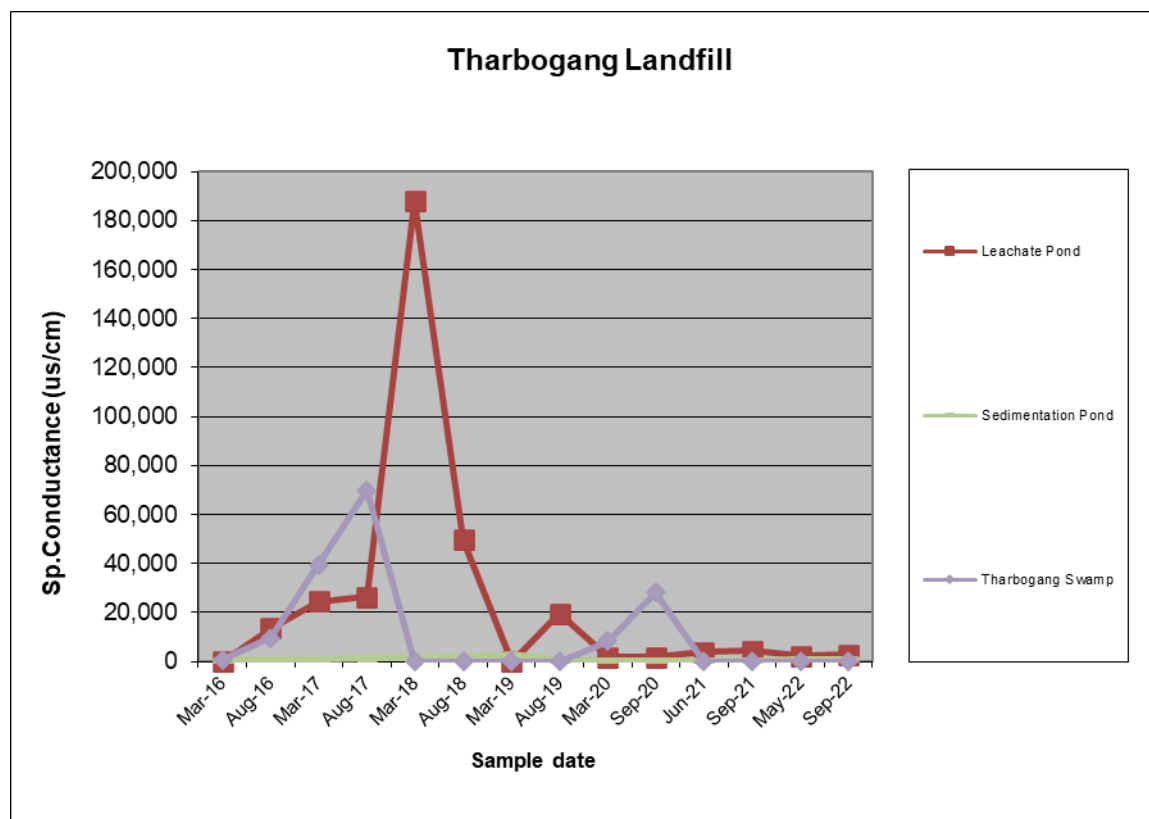


Figure 4-25: Conductivity trends (us/cm)

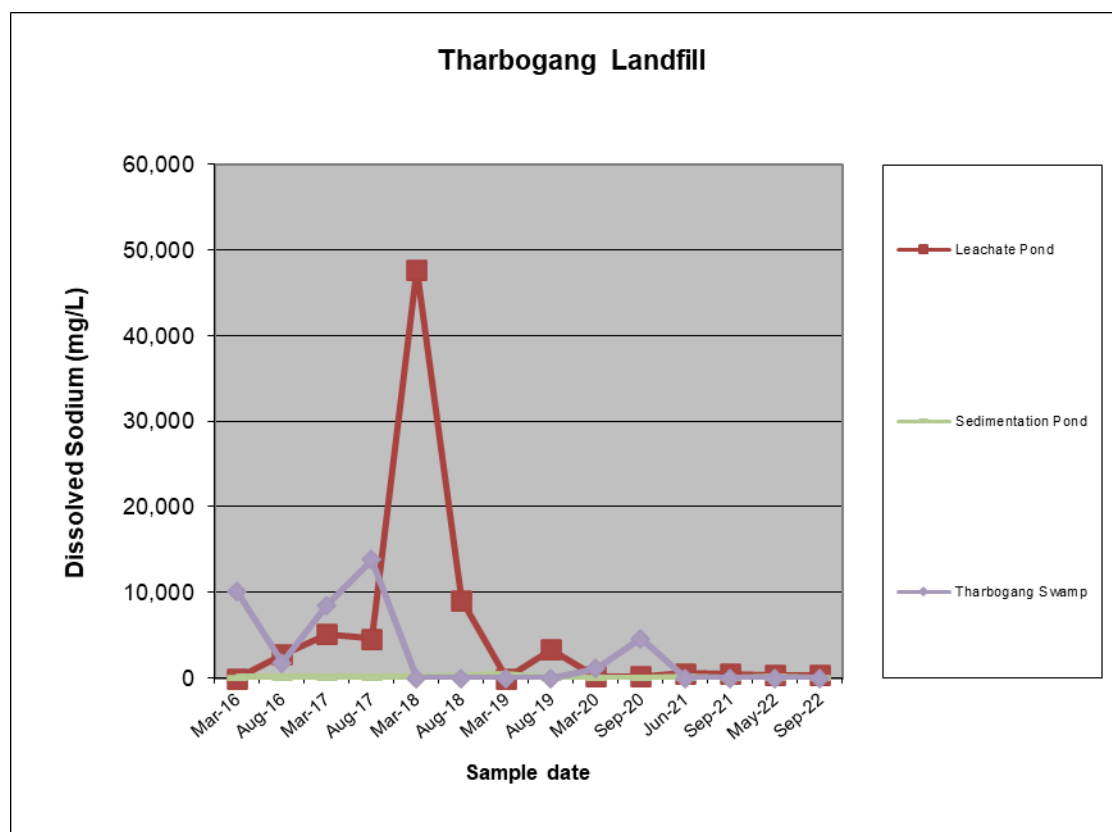


Figure 4-26: Sodium trends (mg/L)

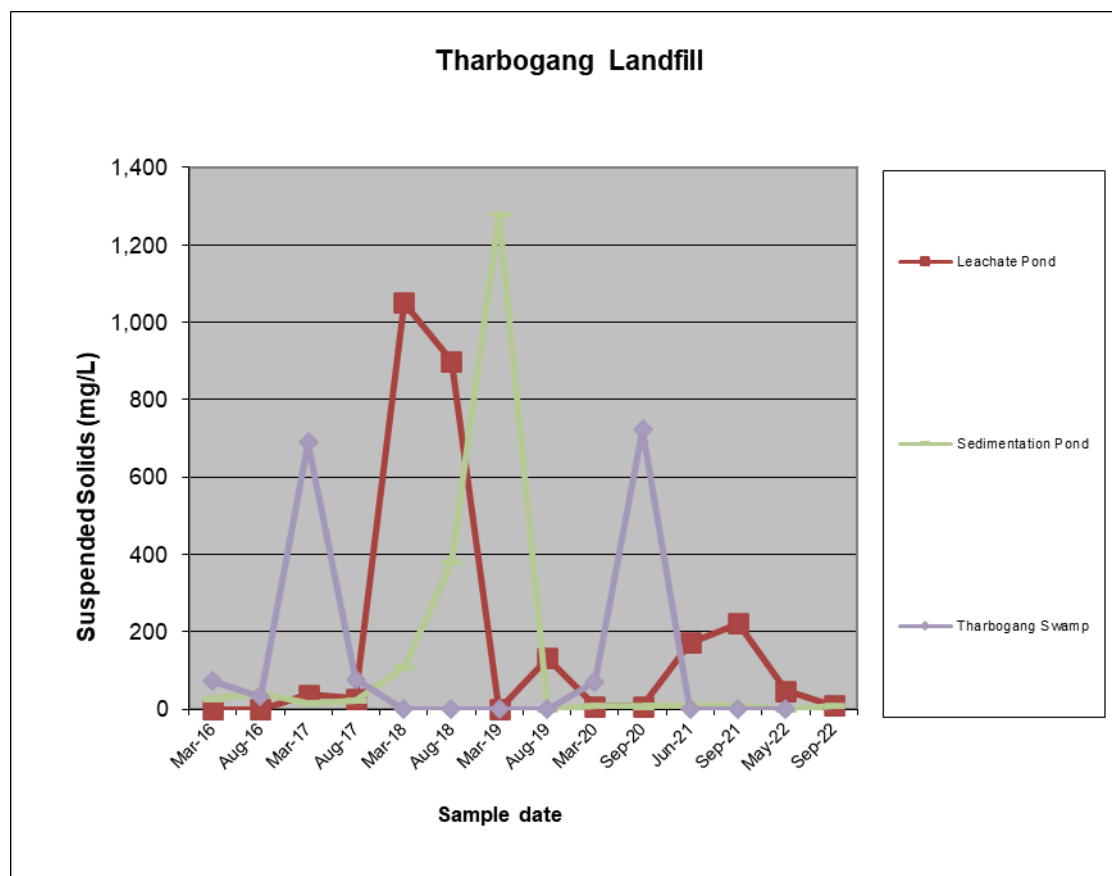


Figure 4-27: Suspended solids trends (mg/L)

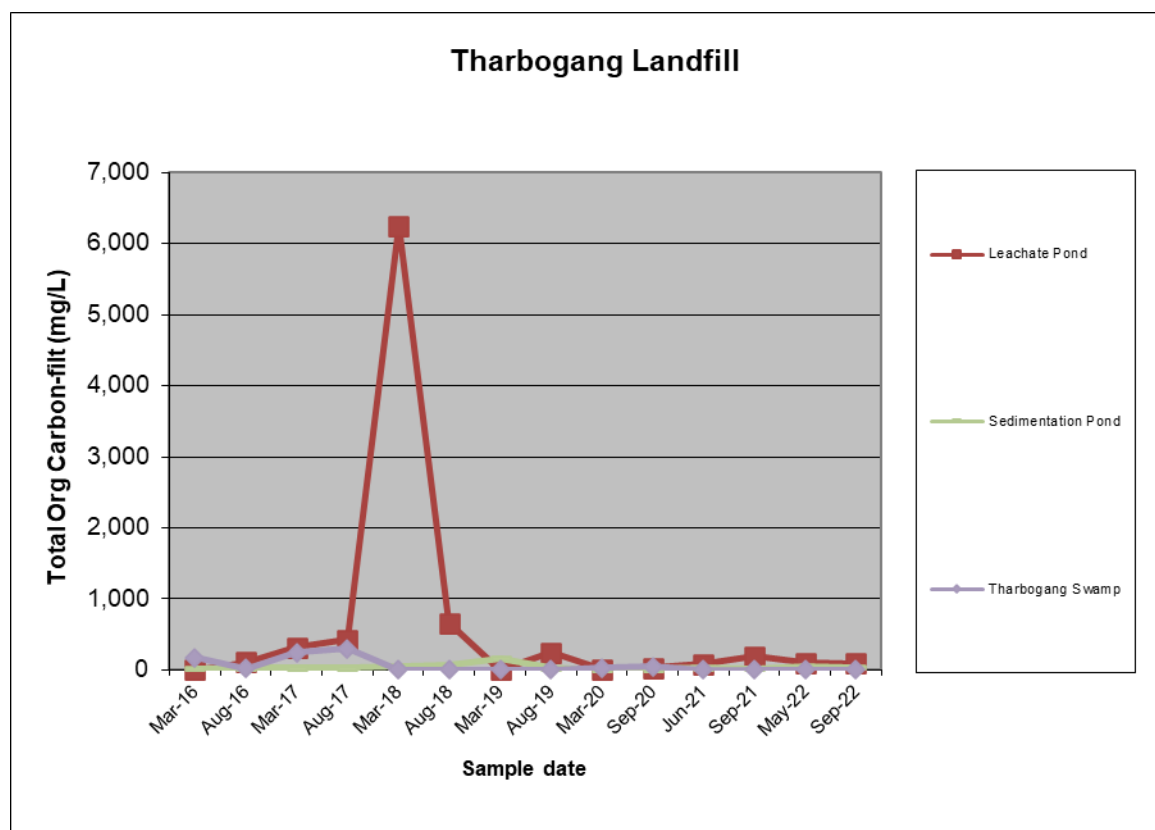


Figure 4-28: Total organic carbon trends (mg/L)

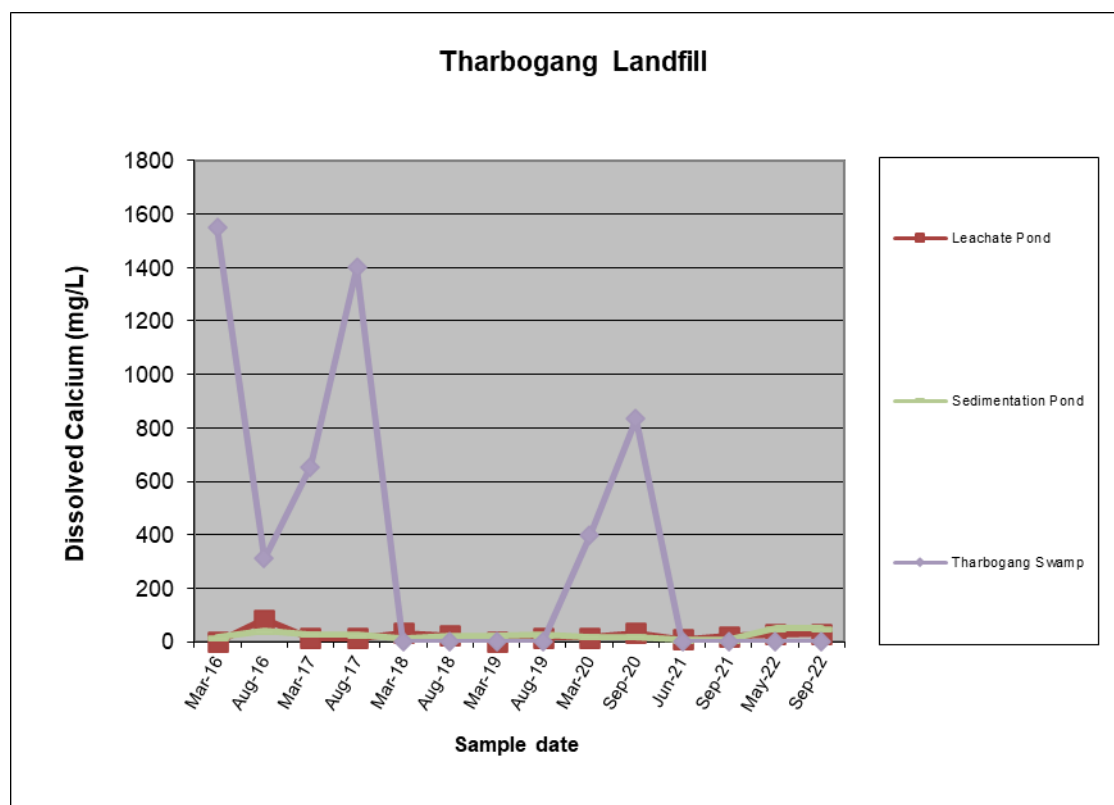


Figure 4-29: Calcium trends (mg/L)

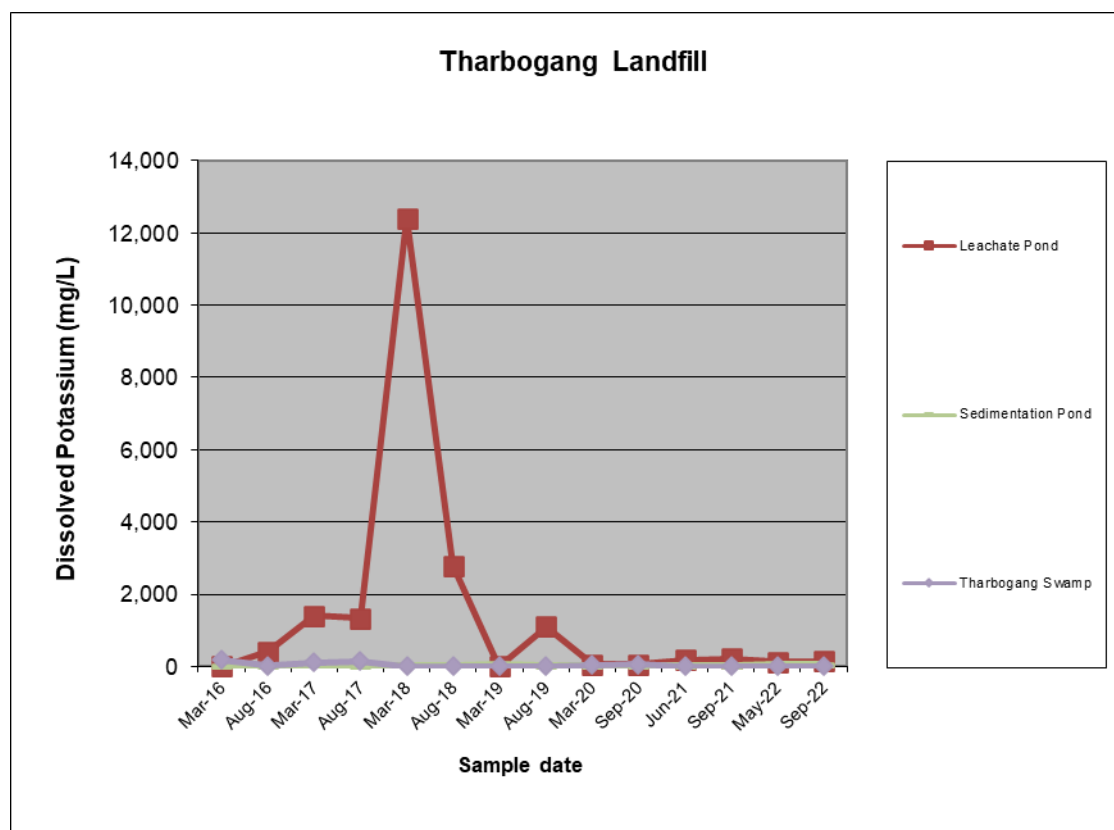


Figure 4-30: Potassium trends (mg/L)

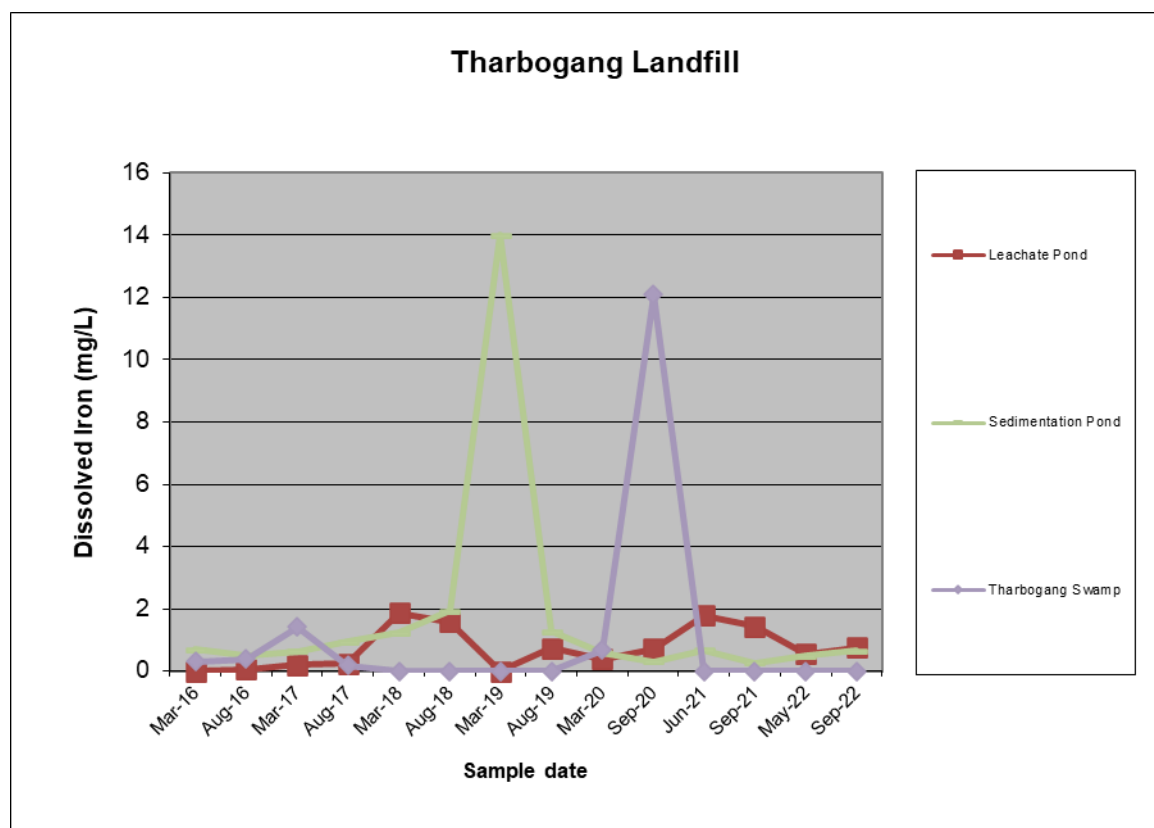


Figure 4-31: Iron trends (mg/L)

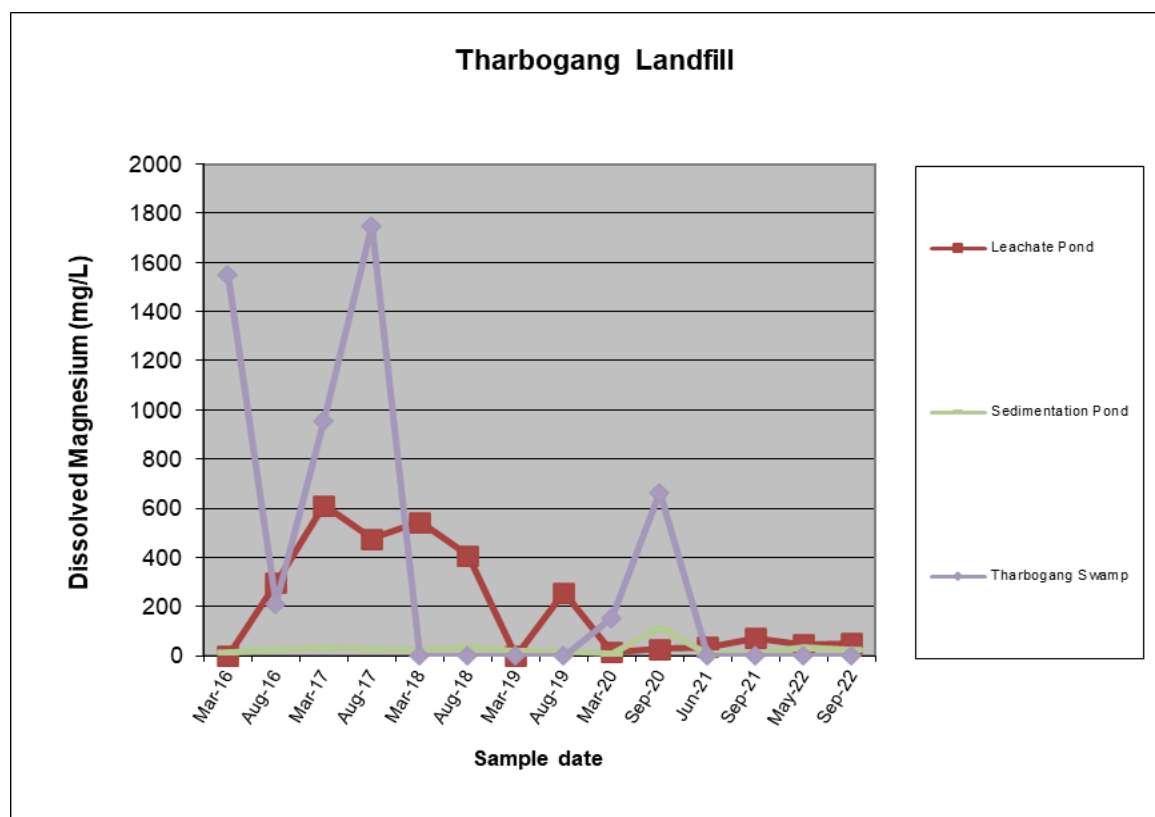


Figure 4-32: Magnesium trends (mg/L)

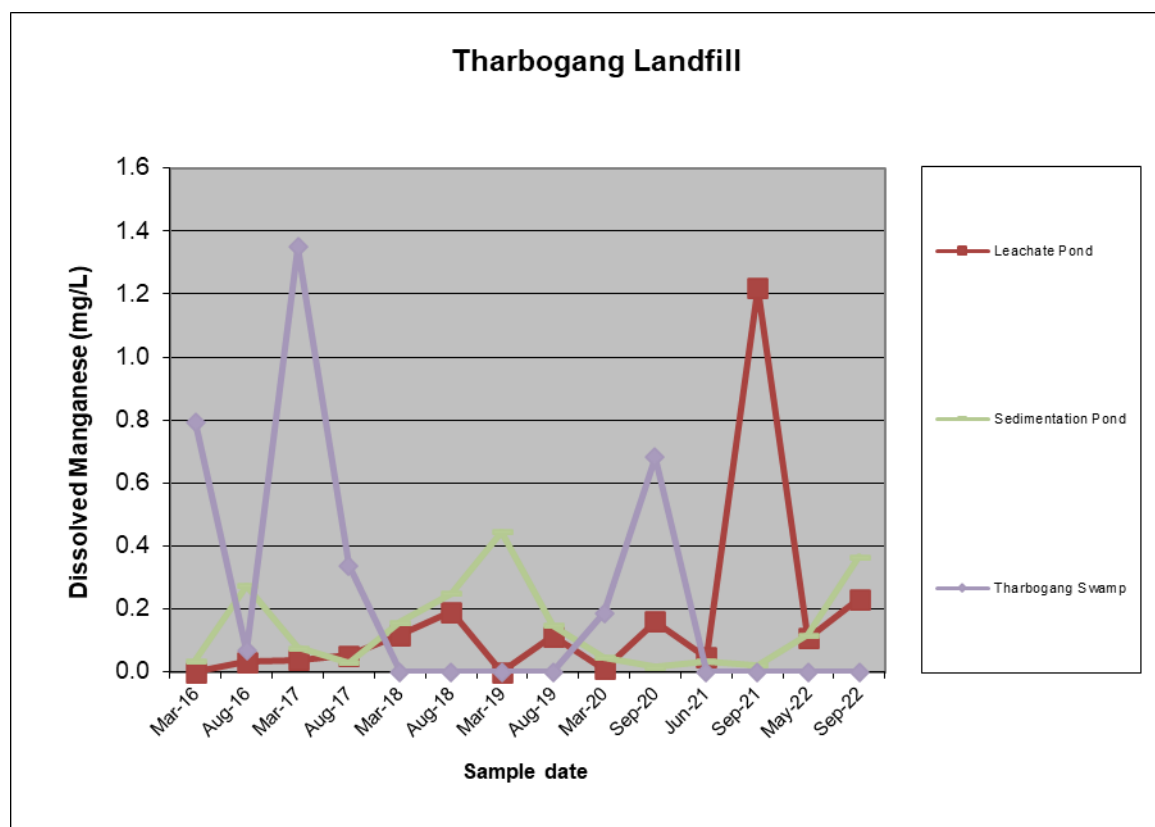


Figure 4-33: Manganese trends (mg/L)

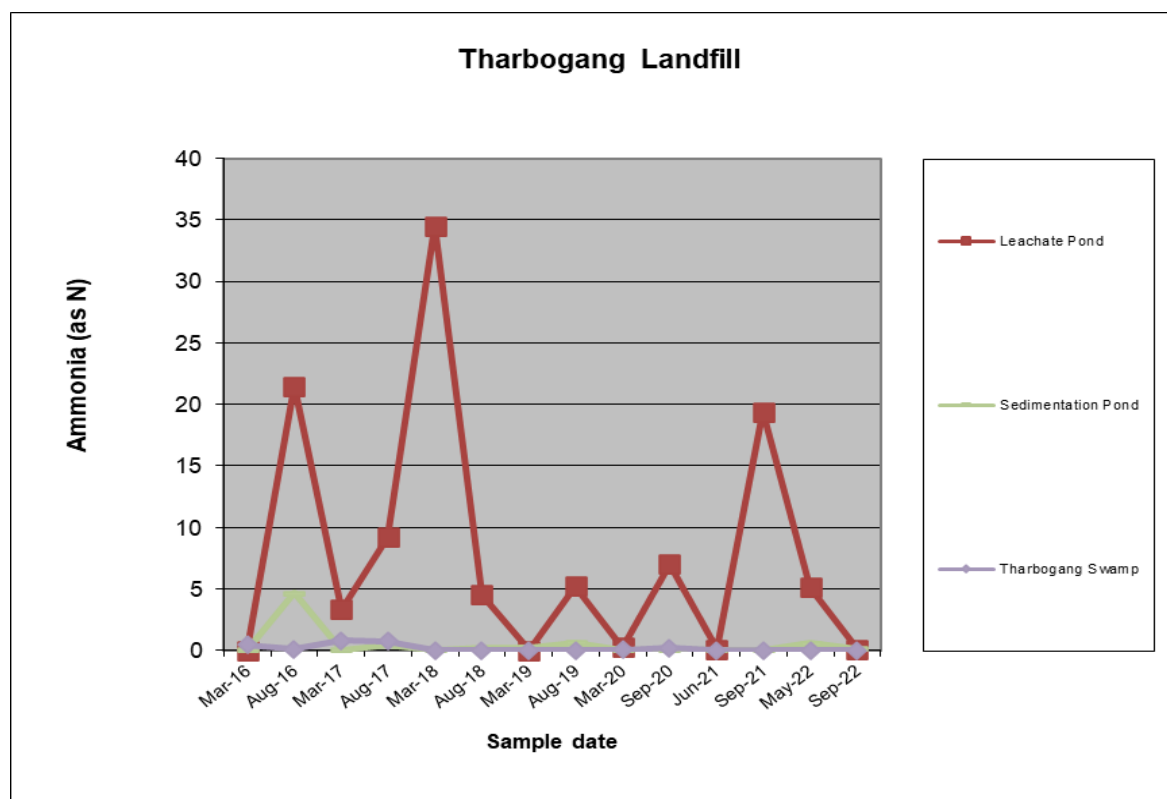


Figure 4-34: Ammonia trends (as N mg/L)

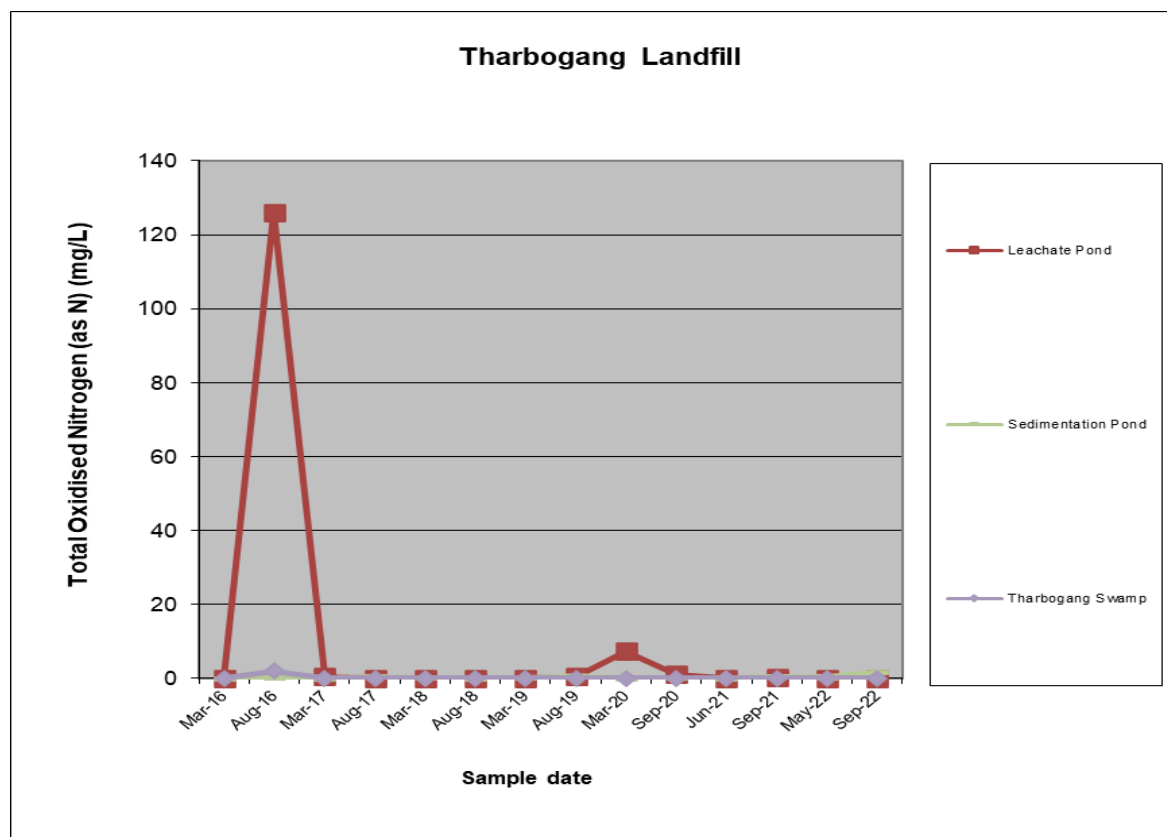


Figure 4-35: Total Oxidised Nitrogen (as N mg/L)



### 4.6.3 Review

An assessment of the monitoring results against the regulatory framework is presented in Table 4-15.

**Table 4-15: Surface Water Compliance Assessment**

Condition	Review
<b>Project Approval</b>	
Condition 14, Schedule 3	No water is discharged from site. The EPA annual return states that all stormwater that falls on the active landfill and quarry sites is contained on site and leachate is contained on site.
Condition 15, Schedule 3	Two stormwater control ponds are on site. These are proposed to be expanded in the near future. All stormwater that falls on site is contained. Rainwater and process water is pumped from the quarry collection sumps to the stormwater collection pond.
Condition 16, Schedule 3	All sewerage is contained in two septic tanks and is emptied when required.
Condition 17, Schedule 3	No water is discharged from site.
Condition 20-26, Schedule 3	A Soil, Water and Leachate Management Plan has been developed.
<b>EPL</b>	
M2.1 and M2.2	Monitoring of all attributes listed in Section M2.2 of the EPL was undertaken at the relevant sites (see Groundwater section). Tharbogang Swamp contained no water and therefore could not be monitored.
O5.1 and O5.2	All water that falls on site is contained within sedimentation basins and the landfill perimeters have been contoured. Construction has been completed for the Stormwater, Sedimentation and Leachate ponds, resulting in a more formalised contaminant system. <ul style="list-style-type: none"> <li>• Council has completed the design for the new Leachate Containment System which will cater for: Existing Landfill currently</li> <li>• Existing Landfill though the Closure and Rehabilitation process</li> <li>• New Landfill development (existing quarry)</li> </ul>
L1.1	No water is discharged from site

Condition	Review
<b>EA</b> <b>(See section 4.6.1 for description of 'condition')</b>	
A	A Soil, Water and Leachate Management Plan has been developed.
B	New diversion drains and bunds were constructed during the 2021 monitoring period.
C	<p>Council has advised that due to the formalisation of draining system (open drains, piped section and head walls) over the years there is little to no requirement for such pumps.</p> <p>If water is laying around (after a large rain event) then transfer pumps are hired to move the water along into the formalised stormwater network.</p>
D	It is understood that sediment traps have been installed at the discharge points.
E	Reinstatement of drainage swale works commenced 27/03/18 and were completed 03/05/18.
F	Table drains, culvert pipes and silt traps have been constructed.
G	All works are either designed by GCC Survey and Design section or a qualified contractor
H	Current water storages are constructed for a 1:100 ARI flood
I	<p>The stormwater pond is not lined with a flexible membrane and water quality monitoring is only undertaken twice a year.</p> <p>Construction has been completed for the Stormwater pond, resulting in a more formalised contaminant system.</p> <p>Whilst there is no Flexible membrane for the stormwater pond, there has been major formalisation stormwater works up stream.</p> <p>Council will begin works on the Stormwater and Sedimentation Ponds in the 22/23 financial year budget.</p> <p>Monitoring more than twice a year is not proposed.</p>

Condition	Review
K	Water, sewer and electrical lines are easily identifiable onsite, and Council has mapped the location of these within their GIS mapping.
M	All surface water is contained on site, any water in contact with the landfill site is treated as leachate. Construction has been completed for the Stormwater, Sedimentation and Leachate ponds, resulting in a more formalised contaminant system.
P	Work was undertaken on reinstatement of the drainage swale on 27/3/18. The drainage swale was roughly cleaned out over the full length and works completed 3/5/18.
Q	Council has advised that daily visual inspections of erosion and sediment controls began in 2021, following the recommendations of the independent audit.
<b>Not Triggered</b>	
J	Landfilling activities within the existing quarry have not commenced. All surface water is contained on site, any water in contact with the landfill site is treated as leachate.
L	Not triggered: Landfilling activities within the existing quarry have not commenced. All surface water is contained on site, any water in contact with the landfill site is treated as leachate.
N	Not triggered: Landfilling activities within the existing quarry have not commenced. All surface water is contained on site, any water in contact with the landfill site is treated as leachate.
O	Not triggered: Landfilling activities within the existing quarry have not commenced. All surface water is contained on site, any water in contact with the landfill site is treated as leachate.

## 4.7 Leachate

### 4.7.1 Monitoring and Management Criteria

Leachate criteria is provided by the PA, EPL and EA. The PA provides criteria for the collection and management of leachate (Condition 18, Schedule 3). The proponent shall:

- a) Install a leachate barrier system on any surface to be use for the direct impoundment of leachate;
- b) Ensure that this leachate barrier system:
  - a. has a re-compacted clay or modified soil layer that is at least 600 mm thick and has in situ coefficient of permeability of less than  $1 \times 10^{-9}$  m/s, or some other suitable liner approved by DECCW; and
  - b. drain to the leachate dams (ponds) as a minimum gradient of 0.5%.
- c) Collect all leachate in the leachate dams (ponds) to prevent it from escaping from the site to surface water, ground water or subsoil.
- d) Treat all water from waste storage or handling areas, including any organic waste storage area, or that has been in contaminated by leachate, as leachate;
- e) Ensure that the leachate storage dams (ponds):
  - a. Are capable of accepting leachate generated in a 1 in 100 year, 72 hour duration storm event without overflowing;
  - b. Have a re-compacted clay or modified soil layer that is at least 900 mm thick and in situ coefficient of permeability of less than  $1 \times 10^{-9}$  m/s, or, some other suitable liner approved by DECCW;
- f) Are constructed to the satisfaction of the DG.

Additionally, as with surface and groundwater, the PA recommends that a Soil, Water and Leachate Management Plan must be prepared and implemented, which must include a site water balance, erosion and sediment control plan, stormwater management scheme, surface water monitoring program and surface water response plan (Condition 20-26, Schedule 3).

The EPL provides several performance criteria for leachate management.

- A leachate collection system must be installed on each surface within the premises to be used for the disposal of waste (O6.1),
- The leachate collection system must be capable of capturing all leachate generated from the waste disposed of at the premises (O6.2),
- Surface waters must be diverted away from any area where waste is being or has been landfilled (O6.3),
- A leachate barrier system must be installed on each surface within the premises to be used for the storage of leachate (O6.4),
- There must be no discharge of leachate to waters (O6.5), and
- Requirement to monitor concentration of pollutants discharged (M2.1), following the Water/Land Monitoring Requirements (M2.2).

The EA statement of commitments requires the following:

- Construct a leachate collection system with appropriate holding pond and/or tanks to divert leachate back to landfill (A),

- Install high level alarm to the leachate pond interlocked with the drainage system to prevent overfilling (B),
- Install monitoring and alarm system to detect possible failures in the leachate collection system (C), and
- Establish assessment procedures to determine extent of leachate system failure (D).

*Griffith City Council has prepared a management plan for Leachate: Tharbogang Waste Management Centre: Soil, Water & Leachate Management Plan (v2.0).*

#### 4.7.2 Results

Leachate monitoring as been completed for monitoring point 9 under the EPL. Monitoring results are presented with surface water data in Section 4.5.2. All leachate is contained on site and is left untreated on site to evaporate.

Details of the installation of the retrofit leachate collection in January 2002 has been provided (SMEC 2002). Griffith City Council has also provided the Leachate Well Pump Investigation document as supporting evidence of the completion of the leachate collection (GCC 2019).

Leachate from the unlined landfill collects at the eastern edge of the cell in a gravel filled cutoff trench which is connected to a 2m deep sump with inspection chamber formed from concrete rings. The cut-off trench is 1m deep, 2m wide and 50-60m long with a 1% fall to the sump. An additional leachate collector drain has been installed in the northern portion of the active cell. The drain falls to the eastern edge of the landfill where passes under the existing access road to enter the leachate evaporation ponds (Talis 2019).

Both leachate drains operate under the influence of gravity.

Leachate is managed by three evaporation ponds to the east of the landfill. GCC are currently considering the installation of a leachate sprinkler system to enhance evaporation rates and manage periods of high leachate production without the need to construct additional leachate pond capacity (Talis 2019).

Griffith City Council has prepared a management plan for Leachate: *Tharbogang Waste Management Centre: Soil, Water & Leachate Management Plan (v2.0).*

#### 4.7.3 Review

An assessment of the monitoring results against the regulatory framework is presented in Table 4-16.

**Table 4-16: Leachate Compliance Assessment**

Condition	Review
<b>Project Approval</b>	
Condition 18, Schedule 3 (a)	The Soil, Water and Leachate Management Plan assumes that the landfill profile has these characteristics.
Condition 18, Schedule 3 (b)	Installation of the retrofit leachate collection has been completed (SMEC 2002).
Condition 18, Schedule 3 (c)	All leachate generated by the site is contained within the leachate ponds. However, the EPA audit (2019) noted that the leachate pump and

Condition	Review
	<p>discharge point into the leachate pond was obstructed and not functional.</p> <p>Council has confirmed that all leachate is still captured and stored in the main leachate pond where it is left to evaporate and the leachate pump and discharge point into the leachate pond is not obstructed.</p>
Condition 18, Schedule 3 (d)	All stormwater runoff from the landfill and Green Waste Site is contained in the leachate pond.
Condition 18, Schedule 3 (e)	Leachate storage ponds are designed to cater for a 1 in 100 year, 72 hour storm event. The Council has advised that the current leachate collection system is suitable for existing landfill.
Condition 20-26, Schedule 3	A Soil, Water and Leachate Management Plan has been developed.
EPL	
O6.5	All leachate is contained on site. No leachate is discharged. Leachate generated is contained and natural evaporation takes place.
O6.1	Leachate storage ponds have been installed.
O6.2	Storage ponds are designed to cater for a 1 in 100 year, 72 hour storm event. The current leachate collection system is suitable for the existing landfill.
O6.3	<p>No surface water which falls on site leaves the site.</p> <p>Whilst there are no pumps to divert surface water to the ponds Council has advised that they are not required, as there is sufficient natural flow at all the required stormwater infrastructure which has been formalised so water runs via gravity to the sedimentation pond.</p>
O6.4	Installation of the retrofit leachate collection has been completed (SMEC 2002 and GCC 2019).
O6.5	All leachate is contained on site. No leachate is discharged. Leachate generated is contained and natural evaporation takes place.
M2.1 and M2.2	Monitoring of EPA point 9 (Leachate Pond) was completed in May and September 2022, see Section 4.6 'Surface Water' for results.

Condition	Review
<b>EA- Not Triggered</b> <b>(See section 4.7.1 for description of 'condition')</b>	
A	Relates to the new landfill development which has not commenced.
B	Relates to the new landfill development which has not commenced.
C	Relates to the new landfill development which has not commenced.
D	Relates to the new landfill development which has not commenced.

## 4.8 Meteorological Monitoring

### 4.8.1 Monitoring and management criteria

The PA requires that the meteorological station be established and maintained in the vicinity of the development (Condition 27, Schedule 3). The station should monitor rainfall, wind speed and wind direction in accordance with the *Approved Methods for Sampling of Air Pollutants in New South Wales guidelines*. Meteorological monitoring is not addressed in the EPL or EA.

### 4.8.2 Results

Meteorological monitoring data has been collected from the Griffith Water Reclamation Plant (AMG 6206405.9, 408734.488) for reporting purposes to meet the EPL requirements (Figure 4-36). Thirteen monitoring parameters are downloaded from the weather station and averages calculated for each parameter. The following have been included in Table 4-17.

- Wind Speed AVG
- Radiant Heat AVG
- Air Temperature AVG
- Rainfall Data provided from BOM (site # 75041)

Data is logged at two-minute and ten-minute intervals. Modelling utilises the ten-minute interval. Due to the rain sensor not working the statistical information for rainfall was taken from the Bureau of Meteorology Griffith Airport AWS station (station # 075041).

Over the reporting period there was 850.6 mm of rainfall (BOM 2023). The mean annual rainfall for the Griffith region is 406.7 mm (BOM 2023). The annual mean daily evaporation has been recorded at 4.8 mm. (Site # 075028) (BOM 2023). Annual rainfall has been increasing since 2018. Total monthly rainfall between January 2022 and December 2022 varied between 2.2 mm (February) and 203.6 mm (October).



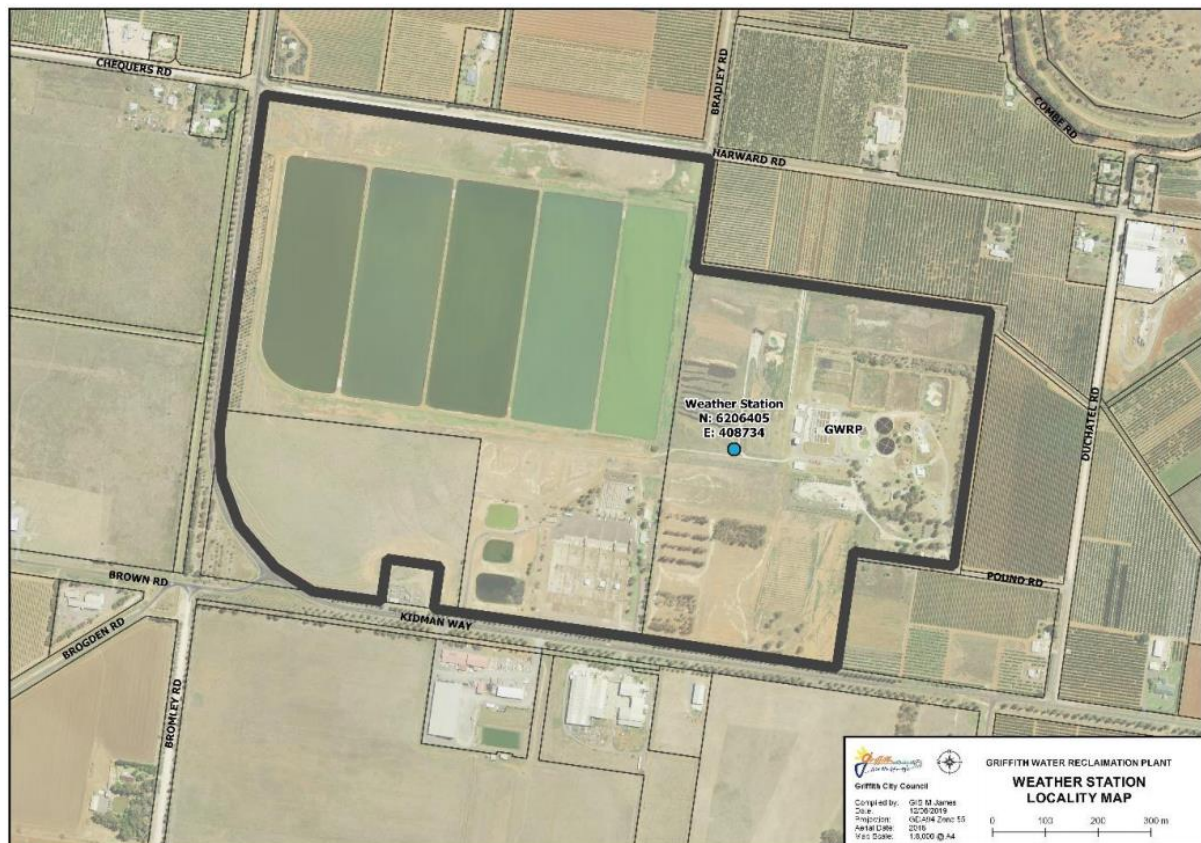


Figure 4-36: GRWP Weather Station Site Map

Table 4-17: Meteorological monitoring data 2022

Parameter	Wind Speed AVG	Radiant heat AVG	AVG Air temperature at 10m	Monthly Rainfall Data
Month	Km/h	W/m <sup>2</sup>	C°	mm
January	22.6	266.7	24.7	172
February	22.9	289.5	23.8	2.2
March	19	225.2	21.7	53.0
April	19.2	183	17	72.2
May	17.6	160.2	13.3	80.4
June	21.1	137.8	9.2	18.8
July	19.5	155.9	8.1	19.4
August	23.3	162.6	10.2	82.4

Parameter	Wind Speed AVG	Radiant heat AVG	AVG Air temperature at 10m	Monthly Rainfall Data
Month	Km/h	W/m <sup>2</sup>	C°	mm
September	20.7	192.7	15	49.6
October	10.84	219.85	16.36	203.6
November	10.55	256	16.58	87.8
December	9.89	299.92	21.92	9.2

### 4.8.3 Review

An assessment of the monitoring results against the regulatory framework is presented in Table 4-18.

**Table 4-18: Meteorological Monitoring compliance assessment**

Condition	Review
<b>Project Approval</b>	
Condition 27, Schedule 3	Use of the meteorological station as Griffith Water Reclamation Plant was approved by DPE & EPA in September 2011 and data included in this report.

## 4.9 Noise and Vibration

### 4.9.1 Monitoring and management criteria

Noise and vibration criteria is provided by the PA, EPL and EA. The PA requires:

- Maximum noise limits must not exceed the noise impact assessment criteria in Table 4-19 (Condition 28, Schedule 3),
- Continuous improvement of noise impacts and mitigation measures must be undertaken (Condition 39, Schedule 3),
- A Noise and Vibration Plan must be developed and implemented. An annual attended noise monitoring, traffic monitoring, details of how the noise monitoring is to be conducted and a noise monitoring protocol must be included in the Noise and Vibration Plan (Condition 40, Schedule 3).

**Table 4-19: PA operational noise impact assessment criteria dB(A)**

Location and Locality	Day L <sub>Aeq</sub> (15 min)	Evening L <sub>Aeq</sub> (15 min)	Night L <sub>Aeq</sub> (15 min)
All Surrounding Sensitive Receivers	35	35	35

Noise restrictions under the EPL (L3.1 and 3.2) are presented in Table 4-20.

**Table 4-20: Noise limits dictated under the EPL**

Day	Time	Limit dB ( $L_{A10(15 \text{ minute})}$ )
Monday - Friday	7am - 6pm	55
Saturday	7am - 1pm	
Monday - Friday	6pm - 10pm	45
All other times	All other times	40

The revised EA mitigation table identified the following mitigation and management commitments for relating to noise and vibration:

- Implement procedures or investigating complaints (A),
- Ensure noise and vibration from quarry operation does not exceed project specific intrusive, amenity, vibration and sound pressure level goals. Noise from the plant should be below 35dB (B),
- Where quarry plant noise is found to exceed the intrusive goal of 35dB ( $L_{Aeq,15 \text{ mins}}$ ) at affected residences, the plant will be moved or modified to ensure the noise impact from the plant is below 35dB ( $L_{Aeq,15 \text{ mins}}$ ) (C),
- Review potential for traffic noise levels once extraction rates exceed 350,000 tpa and scale up (Prior to 2033) (D), and
- Restrict operating hours to 8:30am - 5pm (E).

#### 4.9.2 Results

Noise monitoring of Tharbogang Quarry Operations was undertaken by GHD in 2022 by placing a sensitive receiver in six residential areas with close proximity to quarry operations (R1-R6). The sensitive receiver was also placed in two additional areas within the quarry footprint (Quarry Location 1 – West, and Quarry Location 2 – East) (Figure 2-1).

It should be noted that the monitoring locations (Residential and Quarry), were the same as 2021. However it should be noted that, “Quarry Location 1” was named as “Quarry Location 2” in 2021, whilst “Quarry Location 2” was named as “Quarry Location 1” in 2021.

A GHD consultant attended each sensitive receiver location to conduct noise monitoring for 15 minute intervals using a Class 1 sound level meter (Svantek 977). The sound level meter was positioned between 30 m from the façade of the residential dwelling, mounted on a tripod 150 cm off the ground, with the microphone facing the main noise source(s). Monitoring was conducted three times at each residential sensitive receiver over three different time periods: morning 10:15 am – 12:35 pm, midday 12:50 pm – 02:40pm, and afternoon 02:50 pm – 04:40 pm. The monitoring was completed on 29<sup>th</sup> and 30<sup>th</sup> November 2022. The landfill site and quarry were in operation during the time of the monitoring (GHD 2022).

The additional quarry noise monitoring was conducted once in each location for 15 minutes between 09:30 am and 10:05 am, midday and afternoon monitoring was not completed for these areas.

The noise impact assessment threshold is defined as 35 dB(A) $L_{Aeq}$  for all times the Quarry and Landfill is operational. All 22 monitoring events exceeded this noise threshold (Table 4-21). A variety of foreground and background noises were audible at the sensitive receiver locations that were not associated with quarry or landfill operations. These noise sources included the sound of wind, birds, orchard workers, road traffic from Slope Road, Hillside Drive and Kidman Way, dogs barking, twigs snapping, and people talking (GHD 2022). Noise from the landfill was not audible from any of the residential sensitive receivers, which is therefore compliant with the conditions of approval.

**Table 4-21: Noise monitoring summary results (GHD 2023)**

Site	Monitored noise levels $L_{Aeq}$ (15min) (decibels (dB))		
	Morning	Midday	Afternoon
R1	47	44	46
R2	46	43	43
R3	43	43	42
R4	42	43	44
R5	42	43	44
R6	43	48	41
Quarry Location 1 (West)	41	-	-
Quarry Location 2 (East)	50	-	-

#### 4.9.3 Review

An assessment of the monitoring results against the regulatory framework is presented in Table 4-22.

**Table 4-22: Noise and Vibration compliance criteria**

Condition	Review
<b>Project Approval</b>	
Condition 28, Schedule 3	<p>The monitored noise level <math>L_{Aeq}</math> (15 min) exceeded the assessment criterion of 35 <math>L_{Aeq}</math> (15 min) across all monitoring periods, at all sensitive receiver sites. However, it was concluded that it is unlikely that the landfill contributed significantly to monitored noise levels at the sensitive receivers. Machinery movements associated with the Landfill &amp; Quarry were not audible at any of the sensitive receivers. It was clear that noise from the Landfill &amp; Quarry was not a key noise contributor at any of the sensitive receiver locations (GHD 2022).</p> <p>The EPA audit (2019) states that the licensee is to keep copy of chain of custody of all samples taken for auditable records.</p>

Condition	Review
Condition 39, Schedule 3	No evidence of continuous improvement is provided. However, the impact of quarry and landfill noise emission was shown to be compliant.
Condition 40, Schedule 3	Noise and Vibration Plan has been developed.
<b>EPL</b>	
L3.1 and L3.2	The monitored noise level Laeq (15 min) exceeded the assessment criterion of 35 Laeq (15 min) across all monitoring periods, at all sensitive receiver sites. However, it was concluded that it is unlikely that the landfill contributed significantly to monitored noise levels at the sensitive receivers. Machinery movements associated with the Landfill & Quarry were not audible at any of the sensitive receivers. It was clear that noise from the Landfill & Quarry was not a key noise contributor at any of the sensitive receiver locations (GHD 2022).
<b>EA</b>	
<b>(See section 4.9.1 for description of 'condition')</b>	
A	No complaints have been received.
B	The monitored noise level Laeq (15 min) exceeded the assessment criterion of 35 Laeq (15 min) across all monitoring periods, at all sensitive receiver sites. However, it was concluded that it is unlikely that the landfill contributed significantly to monitored noise levels at the sensitive receivers. Machinery movements associated with the Landfill & Quarry were not audible at any of the sensitive receivers. It was clear that noise from the Landfill & Quarry was not a key noise contributor at any of the sensitive receiver locations (GHD 2022).
E	Operating hours are that which is recommended (08:00- 17:00).
<b>Not Triggered</b>	
C	Not triggered
D	Not triggered

## 4.10 Blasting

### 4.10.1 Monitoring and management criteria

Blasting criteria is provided by the PA and EPL. The PA Compliance Requirements state that the following criteria must be upheld in accordance with the Schedule 3 – Specific Environmental Conditions. Airblast overpressure limits and the ground vibration thresholds must not be exceeded. The following criteria is provided by the PA:

- Blasting must not occur within 200m of privately-owned lands unless suitable arrangements have been arranged (Condition 34, Schedule 3)
- Property inspections are required in which landholders are entitled to a property inspection when the property lies within 500m of the blasting area. The landholders within 500m of the blasting area must be notified of the proposed blasting activities (Condition 35, Schedule 3).
- If a landholder has requested an inspection of their property, a suitably qualified person must undertake the inspection. The process involved in the investigation must be recorded. (Condition 36, Schedule 3).

The preparation and implementation of a Blast Management Plan is required. Continual improvement criteria must be recorded for blasting.

The EPL specifies the overpressure level (Table 4-23) and ground vibration (Table 4-24) criteria be met when undertaking blasting. Monitoring equipment should have a cut-off frequency of 2Hz or less. If the equipment has a higher cut-off frequency, then a correction of 5dB should be added. However, no equipment with cut-off frequency exceeding 10Hz should be used to measure Airblast overpressure.

**Table 4-23: Airblast overpressure limits specified in the EPL L4.1**

Receiver	Airblast overpressure level (dB (Lin Peak))	Allowable exceedance
All Surrounding Sensitive Receivers	115	Must not exceed 5% of the total number of blasts in a 12-month period.
	120	0% - must not exceed at any time.

**Table 4-24: Ground Vibration criteria from the EPL L4.2**

Receiver	Peak particle velocity (mm/s)	Allowable exceedance
All Surrounding Sensitive Receivers	5	Must not exceed 5% of the total number of blasts in a 12-month period
	10	0% - must not exceed at any time.

The EPL (L4.3) also requires that blasting must only be carried out between 9.00 hours and 17.00 hours, Monday to Saturday. Blasting must not take place on Sundays or Public Holidays without prior EPA approval.

The EA revised conditions specify the following mitigation and management measures regarding blasting:



- Blasting airblast overpressure (in dB Linear Peak) and ground vibration peak particulate velocity (in millimetres per second) will be measured for the first three blasts at the nearest affected residence. If these are well within the limited and there are no complaints, then monitoring will be undertaken once per year. The results will be reported to DECCW (A),
- Blasting will only occur between 9:00am-3pm, Monday to Friday excluding public holidays (B), and
- Notify residents within 2 km of intention to blast at least 7 days in advance ©

#### 4.10.2 Results

No blasts occurred within the 2022 monitoring period.

#### 4.10.3 Review

An assessment of the blasting results against the regulatory framework is presented in Table 4-25.

**Table 4-25: Blasting compliance assessment**

Condition	Review
<b>Project Approval</b>	
Condition 30, Schedule 3	No blasts occurred during this monitoring period, therefore airblast overpressure was not recorded.
Condition 31, Schedule 3	No blasts occurred during this monitoring period, therefore ground vibration levels were not recorded.
Condition 32, Schedule 3	The hours for blasting are between 09:00 am – 05:00 pm Monday – Saturday as per the EPL (EPA 2020) No blasts occurred during this monitoring period.
Condition 33, Schedule 3	No blasts occurred during this monitoring period.
Condition 34, Schedule 3	No blasts occurred during this monitoring period.
Condition 35, Schedule 3	No blasts occurred during this monitoring period.
Condition 36, Schedule 3	No written requests were made within the reporting period.
Condition 37, Schedule 3	No property damage occurred to any landowner within 500m of blasting.
Condition 38, Schedule 3	A Blast Management Plan has been prepared by Griffith City Council.



Condition	Review
Condition 39, Schedule 3	No indication of continuous improvement within the reporting year although it is doubtful that any is required at this stage.
<b>EPL</b>	
L4.1	No blasts occurred during this monitoring period, therefore airblast overpressure was not recorded.
L4.2	No blasts occurred during this monitoring period, therefore ground vibration levels were not recorded.
L4.3	The hours for blasting are between 09:00 am – 05:00 pm Monday – Saturday as per the EPL (EPA 2020) No blasts occurred during this monitoring period.
<b>EA</b> (See section 4.10.1 for description of ‘condition’)	
A	No blasts occurred within the 2022 monitoring period, therefore airblast overpressure and ground vibration levels were not recorded. No complaints were received.
B	The hours for blasting are between 09:00 am – 05:00 pm Monday – Saturday as per the EPL (EPA 2020) No blasts occurred during this monitoring period.
C	No blasts occurred during this monitoring period.

## 4.11 Air Quality- Dust

### 4.11.1 Monitoring and management criteria

Air Quality criteria is provided by the PA, EPL and EA. Under the PA (Condition 43, Schedule 3), an Air Quality Monitoring Plan (AQMP) is required to be prepared and implemented. This plan must include details of how air quality performance will be monitored and protocols for compliance evaluation.

Dust monitoring was carried out by Coffey Geotechnics at four sampling points in June 2007 as part of the EA to determine background dust levels. Although the data on background dust levels has not been provided, data for monitoring from 2022 has been provided with the results shown in Table 4-28.

The PA also prescribes air quality criteria which must not be exceeded (Condition 41, Schedule 3), this is listed in Table 4-26 for suspended particulate matter and Table 4-27 for dust.

**Table 4-26: Impact assessment criteria for particulate matter under the project approval**

Pollutant	Averaging Period	Criterion
Total suspended particulate (TSP) matter	Annual	90 $\mu\text{m}^3$
Particulate matter <10 pm (PM <sub>10</sub> )	Annual	30 $\mu\text{m}^3$
Particulate matter <10 pm (PM <sub>10</sub> )	24 hour	50 $\mu\text{m}^3$

**Table 4-27: Long term impact assessment criterion for deposited dust under the project approval**

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

The EPL condition O3 specifies that all operations and activities occurring at the premises must be carried out in manner that will minimise the emission of dust from the premises.

The approved methods for the modelling and assessment of air pollutants in NSW has been developed by the EPA (NSW EPA 2022). This document provides the methodology and impact assessment criteria for common pollutants.

Air quality impacts have been assessed by the EA. The following mitigation and monitoring commitments have been made:

- Implement procedures for investigating complaints (A),
- Water cart for dust suppression on unsealed roads (B),
- Water down uncovered stockpiles (C),
- Use water sprayers whenever the crusher is operating (D),
- When 10 minute average wind speed exceeds 30km/hr from the NE quadrant (between 0o and 90o), operation of the quarry will cease or as specified in the Dust Management Plan (E),
- When 10 minute average wind speed exceeds 35km/hr from any direction, operation of the quarry will cease or as specified in the Dust Management Plan (F),
- Preparation and implementation of a Dust Management Plan incorporating dust monitoring (G), and
- Wet down stockpiles as per the dust management plan (H).

#### 4.11.2 Results

Samples were unable to be taken in November and December 2022 due to poor weather.

Dust and air quality monitoring data for this reporting period is provided below in Figure 4-37, Figure 4-38 and Table 4-28. An Air Quality Monitoring Plan has been developed for the site (GHD 2013a) which has since been reviewed by Northstar Air Quality (2019a), outlines the air quality criteria. Dust

deposition is measured at four locations surrounding the Tharbogang Waste Management Centre (Figure 4-39).

It is noted that the application of a monthly average is a derogation from the annual average as specified within the Conditions of Approval and NSW Approved Methods (Northstar Air Quality 2019b).

During the 2022 monitoring period, two of the four monitoring stations exceeded the project specific monthly average criterion of 4 g/m<sup>2</sup>/month for deposited dust levels on at least one occasion. Monitoring station 2 exceeded the threshold in August 2022 while Station 4 exceeded the threshold in July 2022. This is indicated in yellow in Table 4-28. During the 2022 monitoring period deposited dust levels increased by more than 2 g/m<sup>2</sup>/month on two occasions; once for monitoring station 2 between July and August, again for monitoring station 4 between June and July. It should be noted that for the total monitoring period, the yearly average of dust levels were less than the project specific monthly average at all sites. Likewise, the yearly average change in deposited dust levels did not exceed the required threshold at any site (Northstar Air Quality 2022).

Total suspended particulate matter (gm) was above the 90 gm threshold at DM02 in August 2022 and DM04 in July 2022. This is indicated in yellow in Table 4-28. This result is a diminishment compared with the previous monitoring period, where TSP matter exceeded the threshold once at monitoring site 4. The AQMP was reviewed (Northstar Air Quality 2019b) and updated in 2019 (Northstar Air Quality 2019a).

The data indicates that no exceedances of the average annual criteria were observed at any of the dust deposition gauges during the 2022 monitoring period. Based on the requirements of section 4.1 of the AQMP, Northstar Air Quality (2019a) recommends that annual dust monitoring at the Tharbogang Recycling and Waste Disposal Centre may cease.

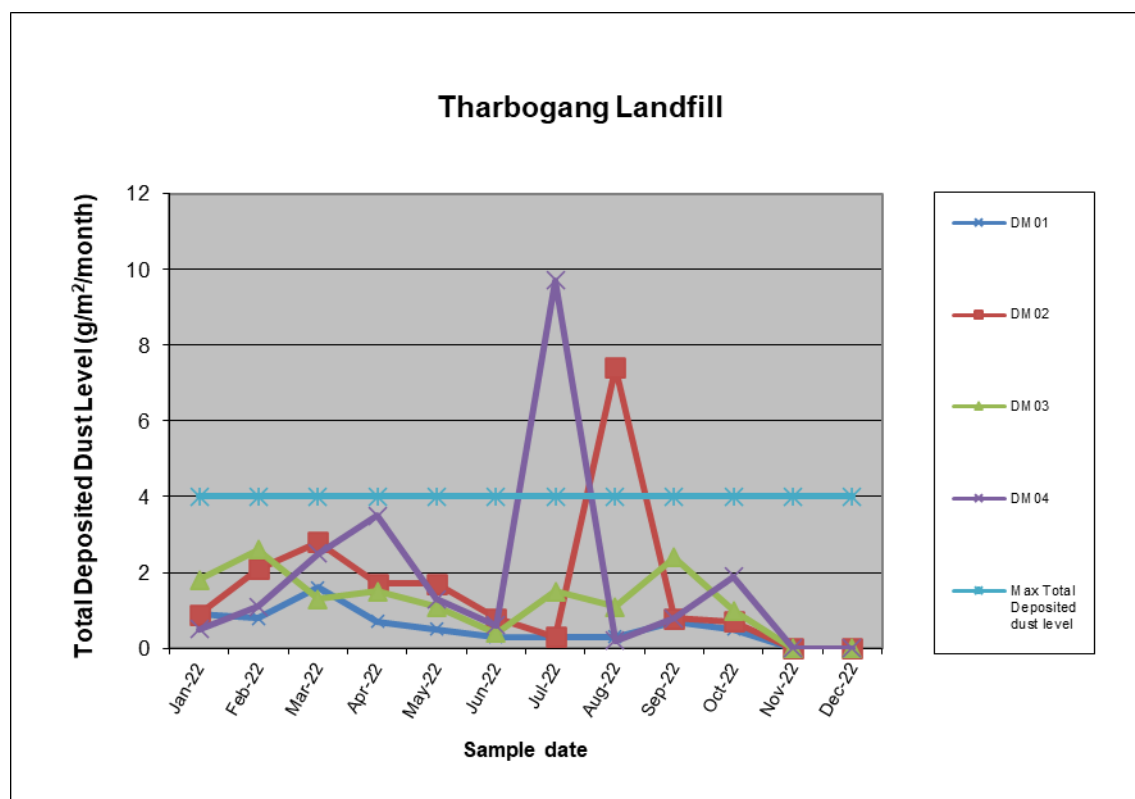


Figure 4-37: Total deposited dust level for 2022

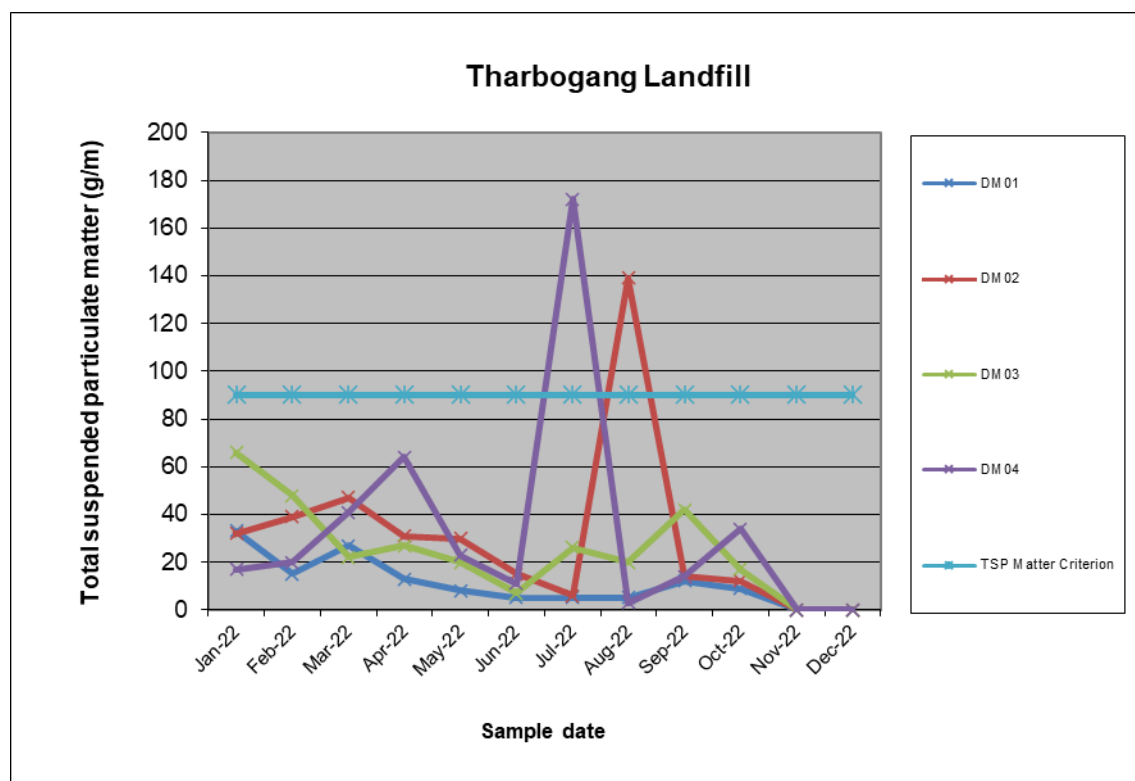


Figure 4-38: Total suspended particulate matter for 2022

**Table 4-28: Dust and air quality monitoring results**

	Total Deposited Dust Level				Total suspended particulate matter			
Trigger Threshold	4.0 (g/m <sup>2</sup> /month)				90.0 (gm)			
Month	DM01	DM02	DM03	DM04	DM01	DM02	DM03	DM04
Jan – 22	0.9	0.9	1.8	0.5	33	32	66	17
Feb – 22	0.8	2.1	2.6	1.1	15	39	48	20
Mar – 22	1.6	2.8	1.3	2.5	27	47	22	41
Apr – 22	0.7	1.7	1.5	3.5	13	31	27	64
May – 22	0.5	1.7	1.1	1.3	8	30	20	23
Jun – 22	0.3	0.8	0.4	0.6	5	15	7	11
Jul – 22	0.3	0.3	1.5	9.7	5	6	26	172
Aug – 22	0.3	7.4	1.1	0.2	5	139	20	3
Sep – 22	0.7	0.8	2.4	0.2	12	14	42	14
Oct – 22	0.5	0.7	1.0	1.9	9	12	17	34
Nov – 22	-	-	-	-	-	-	-	-
Dec - 22	-	-	-	-	-	-	-	-



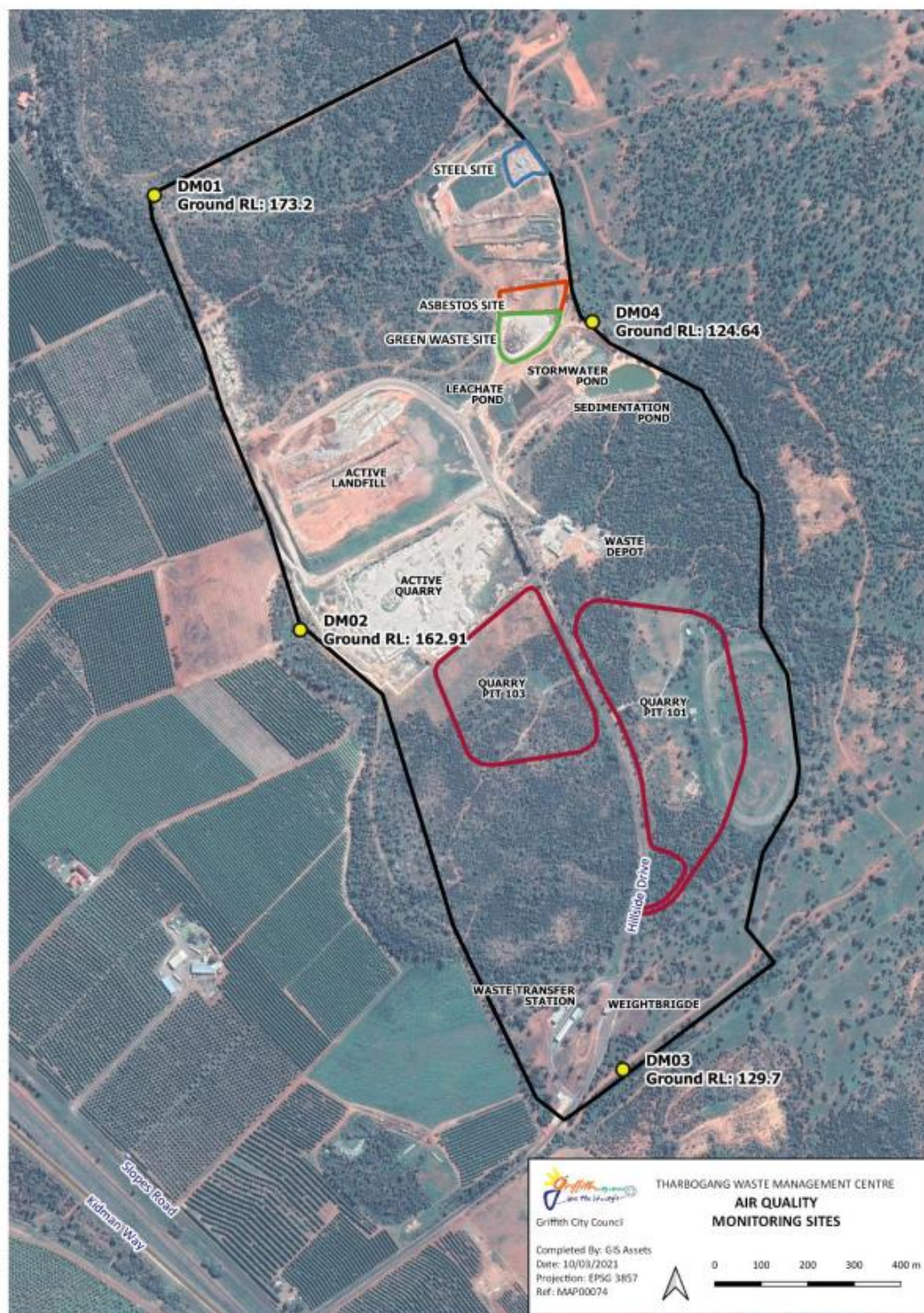


Figure 4-39: Air Quality Monitoring Locations (monitoring began in 2018)

### 4.11.3 Review

Northstar Air Quality were commissioned to perform reviews of the air quality monitoring data for this monitoring period. These reviews reveal that while exceedances of the project-specific monthly average criteria have been previously observed, the average annual criterion for deposited dust levels has not been exceeded.

An assessment of the monitoring results against the regulatory framework is presented in Table 4-29.

**Table 4-29 Dust compliance assessment**

Condition	Review
<b>Project Approval</b>	
Condition 43, schedule 3	An Air Monitoring Plan has been developed for TWMC (GHD 2013a).
Condition 41, schedule 3	Air quality monitoring commenced in September 2018 and occurs monthly.
<b>EPL</b>	
O3	Dust mitigation activities are considered in the Air Monitoring Plan (GHD 2013a).
<b>EA</b> (See section 4.11.1 for description of 'condition')	
A	Procedures for investigating complaints are considered in Section 3. No complaints have been received during the reporting period.
B	Water carts are in use for dust suppression on unsealed roads. Operations cease when weather conditions cause low visibility.
C	When gravel stockpiles are being disturbed (loading from or adding to) the quarry operator runs the sprinklers to reduce the dust.
D	A sprinkler system is in use when the crusher is operating.
E	Average wind speed management measures and monitoring protocol are included in the Air Monitoring Plan (GHD 2013a) and meet the EA criteria.
F	Average wind speed management measures and monitoring protocol are included in the Air Monitoring Plan (GHD 2013a) and meet the EA criteria.



## 4.12 Air Quality- Odour

### 4.12.1 Monitoring and management criteria

Odour criteria is provided by the PA. The PA (Condition 42, Schedule 3) requires that odour complies with section 129 of the *POEO Act* unless expressly provided in the EPL. Under this Act, no emission of any offensive odour must come from the premises where the licence applies. However, odour emissions are permitted provided they are in accordance with the conditions of the licence or that the only persons affected are workers on site. This is designed to minimise the nuisance effect to acceptable levels.

The EA has recommended that the site conduct odour modelling in the event of a complaint / incident (A).

### 4.12.2 Results

No odour monitoring data was provided for the 2022 reporting period. An Odour Impact Assessment Study was completed in 2007 by The Odour Unit Pty Ltd. This assessment conducted odour modelling.

### 4.12.3 Review

No further assessment was completed as no odour monitoring was completed. The legislative criteria addressed by the PA is assessed in Table 4-30.

**Table 4-30: Odour (air quality) compliance assessment**

Condition	Review
<b>Project Approval</b>	
Condition 42, Schedule 3	No odour monitoring data has been provided. However, no complaints have been made regarding odour in the reporting period.
<b>EA</b> (See section 4.12.1 for description of 'condition')	
A	Odour Modelling has been completed in an Odour Impact Assessment Study (The Odour Unit 2007).

## 4.13 Greenhouse Gas Emissions

### 4.13.1 Monitoring and management criteria

Greenhouse Gas Emissions (GHG) are emitted from the landfill site. The relevant criteria are provided by the PA and EA. Landfill sites are a source of GHG as waste decomposes. Under the PA (Condition 11, Schedule 3), all composting undertaken at the site must be in accordance with *AS 4454-2003*:

*Composts, Soil Conditioners and Mulches, Appendix N, best practice guidelines for Composting Systems.* Utilisation of other composting practices must be approved by the DECCW (now the Department of Planning and Environment (DPE)). Additionally, the PA requires that a feasibility report is required to be prepared for within 5 years of the Planning Approval (Condition 12, Schedule 3). This report must outline options to capture and use GHG in the generation of electricity. Feasible options must be considered in this report.

Present and future GHG emissions have been assessed in the EA, the following mitigation and management commitments have been made:

- Capture and flare landfill gases and continuously monitor emissions (A),
- Once data is available, a greenhouse gas target will be set and incorporated into the landfill operational environmental management plan (B),
- Construct and operate waste transfer station to reduce waste to landfill (C), and
- Cover active tip face daily with green waste to improve bioreaction process (D).

#### 4.13.2 Results

No greenhouse gas emission monitoring occurred during the reporting period. No feasibility report for the capture and use of greenhouse gas has been prepared.

#### 4.13.3 Review

No monitoring data has been provided. Consequently, it is not possible to assess the levels of GHG emissions, or, if composting undertaken met AS 4454-2003. An assessment of the monitoring results against the regulatory framework is presented in Table 4-31. No target has been set and incorporated into the landfill Operational Environmental Management Plan.

**Table 4-31: Greenhouse Gas Emissions compliance assessment**

Condition	Review
<b>Project Approval</b>	
Condition 11, Schedule 3	No composting occurs on site.
Condition 12, Schedule 3	No feasibility report has been provided.
<b>EA</b> (See section 4.13.1 for description of 'condition')	
B	No GHG monitoring has been undertaken or a target set.
C	Waste transfer station has been constructed.
D	The full landfill area is not covered daily but it is compacted at the end of each day to alleviate wind blow rubbish. Green waste is not used as a direct cover material, it is only used on the top of the final cover.

Condition	Review
	In December 2020 Council obtained approval from the EPA to compact waste in accordance with O6.7 given the difficulty in sourcing clean fill to cover the landfilled waste daily. However, this condition remains non-compliant as the goal of improving the bioreaction process remains unaddressed.
<b>Not Triggered</b>	
A	Not triggered at this stage.

## 4.14 Rehabilitation and Landscape Management

### 4.14.1 Monitoring and management criteria

Rehabilitation and Landscape management criteria is provided by the PA and EA. The PA has specific requirements for the visual amenity and litter control within 6 months of the date of project approval (Condition 9, Schedule 3):

- Remove existing litter that has accumulated across the site,
- Implement suitable measures to prevent the unnecessary proliferation of litter both on and off site, including the installation and maintenance of a mesh fence not less than 1.8m high around the proposed landfill area, and
- Inspect daily and clear the site (and surrounding area if necessary) of litter on at least a weekly basis.

The PA also requires that a Landscape and Biodiversity Management Plan be prepared and implemented. This plan must be prepared by a suitably qualified person, include a Rehabilitation and Biodiversity Offset Strategy Management Plan and a Long Term Management Strategy (Condition 48, Schedule 3). The Landscape and Biodiversity Management Plan must address the following criteria (Condition 49, schedule 3):

- The rehabilitation objectives for the sites and offset areas;
- A description of the measures that would be implemented to;
  - rehabilitate and stabilise the site,
  - minimise the removal of mature trees,
  - implement the Biodiversity Offset Strategy and
  - manage the remnant vegetation and habitat on the site and in offset areas.
- Detailed performance and completion criteria for the rehabilitation and stabilisation of the site,
- A detailed description of how the performance of the rehabilitation of the quarry areas would be monitored over time to achieve the stated objectives,
- A detailed description of what measures would be implemented to rehabilitate and manage the landscape of the site including

- the procedures to be implemented for: progressively rehabilitating and stabilising areas disturbed by quarrying,
- implementing revegetation and regeneration within the disturbance areas, protecting areas outside the disturbance areas,
- including the biodiversity Offset Strategy areas. Vegetation clearing protocols,
- including a protocol for clearing any trees containing hollows and the relocation of hollows from felled trees,
- managing impacts on fauna, in particular threatened species,
- controlling weeds and pests,
- controlling access,
- bushfire management and
- reducing the visual impacts of the projects.
- A description of the potential risks to successful rehabilitation and a description of the contingency measures that would be implemented to mitigate these risks, and
- Details of who is responsible for monitoring, reviewing and implementing the plan.

The EPL states that the licensee must submit to the EPA within three months prior to the last load of waste being landfilled a closure plan in accordance Section 76 of the POEO Act (O6.12).

The PA specifies criteria for the Long Term Management Strategy (Condition 50, Schedule 3), which must:

- Define the objectives and criteria for quarry closure and post-extraction management,
- Be prepared in consultation with DECCW, NOW and DII,
- Describe the measures that would be implemented to minimise or manage the ongoing environmental effects of the projects, and
- Describe how the performance of these measures would be monitored over time.

The need for a rehabilitation bond prior to commencing quarrying operations is specified in condition 51, Schedule 3. This requires that the sum of the bond be \$1/m<sup>2</sup> for the area to be disturbed. Additionally, within 3 months of each Independent Environmental Audit (IEA), the proponent shall review and if necessary, revise the sum of the rehabilitation bond to the satisfaction of the DG (Condition 52, Schedule 3). This review must consider, inflation, changes to the total area of disturbance and performance of the rehabilitation and revegetation to date.

The visual amenity of the site has been assessed in the EA. The following mitigation and management commitments have been made:

- Erect 2.5 m perimeter fence to prevent windblown rubbish leaving the site (A),
- Ensure rubbish pickup along the fence line and more generally is undertaken regularly (B),
- The landfill will be rehabilitated and revegetated to replicate areas of open grassy woodland (C),
- Construct batters with fissures (offset at each bench) and benches to minimise extent of the cut face. These will mimic natural scarps and reduce the formation of unnatural straight lines (D),
- The benches and floor of the quarries will be revegetated with suitable native species (E),

- Ensure strategic landscaping is incorporated into new residential developments within line of site and in close proximity to the development (F),
- Contaminated soils will be removed and placed in the active putrescible landfill cell (G)
- Soils testing will be conducted down gradient of the landfill, leachate collection system, leachate pond, quarry pits and settlement pond to ensure soil quality remains intact (H),
- Enhance vegetation in edge areas (landfill, roads, quarry edges etc) (I),
- Cover edges with mulch as a temporary measure (J),
- Progressively rehabilitate quarry voids to minimise area of disturbance potential for loss/gain of water accession to groundwater (K),
- Progressively rehabilitate each quarry pit (L), and Cap and rehabilitate the landfill on completion (M).

#### 4.14.2 Results

The Closure and Rehabilitation plan was lodged on the 20/12/19. The EPA Landfill technical team required further information regarding slope stability. The Slope Stability Risk Assessment along with the Landfill Closure and Rehabilitation Plan was resubmitted to the EPA Riverina Far West office on the 26/8/20 at 3:59pm (GCC 2020a). The Landfill Closure and Rehabilitation Plan was approved by the EPA on 1 December 2020.

A Landscape and Biodiversity Plan has been developed and implemented (ELA 2011). The Landscape and Biodiversity Management Plan (LBMP) was prepared by ELA in accordance with the Project Approval (dated 8 July 2010) Condition 48 which required the LBMP to be submitted prior to 30 December 2010. The previous LBMP forms the foundation of the BMP that is currently being prepared and that has been revised and updated in accordance with subsequent Section 75J modifications and the Conservation Agreement (Ecoplanning 2021).

The BMP aims to consolidate the biodiversity management actions applying to the site, including referring to separate documents where management actions are addressed in greater detail, in order to provide a comprehensive management document. Biodiversity management actions currently occurring in the offset area (BOAs) under the existing LBMP and the Conservation Agreement (CA).

Table 4-6 (Biodiversity section) outlines the management actions completed for year 6.

The Site disposes of approximately 30,409 tonnes ( $46,785\text{m}^3$ ) of waste annually (2018/19 base year) based on a compaction rate of  $0.65\text{t}/\text{m}^3$  provided by GCC. Based on the final fill profile and the projected annual waste disposal estimates, the remaining void space and estimated lifespan calculated from the 3-D model is as follows:

- Approximate gross void space ( $\text{m}^3$ ) - 328,440
- Approximate net void ( $\text{m}^3$ ) - 295,596
- Landfilling duration (months) - 55 (4 years & 7 months)
- Estimated date cell becomes full - May 2024 (Talis 2019)

#### 4.14.3 Review

An assessment of the monitoring results against the regulatory framework is presented in Table 4-32.

**Table 4-32: Rehabilitation and landscape management compliance assessment**

Condition	Review
<b>Project Approval</b>	
Condition 9, Schedule 3	<p>Litter on site is collected by staff. There is no specific Litter Management Program.</p> <p>No indication of weekly litter removal, however Council has advised that daily inspections began in 2021.</p> <p>The 1.8 m high mesh fence around the active tipping area was completed in January 2023.</p>
Condition 48, Schedule 3	<p>A Landscape and Biodiversity Management Plan (LBMP) has been developed by Eco Logical Australia (2011). This plan covers management implementation for each year up to year 10 and then a more generalised set of management measures for year 10 onwards per year.</p> <p>A LBMP has been prepared to consolidate the biodiversity management actions applying to the site, including referring to separate documents where management actions are addressed in greater detail, in order to provide a comprehensive management document.</p> <p>Biodiversity management actions currently occurring in the offset area (BOAs) under the existing LBMP and the Conservation Agreement (CA).</p>
Condition 49, Schedule 3	The Landscape and Biodiversity Management Plan (LBMP) meets the specified criteria.
Condition 50, Schedule 3	The LBMP and BMP outline the Long Term Management Strategy.
Condition 52, Schedule 3	Not relevant. The first IEA was completed after this reporting period.
<b>EPL</b>	
○ See 'not triggered' section	
<b>EA</b>	
<b>(See section 4.14.1 for description of 'condition')</b>	
B	No observation of rubbish along fence-lines during the independent audit (Property Risk 2018).

Condition	Review
<b>Not Triggered</b>	
Condition 51, Schedule 3	Council has a Waste Reserve which is cash backed, which will cover any rehabilitation works required. Council is currently consulting with the EPA regarding the Post Closure and Rehabilitation Plan. This condition relates to the new quarry and has not been triggered yet
O6.12	Not required until 3 months prior to last load of waste being landfilled. The Landfill Closure and Rehabilitation plan approved by the EPA on 1 December 2020. The slope Stability Risk Assessment was resubmitted to the EPA Riverina Far West office on the 26/8/20 at 3:59pm and has been approved by the EPA
A	Not triggered – landfilling activities within the existing quarry have not commenced.
C	Not triggered.
D	Not triggered – no information regarding batters with fissures and benches.
E	Not triggered.
F	Not triggered – no new residential developments.
G	Not triggered – no information regarding contaminated soil disposal.
H	Not triggered – no information regarding soils testing.
I	Not triggered – no information regarding edge vegetation.
J	Not triggered – no information regarding mulching.
K	Not triggered – no quarry pits require rehabilitation
L	Not triggered – no quarry pits require rehabilitation.
M	Not triggered – no landfill sites require capping and rehabilitation.



## 4.15 Heritage

### 4.15.1 Monitoring and management criteria

Heritage criteria is provided by the PA and EA. The project approval (Condition 53, Schedule 3) requires that a Cultural Heritage Management Plan be prepared and implemented. The plan must be prepared in consultation with the DECCW (now DPE) and local Aboriginal communities, it must draw on relevant recommendations for management and include descriptions of measures to be implemented.

Heritage impacts of the site and proposed expansion have been investigated in the EA, the following mitigation and management recommendations have been made:

- Implement procedures to investigate and protect culturally significant material if discovered during construction and operation (A),
- Protect and preserve the scarred tree and a 20 m exclusion zone maintained around the tree (B), and
- Bluedot Speedway signs will be carefully removed and handed over to the car racing club, reused or displayed at Griffith Pioneer Park Museum©.

### 4.15.2 Results

No information regarding heritage management has been provided for this reporting period other than the Heritage Management Plan (Black Mountain Projects 2013).

There is no evidence of Aboriginal Heritage Cultural Material within the study area. The scarred tree is listed under the Cultural Heritage Management Plan (CHMP) and included in schedule 5 of the Griffith Local Environmental Plan 2014. There is a requirement that 20 exclusion zones be installed around the trees. Council offered the two hand painted Bluedot Speedway signs to Pioneer Park Museum who declined the offer. Therefore, an Expression of Interest was put out and Council has given the signs to an ex-member of the Speed Way club who is to restore them and add them to his collection.

### 4.15.3 Review

The exclusion zones surrounding the two scarred trees have not been implemented.

A Cultural Heritage Management Plan has been provided and meets the criteria specified within the Project Approval. An assessment of the monitoring results against the regulatory framework is presented in Table 4-33.

**Table 4-33: Heritage Compliance Assessment**

Condition	Review
<b>Project Approval</b>	
Condition 53, Schedule 3	A Cultural Heritage Management Plan has been developed.
<b>EA</b>	
(See section 4.15.1 for description of 'condition')	

Condition	Review
A	The Cultural Heritage Management Plan has been prepared, which recommends a 20m development exclusion zones around each 'scar tree'.
B	It is understood that the one remaining scar tree has been included in the LEP Heritage Plan and a large 'do not touch' band has been put around the scar tree to protect it from contractors who may not know the significance of the tree.
C	Council has given the signs to an ex-member of the Speed Way club who is to restore them and add them to his collection.

## 4.16 Traffic and Transport

### 4.16.1 Monitoring and management criteria

Traffic and transport criteria are provided by the PA and EA. The PA requires the following:

- A *Transport Management Plan* is prepared and implemented (Condition 54, Schedule 3).
- The upgrade of the Auxiliary Right Turn (AUR) at the intersection of Access Road and Kidman Way within 12 months of operations commencing (Condition 55, Schedule 3),
- Loaded vehicles are covered when travelling to and from the site, and that loaded vehicles are cleaned of materials when leaving the site (Condition 57, Schedule 3),
- A logbook of the traffic movements is kept on site and made available for inspection (Condition 58, Schedule 3).

Traffic volumes and predicted impacts were assessed in the EA. The following mitigation and management procedures were recommended:

- Implement procedures for investigating complaints (A),
- Undertake regular road inspections and any works required will be undertaken in accordance with road and rail design standard applicable at the time (B),
- Compile a Transport Management Plan (C),
- Upgrade auxiliary right turn at the intersection with Kidman Way and ensure that there is no cost to the RMS associated with the development (D), and
- The operator to maintain a logbook of traffic movements (E).

### 4.16.2 Results

Information on traffic volumes and vehicle types has been provided. Full weighbridge data per calendar year is recorded and include dates, time, truck registration number, product type and individual Gross,

Tare and Net weigh for each truck. No evidence of abnormal traffic and/or transport occurred during this reporting period. A *Transport Management Plan* has been produced for the site under condition 54 (Section 3) of the Project Approval (GCC n.d.).

Upgrades to the intersection of Access Road and Kidman Way occurred in 2012/2013.

#### 4.16.3 Review

The production and implementation of a Transport Management Plan meets the criteria specified for the Project Approval Condition 54. The Auxiliary Right Turn (AUR) has previously been upgraded as per the Project Approval. However, traffic volumes and vehicle types are to be reviewed every five years and no indication of any review has been provided. Traffic movements have been logged and a record kept on site. An assessment of the monitoring results against the regulatory framework is presented in Table 4-34.

**Table 4-34: Traffic and transport compliance assessment**

Condition	Review
<b>Project Approval</b>	
Condition 54, Schedule 3	A Transport Management Plan has been developed (GCC 2020b).
Condition 55, Schedule 3	The AUR turn has been upgraded.
Condition 57, Schedule 3	All loads that enter site must be covered and all gravel loads that leave the weighbridge are covered.
Condition 58, Schedule 3	A logbook of traffic movements, including all weighbridge data per calendar year, has been provided.
<b>EA</b>	
<b>(See section 4.16.1 for description of 'condition')</b>	
A	Complaints procedures are addressed in Section 3.
B	Council has advised that daily road inspections began in 2021.
C	A Transport Management Plan has been developed (GCC 2020b).
D	The AUR turn has been upgraded.
E	A logbook of traffic movements, including all weighbridge data per calendar year, has been provided.

## 4.17 Dangerous goods and hazardous materials management

### 4.17.1 Monitoring and management criteria

Dangerous good and hazardous materials management criteria is provided by the PA and EA. The management of dangerous goods under PA Condition 19 (Schedule 3) requires that all above ground tanks and vats are stored and handled in accordance with all relevant Australian standards and have a minimum bund volume of 110% of the volume of the largest single stored volume and the DECCW's *Storing and Handling of Liquids: Environmental Protection - Participant Manual*. Additionally, Condition 59 (Schedule 3) requires that the storage, handling and transport of fuels and dangerous goods be conducted in accordance with *Australian Standards AS 1940* and *AS1596*, and the *Dangerous Goods Code*.

EA:

- Construct bunded area of diesel containers (A),
- Store chemical and explosives offsite (B), and
- Install bunding and spill kits in the vicinity of any chemicals or fuels stored or used onsite (C).

### 4.17.2 Results

A Pollution and Incident Response Management Plan has been developed for the site (GCC 2022). Dangerous goods and hazardous materials on site are managed via diesel bunds, spill kits and bunding around the storage of chemicals and fuels. Spill kits are located inside the landfill workshop (Figure 4-40) and at the waste transfer station (Figure 4-41). Diesel fuel is stored in an open location in a self-bunded 4000L storage tank on a concrete bund (Figure 4-42). Bunds are also utilised for battery storage and chemical storage (Figure 4-43 and Figure 4-44) on site. Chemicals used on site are stored in coloured and clearly signed cabinets within the landfill workshop (Figure 4-45). Additionally, there is a MDS folder kept on site, which contains the technical details (safe handling procedures, spill cleanup and disposal) of all the chemicals which are held on site (Figure 4-46) (Ecoplaning 2022).

A ten-year portable fuel station inspection report has been provided by Council, with the inspection undertaken in November 2019. Pass was obtained for all attributes except the tank being earthed and the absence of an emergency stop (B&B Industrial 2019).



Figure 4-40: General purpose spill kit located in the landfill workshop

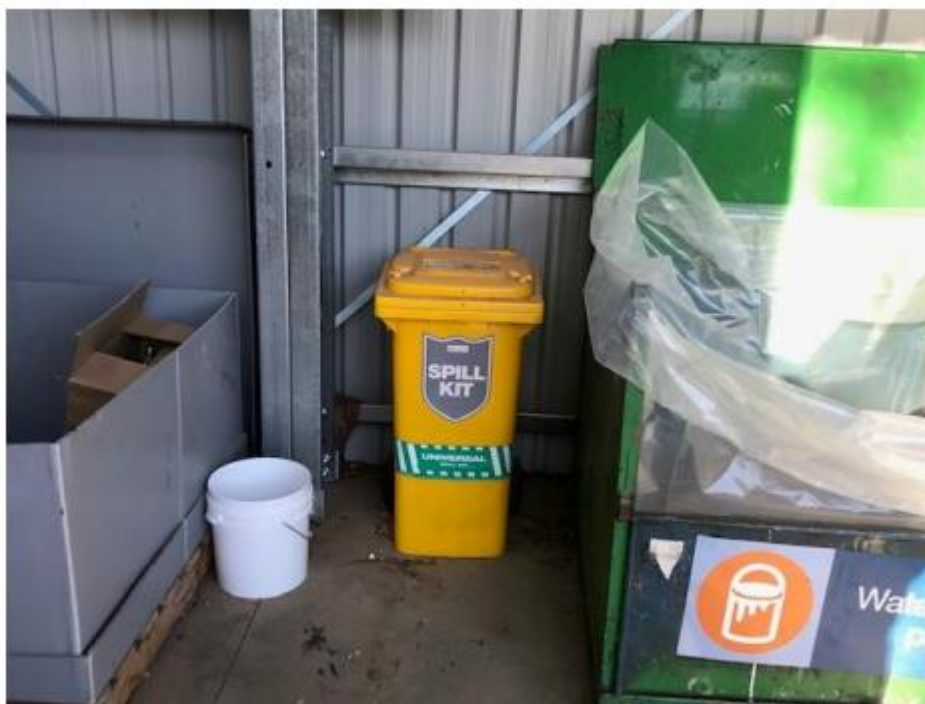


Figure 4-41: Universal spill kit located within the waste transfer station





Figure 4-42: Concrete diesel fuel bund in an open area



Figure 4-43: Bund for battery storage in the landfill workshop

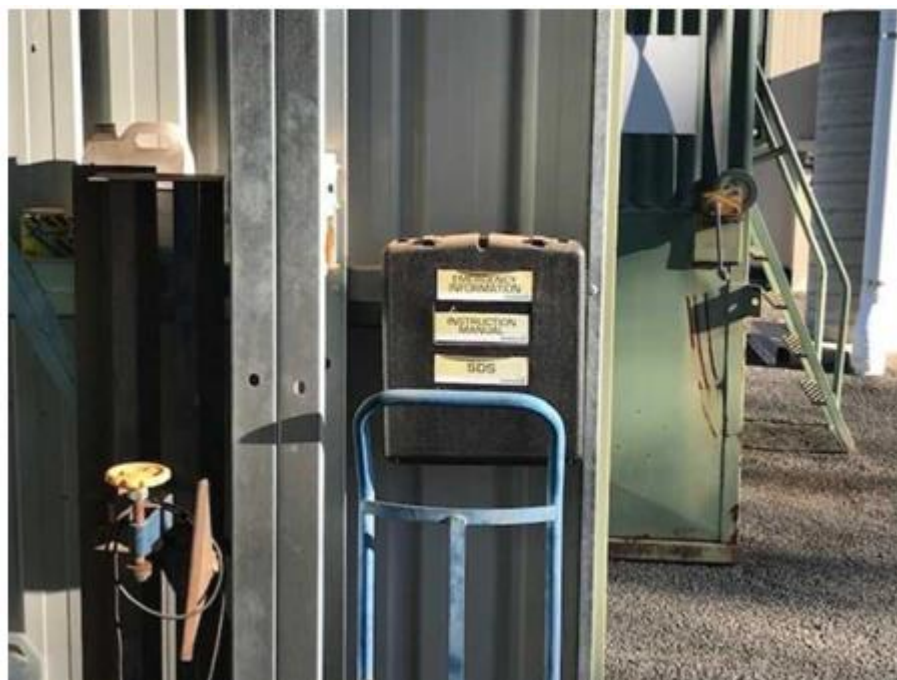


Figure 4-44: Bunded storage shed on site



Figure 4-45: Chemical storage with signage within the landfill workshop





**Figure 4-46: MDS folder located on site**

#### 4.17.3 Review

An assessment of the monitoring results against the regulatory framework is presented in Table 4-35.

The EPA audit (2019) noted that the licensee must ensure that the diesel fuel tank is maintained in a proper and efficient condition including: sign posted appropriately as dangerous goods and otherwise protected from being compromised by vehicular activity.

**Table 4-35: Dangerous foods and hazardous materials compliance assessment**

Condition	Review
<b>Project Approval</b>	
Condition 19, Schedule 3	The management of dangerous goods under PA Condition 19 (Schedule 3) requires that all above ground tanks and vats are stored and handled in accordance with all relevant Australian standards and have a minimum bund volume of 110% of the volume of the largest single stored volume and the DECCW's Storing and Handling of Liquids: Environmental Protection - Participant Manual. Council has confirmed that the current storage of dangerous goods meets the above requirements.
Condition 59, Schedule 3	The photos provided are evidence storage, handling and transport of fuels and dangerous

Condition	Review
	goods is conducted in accordance with AS 1940 and 1596.
<b>EA</b> <b>(See section 4.17.1 for description of 'condition')</b>	
A	The storage and handling of chemicals and fuels, including requirements for bunding and provision of spill kits is met in relation to chemical storage within the WTS and site compound/workshop area.
B	Bunding and spill kits have been installed in the vicinity of any chemical or fuels stored or used onsite.
C	<p>The assessment of chemical management for the existing landfill and quarry was not within the scope of the audit.</p> <p>No information on if there is storage of chemicals and explosives offsite.</p>

## 4.18 Incident management and response

### 4.18.1 Monitoring and management criteria

Dangerous good and hazardous materials management criteria is provided by the PA, EPL and EA. Under the PA the following conditions are provided:

- The project shall be kept secure to ensure public safety (Condition 8, Schedule 3),
- Fire management (Condition 60 (b), Schedule 3):
  - Implement suitable measures to minimise the risk of fire on site, including in the landfill area,
  - Extinguish any fires on site promptly,
  - Maintain adequate fire-fighting capacity on site, in consultation with the rural fire service (RFS), including a tanker or water cart, and
  - Assist the RFS and emergency services if safe to do so, if there is a fire on site.

The EPL requires that a formal investigation and reporting of incidents and management response is required for all incidents. The licensee must:

- Have in place and implement fire prevention measures to minimise risk of fire at the premises (O4.1),
- Extinguish fires at the premises as soon as possible (O4.2),

- Implement fire prevention measures at the premises in accordance with the *LEMP Tharbogang Recycling and Waste Disposal Facility* prepared by RE Barton and dated December 1999 (O4.3),
- Annual returns document meets the requirements outlined in R1,
- Notify the EPA of incidents of environmental harm (R2),
- Provide a written report on request by and EPA officer (R3), and
- Record details of the fire (R4) including:
  - Time and date the fire started,
  - Was the fire authorised by the licensee, and if not, the circumstances which ignited the fire,
  - The time and date that the burn was extinguished,
  - The location of the fire,
  - Prevailing weather conditions at the time of the fire.
  - Observations made in regard to smoke direction and dispersion,
  - Amount of waste that was combusted in the fire,
  - Action taken to extinguish the fire, and
  - Action taken to prevent reoccurrence.

The revised EA mitigation and management commitments are as follows:

- Erect fencing above quarry walls (A),
- Develop and implement fire management procedures in consultation with Griffith Fire Control centre, and submit with emergency services (B),
- Develop emergency response and contingency procedures as part of the operational plans (C),
- Public education and additional inspection for prohibited wastes and burning materials (D),
- Reduce tip face and cover daily to reduce risk of ignition from lightning strikes (E),
- Spread green waste in thin layers to minimise risk of self-combustion (F),
- Create vertical and horizontal layers in inert cell with clay to isolate volume of waste prone to a fire event (G),
- Limit access to quarry faces and exposed edges (H),
- Conduct safe work methods statements for potentially hazardous tasks (I),
- Ensure appropriate supervision for personnel for all tasks (J),
- Conduct site induction and periodic refresher training for all employees, contractors and transport contractors (K), and
- Containment spill kit will be kept on site at all times (L).

#### 4.18.2 Results

No fires occurred at TWMC during the 2022 reporting period. Previously, three fires occurred in 2019. On the 2019 forms it was identified that none of the fires were considered a 'notifiable event' as prescribed in Section 35 of the *Work Health and Safety (WHS) Act 2011 (NSW)*.

Fire breaks and/or fire trails have been established in the woodland to the north and north west of the premises as well as to the south of the sedimentation pond and existing quarry (EPA 2019).

The EPA audit (2019) noted *on 27 September 2017 Nearmap records a potential fire or spill event at or around the containment pond (most northerly pond on the premises), resulting in what looks like an oily substance entering the pond area including contained waters. Note the "spill" was not evident on Nearmap in previous years. There had been a fire in the green waste area a couple of weeks before but this incident appears unrelated. A search of incident logs and notifications for evidence of the event was unsuccessful.*

*The contamination of a site from a hazardous materials spill of that magnitude (potentially a 200L drum) that could potentially show up in the groundwater should have been reported and PIRMP activated.*

### 4.18.3 Review

The current provided information is insufficient to determine the adequacy of the existing procedures and if they were implemented, or, if licencing conditions were met. The EPA audit (2019) identified a potential non-compliance with regards to reporting pollution incidents to the EPA.

All outer access gates to the Waste Management Site have pad locks on them. The perimeter fence line is kept as a serviceable condition. The perimeter fence line is kept as a serviceable condition. There is no 1.8m high mesh fence around the active tipping area, due to the fluid nature of the active tipping area Council uses litter fences these are mobile and are able to be relocated when the active tipping area changes (GCC unpublished). The construction of a 1.8m boundary fence around the landfill will begin in the 2021/22 financial year.

All outer access gates are secured and maintained, there is a CCTV system at the Waste Transfer Station, Front Gate and the Weighbridge this is all integrated to a central server. A Landfill Public Access Procedure flow chart has been prepared. The Waste Management Site is secured by the last employee to leave every afternoon (GCC unpublished).

An assessment of the monitoring results against the regulatory framework is presented in Table 4-36. The EPA (2019) audit states that once emergency services are notified of an incident including fire, and the licensee's response is initiated, the EPA must be notified of any fire on the premise.

**Table 4-36: Incident management and response compliance assessment**

Condition	Review
<b>Project Approval</b>	
Condition 8, schedule 3	The site is secured through fencing, CCTV and padlocked gates to ensure public safety.
Condition 60 (b), schedule 3	There were no fires within the 2022 monitoring period.
<b>EPL</b>	
O4.1	Current fire prevention measures meet the LEMP (1997) requirements.

Condition	Review
	<p>Independent audit notes that fire trails were regraded in November 2017.</p> <p>The EPA Audit (2019) states that emergency response prevention methods were not undertaken.</p> <p>Council has a PIP Fire for landfill fires and this has been sent to NSW Fire &amp; Rescue and NSW Rural Fire Services. The PIP also makes up part of the response to the PRIMP.</p> <p>Staff have undertaken firefighting training (see WHS records)</p> <p>Council has purchased a designated firefighting water tanker.</p>
O4.2	<p>Consultation with the RFS has not been undertaken to decide if the necessary fire-fighting equipment available on site.</p> <p>All fires at the site are extinguished as soon as possible.</p>
O4.3	<p>The landfill has a 10,000 L water cart that has a hydraulic pump / spray unit and a 10,000 L water tank.</p>
R1	<p>The annual return has been completed as required (GCC 2021) and it is assumed it will be kept for at least 4 years after it was submitted to the EPA.</p>
R2	<p>No incidents of environmental harm were recorded during the reporting period (GCC 2021).</p>
R3	<p>No evidence of written reports submitted to the EPA. This is not required if there were no environmental harm incidents.</p>
R4	<p>There were no fires within the 2022 monitoring period.</p>
<p><b>EA</b></p> <p><b>(See section 4.18.1 for description of 'condition')</b></p>	
B	<p>Council has a PIP Fire for landfill fires and this has been sent to NSW Fire &amp; Rescue and NSW Rural Fire Services. The PIP also makes up part of the response to the PRIMP.</p> <p>Staff have undertaken firefighting training (see WHS records)</p> <p>Council has purchased a designated firefighting water tanker. The landfill has on site a 5,000L water cart</p>

Condition	Review
	<p>that has a hydraulic pump/spray unit. The landfill operations staff can also call on the Rural Fire Service and other council plant available, if required.</p> <p>The Rural Fire Service responds to any landfill fires and other council departments provide resources when required.</p>
C	<p>The 'Procedures in the Event of a Fire at the Landfill (WM-PR-016)' were approved 8 February 2017. They do not specifically cover a fire at the WTS.</p> <p>Council has a PIP Fire for landfill fires and this has been sent to NSW Fire &amp; Rescue and NSW Rural Fire Services. The PIP also makes up part of the response to the PRIMP.</p> <p>Staff have undertaken firefighting training (see WHS records)</p> <p>Council has purchased a designated firefighting water tanker.</p>
D	<p>A Waste Education Plan (GCC 2020) has been prepared and outlines the waste education programs undertaken across the community. The includes school education programs, media campaigns, new resident packs, plastic free July 2021 campaign and a 2021 waste and recycling calendar.</p> <p>All waste is inspected upon entry at the Weighbridge.</p> <p>In the event of a fire Council has advised that the site is not left until the area is fully extinguished and the section is quarantined for a day or two as a precaution.</p> <p>When there is an extreme fire season (summer time and over 40 degrees at night) inspections of the site are carried out throughout the night.</p> <p>Council trialled IR cameras in 2019 which alerted if the active cell was superheating.</p>
E	<p>On 9 December 2020 Council obtained approval from the EPA to compact waste in accordance with O6.7 given the difficulty in sourcing clean fill to cover the landfilled waste daily. The current practices are, therefore, considered compliant.</p> <p>The full landfill area is not covered daily but is compacted at the end of each day. It is unknown if minimum compaction is being achieved.</p>
F	<p>Green waste is not used as a direct cover material, it is only used on the top of the final cover. The active</p>

Condition	Review
	<p>cell is compacted each day which alleviates wind blow rubbish.</p> <p>On 9 December 2020 Council obtained approval from the EPA to compact waste in accordance with O6.7 given the difficulty in sourcing clean fill to cover the landfilled waste daily. The current practices are, therefore, considered compliant.</p> <p>The full landfill area is not covered daily but is compacted at the end of each day. Council progressively covers waste maintaining minimum area exposed to 1,000 m<sup>2</sup> to 2,000 m<sup>2</sup>. The system still appears to meet the goals of preventing fires in the waste, controlling vermin and achieving good compaction (GCC 2020a).</p>
G	Cells are overlayed in a grid fashion. One lift the cell walls run east to west and the next lift the cell walls will run north and south.
H	Public access is restricted to designated areas.
I	The waste departments WHS records were provided by Council and show that the tasks for which SWMS have been prepared. The records list the name of those who have signed the SWMS and the date.
J	No information regarding appropriate supervision although the waste departments WHS records were provided by Council that show a log of staff inductions and other training
K	The waste departments WHS records were provided by Council that show a log of staff inductions and other training.
L	A containment spill is kept on site at all times.
Not Triggered	
A	No evidence of fencing as not triggered yet.

## 4.19 Monitoring and recording conditions

### 4.19.1 Monitoring and management criteria

The EPL conditions (M1.1 to M1.3) state the following:

The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition (M1.1).



- All records required to be kept by this licence must be:
  - in a legible form, or in a form that can readily be reduced to a legible form;
  - kept for at least 4 years after the monitoring or event to which they relate took place; and
  - produced in a legible form to any authorised officer of the EPA who asks to see them. (M1.2)

The following records must be kept in respect of any samples required to be collected for the purposes of this licence (M1.3):

- the date(s) on which the sample was taken;
- the time(s) at which the sample was collected;
- the point at which the sample was taken; and
- the name of the person who collected the sample.

#### 4.19.2 Results

The licensee provided a copy of the chain of custody as well as the date and time recorded for all records for this monitoring period.

#### 4.19.3 Review

An assessment of the monitoring and recording conditions against the regulatory framework is presented in Table 4-37.

**Table 4-37: Monitoring and recording conditions compliance assessment**

Condition	Review
<b>EPL</b>	
M.1.1	All monitoring results are set out as required by the condition.
M1.2	Page 39 of the audit report demonstrates compliance here (EPA 2019).
M1.3	The required records for this condition have been provided for all samples.

## 5 Conclusions and recommendations

The Griffith City Council owns and operates the Tharbogang Waste Management Centre operates under Project Approval 06\_0334, which includes a specific requirement for an AEMR to be prepared annually. This report aims to assess the environmental performance of the site over the 2022 calendar year. Assessments are made with reference to the conditions within the PA, the EPL and the revised EA commitments.

During the reporting period, a review of all existing quarry and landfill environmental management plans for the control and monitoring was undertaken. These documents provide the objectives and framework for the compliance and continual improvement objectives. They aim to ensure that the environment and neighbouring community are not adversely impacted by Tharbogang Waste Management Centre activities.

### 5.1.1 Community engagement

No complaints were received over the reporting period. The Customer Service Call Centre is used as a telephone complaints line and all complaints are recorded on Council's Complaint Management System.

No community engagement occurred in the 2022 monitoring period.

### 5.1.2 Statement of compliance

A compliance assessment found that the TWMC had a moderate level of compliance with the PA and EPL conditions and EA revised statement of commitments. There has been an overall improvement in compliance since the first AEMR in 2017. Nineteen non-compliances were identified over the 2022 reporting period, however, five of them were related to the unknown compaction rate of the landfill.

An independent EPA audit (2019) noted several non-compliances, most of which have been addressed since the audit. A small number of compliances were unable to be adequately assessed, largely due to insufficient information.

On 9 December 2020 Council obtained approval from the EPA to compact waste in accordance with O6.7 of EPL given the difficulty in sourcing clean fill to cover the landfilled waste daily.

Compliance for all relevant criteria were recorded for the following categories although some had conditions for which insufficient information was available to adequately assess compliance and / or conditions that were not yet triggered:

- Groundwater
- Leachate
- Meteorological Monitoring
- Noise and Vibration
- Blasting
- Air quality – Dust
- Air Quality - Odour
- Heritage
- Traffic and transport

- Dangerous goods and hazardous materials
- Incident Management and Response
- Monitoring and recording conditions

There is an absence of the following information and / or monitoring data (this list is not exhaustive and the compliance table in each section should be referred to):

- No information regarding Greenhouse Gas Emissions
- Landfill compaction rate

Non-compliance was recorded for the following categories:

- Community relations
- Operations
- Waste
- Landfilling
- Biodiversity
- Surface water
- Greenhouse gas emissions
- Rehabilitation and Landscape Management

A summary of any non-compliance from 2022 with the relevant TWMC approvals is outlined below in Table 5-1 (see Table 1-4 for non-compliance risk colour coding).

Table 5-1 also outlines the actions required to be undertaken over the next reporting period and the proposed timeframes to achieve compliance. The EPA audit (2019) noted several non-compliances, many of which have been addressed in the past two years.

**Table 5-1: Non Compliance risk assessment 2022**

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed actions	Timing of proposed actions
<b>Project Approval #06_0334</b>							
<b>Community Relations</b>							
#06_0334	Condition 10, Schedule 5	The proponent shall prepare and implement a Community Education Program.	Non-compliant	A community program was not implemented for this monitoring period.	Section 3.4	It is recommended that a Community Education Program be created and approved by the Secretary before implementation.	TBA
<b>Operations</b>							
#06_0334	Condition 8, Schedule 5	Within 1 month of approval of any strategies/plans/programs required under this approval, or the completion of the audits: the proponent shall ensure that a copy of the relevant is made publicly available on it's website.	Non-compliant	<ul style="list-style-type: none"> <li>The following plans are not provided on the website:</li> <li>Compliance Audit (EPA 2019) <ul style="list-style-type: none"> <li>Independent Environmental Audit (Property Risk Australia 2018)</li> </ul> </li> </ul>	Section 4.1.3	It is recommended that the website be updated to include these audits and agreements.	TBA

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed actions	Timing of proposed actions
				<ul style="list-style-type: none"> <li>Conservation Agreement</li> </ul>			
<b>Landfilling</b>							
#06_0334	Condition 13, Schedule 3	The PA requires that the existing Landfill Environmental Management Plan (LEMP) be updated within 6 months of the approval.	Non-compliant	<p>The Landfill Environmental Management Plan (LEMP) was most recently updated in March 1999 (Barton 1999).</p> <p>The Landfill Operations &amp; Environmental Management Plan (LOEMP) has been updated and it is currently with DPE for approval (this document will be superseding the LEMP).</p>	Section 4.3.3	NA	NA
<b>Greenhouse Gas Emission</b>							
#06_0334	Condition 12, Schedule 3	A feasibility report is required to be prepared within 5 years of the Planning Approval	Non-compliant	No feasibility report has been provided.	Section 4.13.3	NA	NA
<b>Rehabilitation and Landscape Management</b>							

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed actions	Timing of proposed actions
#06_0334	Condition 9, Schedule 3	<p>Within 6 months of the date of the PA the proponent shall:</p> <p>(a) remove existing litter that has accumulated across the site, to the satisfaction of the Secretary</p> <p>(b) implement suitable measures to prevent the unnecessary proliferation of litter both on and off site, including the installation and maintenance of a mesh fence of not less than 1.8 metres high around the proposed landfill area; and</p> <p>(c) inspect daily and clear the site (and if necessary, surrounding area) of litter on at least a weekly basis.</p>	Non-compliant	<p>Litter on site is removed by staff. There is no specific Litter Management Program. No indication of weekly litter removal, however Council has advised that daily inspections began in 2021.</p> <p>The 1.8 m high mesh fence around the active tipping area was completed in January 2023</p>	Section 4.14.3	NA	NA

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed actions	Timing of proposed actions
<b>EPL #5875</b>							
<b>Waste</b>							
#5875	O5.8	A litter management program is to be implemented.	Non-compliant	Litter on site is collected by staff. There is no specific Litter Management Program.	Section 4.2.3	NA	NA
#5875	O6.7	An average compaction rate of not less than 650 kg per cubic metre must be achieved for all waste disposed of at the premises.	Non-compliant	Current waste compaction is estimated to be at 630 kgm-3 and is compacted using the 26 tonne Tana Compactor. This is less than the 650 kgm-3 rate required. It is unknown if this compaction rate is being achieved.	Section 4.2.3	Review compaction rate once available.	NA
#5875	O6.8	The licensee must ensure that the achieved compaction rate of landfilled waste (excluding cover material)	Non-compliant	Achieved compaction rate of landfill waste (excluding cover material) is included in the annual report for the waste	Section 4.2.3	Review compaction rate once available.	NA



Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed actions	Timing of proposed actions
		is stated in the annual report for the waste premises submitted to the EPA.		premises submitted to the EPA.			
#5875	O6.14-O6.15	Licensee must cover landfill at the end of the day or compact waste in accordance with condition O6.7	Non-compliant	In 2020 the council has obtained approval from the EPA to compact the waste instead of covering it at the end of each day, however it is unknown if this meets the minimum compaction rate.	Section 4.2.3	Review compaction rate once available.	TBA
#5875	O6.16 – O6.17	Biosolids and greenwaste must be stored on an impermeable pad within a bunded area.	Non-compliant	<p>The green waste and biosolids waste pads must be impermeable to that required and have a thickness of not less than 600mm.</p> <p>Green waste pad construction was concluded on the 24/02/20 and has been used ever since (GCC 2020c).</p>	Section 4.2.3	A Biosolids pad has been designed, however, building will not commence until suitable material has been sourced.	TBA

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed actions	Timing of proposed actions
#5875	L2.1	The licensee must not cause, permit or allow any waste to be received at the premises, except the wastes expressly referred to in the column titles "waste".	Non-compliant	Only waste permitted under this section of the licence is to be accepted on site and there are signs regarding this at the weighbridge 136.96 tonnes of "Drilling/Suction Sludge" is listed as received in this monitoring period, however, receipt of waste sludges are not permitted under the licence (CPE 2011c).	Section 4.2.3	Review Waste Screening Procedures in regards to acceptance of waste sludge.	As soon as available.
Landfilling							
#5875	O6.14-O6.15	Licensee must cover landfill at the end of the day or compact waste in accordance with condition O6.7	Non-compliant	In 2020 the council has obtained approval from the EPA to compact the waste instead of covering it at the end of each day, however it is unknown if this meets the minimum compaction rate.	Section 4.3.3	Review compaction rate once available.	TBA
EA							

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed actions	Timing of proposed actions
<b>Waste</b>							
-	F	Streetsweeper waste to be stockpiled with green waste	Non-compliant	Due to the street sweeper waste being wet, it is disposed of down the side of the landfill or on a cell wall	Section 4.2.3	Nil	NA
<b>Biodiversity</b>							
-	L	Develop and implement a weed and pest management strategy for the control and eradication of weed species and incorporate into the rehabilitation plan, and QOEMP and LOEMP	Non-compliant	The LOEMP is currently awaiting approval from the DPE. The LOEMP has a section outlining the offset land, weed and pest animal monitoring requirements and refers to the relevant plans for details regarding how the work is to be undertaken. Weed and Pest Control Plans have been prepared and the works have commenced.	Section 4.4.3	Advise relevant stakeholder once the DPE approved LOEMP available.	NA
-	Q	Assess the significance of various ephemeral swamps and water	Non-compliant	The draft Griffith Biodiversity Management Strategy must be finalised	Section 4.4.3	Advise relevant stakeholder once the DPE	NA

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed actions	Timing of proposed actions
		bodies as part of the Griffith Biodiversity Strategy		and include an assessment of the significance of various ephemeral swamps and waterbodies in the Griffith region. The Griffith Biodiversity Management Strategy (GBMS) has been reviewed and is currently with the DPE for approval.		approved GBMS available.	
Surface Water							
-	I	The stormwater detention pond will be lined with a flexible membrane and the water quality monitored on a quarterly basis	Non-compliant	The stormwater pond is not lined with a flexible membrane and water quality monitoring is only undertaken twice a year. Construction has been completed for the Stormwater pond, resulting in a more formalised contaminant system. Whilst there is no Flexible membrane for the stormwater pond, there	Section 4.6.3	Council will begin works on the Stormwater and Sedimentation Ponds in the 25/26 financial year budget.	25/26 financial year.

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed actions	Timing of proposed actions
				has been major formalisation stormwater works up stream. Monitoring more than twice a year is not proposed.			
<b>Greenhouse Gas Emissions</b>							
-	B	Once data is available, a greenhouse gas target will be set and incorporated into the landfill operational environmental management plan	Non-compliant	No GHG monitoring has been undertaken or a target set.	Section 4.13.3	NA	TBA
-	D	Cover active tip face daily with green waste to improve bioreaction process	Non-compliant	The full landfill area is not covered daily but it is compacted at the end of each day to alleviate wind blow rubbish. Green waste is not used as a direct cover material, it is only used on the top of the final cover. In December 2020 Council obtained approval from	Section 4.13.3	Covering the tip face daily is not proposed. The full landfill area is not covered daily but it is compacted at the end of each day to alleviate wind blow rubbish.	NA

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed actions	Timing of proposed actions
				<p>the EPA to compact waste in accordance with O6.7 given the difficulty in sourcing clean fill to cover the landfilled waste daily. However, this condition remains non-compliant as the goal of improving the bioreaction process remains unaddressed.</p>		<p>Green waste is not used as a direct cover material, it is only used on the top of the final cover.</p> <p>In December 2020 Council obtained approval from the EPA to compact waste in accordance with O6.7 given the difficulty in sourcing clean fill to cover the landfilled waste daily. However, this condition remains non-compliant as the goal of improving the bioreaction process remains unaddressed.</p>	

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed actions	Timing of proposed actions
<b>Incident Management and Response</b>							
-	E		Non-compliant	In 2020 the council has obtained approval from the EPA to compact the waste instead of covering it at the end of each day, however it is unknown if this meets the minimum compaction rate.	Section 4.18.3	Review compaction rate once available.	NA



### 5.1.3 Recommendations

It is recommended that the compliance tables in Section 4 of this AEMR are used as a 'checklist' for future compliance and ensuring conditions are met as additional criteria are triggered (grey). Table 5-1 should be used to identify non-compliances that require addressing as a priority and in accordance with the timeframes outlined in the EPA audit report. Seventeen non-compliances were identified over the 2022 reporting period.

Areas of non-compliance (red) should be addressed promptly in general and areas where insufficient information was available (white) should be reviewed by Council. Where data is available, this should be reviewed to identify areas of non-compliance or provide the relevant information to enable the assessment of compliance to be revised.

## References

- ANZECC (2000). *Australian Guidelines for Water Quality Monitoring and Reporting*. Australian and New Zealand Environmental and Conservation Council: Canberra.
- Balance consulting Australia (2009). *Tharbogang Quarry and Landfill Expansion. Volume 1 Environmental Assessment Report*. Prepared for Griffith City Council.
- Barton R.E. (1999). *Landfill Environmental Management Plan Tharbogang Recycling and Waste Disposal Facility*.
- Black Mountain Projects (2013). *Cultural Heritage Management Plan - Tharbogang Waste Management Centre Near Griffith, NSW*. Prepared for Griffith City Council, Griffith, NSW.
- Bureau of Meteorology (BOM) (2023). *Weather Station Griffith Airport AWS 075041*. <http://www.bom.gov.au/climate/data/>. Accessed February 2023.
- B&B Industrial (2019). *10 Yearly Inspection Report - Portable Fuel Station*. Unpublished.
- Coffey Geotechnics (2007). *Dust investigation for extension of Tharbogang Waste Management Centre*. Report prepared for Griffith City Council, NSW.
- CPE Associates Pty Ltd (2011a). *Tharbogang Waste Management Centre: Soil, Water & Leachate Management Plan (V2.0)*. Prepared for Griffith City Council, Griffith, NSW.
- CPE Associated Pty Ltd (2011b). *Tharbogang Waste Management Centre: Waste Monitoring Program (V2.0)*. Prepared for Griffith City Council, Griffith, NSW.
- CPE Associates Pty Ltd (2011c). *Tharbogang Waste Management Centre: Waste Screen Procedures (V1.1)*. Prepared for Griffith City Council, Griffith, NSW.
- EPA (2019). *Compliance Audit: Tharbogang Recycling and Waste Disposal Facility - Environment Protection Licence Number 5875*.
- EPA (2020). *Environmental Protection Licence: Tharbogang Recycling and Waste Disposal Facility - Environment Protection (Licence Number 5875)*.
- Eco Logical Australia (ELA) (2011). *Tharbogang Landscape and Biodiversity Management Plan: Rehabilitation and Biodiversity Offset Strategy Management Plan and Long Term Management Strategy*. Prepared for CPE Associates on behalf of Griffith City Council, Eco Logical Australia, Sutherland. Last saved 9<sup>th</sup> April 2013.
- Ecoplaning (2019). *Tharbogang Waste Management Centre Annual Environmental and Monitoring Report 2019*. Prepared for Griffith City Council.
- Ecoplaning (2021). *Biodiversity Management Plan Tharbogang Quarry and Landfill*. In preparation.
- Ecoplaning (2022). *Tharbogang Waste Management Centre Annual Environmental and Monitoring Report 2021*. Prepared for Griffith City Council.
- Ecoplaning (2023). *Tharbogang Quarry and Landfill Offset Monitoring: Annual Monitoring report 2022*. Prepared for Griffith City Council.
- Geolyse (2015). *Hydrogeological Investigation - Tharbogang Waste Management Centre*. Prepared for Griffith City Council.
- GHD (2007). *Traffic Impact Assessment: report for Expansion of Tharbogang Waste Management Centre*. Prepared for Griffith City Council, Griffith, NSW.
- GHD (2013a). *Tharbogang Quarry Air Monitoring Plan*. Prepared for Griffith City Council.
- GHD (2013b). *Tharbogang Quarry Noise and Vibration Monitoring Plan*. Prepared for Griffith City Council, NSW.

GHD (2022). *Tharbogang Waste Management Centre: Annual Noise Monitoring – 2022*

Griffith City Council (GCC) (n.d.). *Blast Management Plan - Tharbogang Waste Management Centre Expansion*.

Griffith City Council (GCC) (1999). *Tharbogang Recycling and Waste Disposal Facility - Landfill Environmental Plan*.

Griffith City Council (GCC) (2018). *Asbestos Procedure (WM - PR - 013). Version 5*

Griffith City Council (GCC) (2019). *Annual Report Tharbogang Recycling and Waste Disposal Facility*.

Griffith City Council (GCC) (2020a). *Annual Environmental Performance Report EPL5875 - 11 September 2020 to 10 September 2021*. Prepared by Griffith City Council.

Griffith City Council (GCC) (2020b). *Transport Management Plan - Tharbogang Waste Management Centre Expansion*.

Griffith City Council (GCC) (2021). *Annual Environmental Performance Report EPL5875 - 11 September 2020 to 10 September 2021*. Prepared by Griffith City Council.

Griffith City Council (GCC) (2022). *Pollution Incident Response Management Plan (PIRMP) for Tharbogang Waste Management Centre and Tharbogang Quarry (EPA Licence No. 5875) (v.4.0)*.

MA & WM Robb Environmental Management Services (2022a). *GCC Weed Control Program – Lot 202 Tharbogang – Report 6 – March/April 2022*

MA & WM Robb Environmental Management Services (2022b). *GCC Weed Control Program – Lot 181, Lot 182, Lot 202 Tharbogang – Report 7 – July 2022*

National Environment Protection (Assessment of Site Contamination) Measure (NEPM) (1999).

Northstar Air Quality. (2019a). *Tharbogang Waste Management Centre - Air Quality Monitoring Plan (20.1051.FR1V2)*.

Northstar Air Quality (2019b). *Tharbogang Waste Management Centre - Air Quality Review*. Prepared for Griffith City Council.

Northstar Air Quality Pty Ltd (2022). *Tharbogang Waste Management Centre: Air Quality Review (Project reference: 23.1033.FR1V1)*.

NSS (2008). *Noise Impact Statement for the proposed Tharbogang Quarry Expansion, Slopes Road, Griffith NSW*. Prepared by Noise and Sound Services, NSW.

NGH Pty Ltd (2021). *Noise Monitoring - Tharbogang Quarry Operations 18-393*. Prepared for Griffith City Council.

NGH Pty Ltd (2022). *Groundwater Analysis Report: Tharbogang Landfill (Project No. 22-485)*.

NSW EPA (1999). *The Environmental Criteria for Road Traffic Noise for on-road traffic noise*.

NSW EPA (2000). *Industrial Noise Policy*.

NSW EPA (2016). *Environmental Guidelines: Solid waste landfills*.

NSW EPA (2022). *Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW*. NSW Environment Protection Authority, Sydney.

NSW Government, Planning & Infrastructure (2014). *Project Approval: Application No 06\_0334*.

The Odour Unit (2007). *Odour Impact Study, Tharbogang Landfill, Tharbogang, NSW*. Preliminary Draft Report for Griffith City Council, Griffith, NSW.

Property Risk Australia (2018). *Independent Environmental Audit, Tharbogang Waste*

Stygoecologia (2019). *Tharbogang Waste Management Centre Groundwater Annual Environmental Report 2018-19 - Environmental Protection Licence 5875*. Prepared for Griffith City Council.

Robb Environmental Management Services (REMS) (2023). *GCC Weed Control Program – Lot 181, Lot 182, Lot 202 Tharbogang – Report 8 – November 2022/January 2023*

SMEC (2002). *Tharbogang Landfill Retro-fit Leachate Collector Installation Report*. Prepared for Griffith City Council. Date: February 2002.

# **APPENDIX A**

## Mitigation and management commitments in the PA

---

**Table E1: Mitigation and management commitments**

MITIGATION AND MANAGEMENT MEASURE	RESPONSIBILITY	IMPLEMENTATION SCHEDULE	PERFORMANCE INDICATOR, STANDARD OR GUIDELINE	DOCUMENT REFERENCE
<b>FLORA AND FAUNA</b>				
<ul style="list-style-type: none"> <li>Develop and implement Griffith Biodiversity Management Strategy</li> </ul>	Council	Project commencement	Strategy review of biodiversity outcomes	EA Section 7.2.2 'Onsite measures'
<ul style="list-style-type: none"> <li>All retained areas of native vegetation on Lot 201 and Lot 202 (that is areas not subject to the proposed and envisaged future clearing for quarrying operations) will be protected in perpetuity as part of the offset package and rezoned to Environmental Conservation or Environmental Management</li> <li>Revegetate and enhance (where possible) to create a contiguous corridor with Lot 201 on the western boundary</li> <li>Maintain and enhance a 40m riparian zone on either side of the ephemeral drainage line</li> </ul>	Contractors	Prior to commencement of each quarry pit	Species survival counts Structural and floristic diversity Buffer dimensions	EA Section 7.2.2 'Onsite measures'
<ul style="list-style-type: none"> <li>Collect, store and/or propagate seeds for rehabilitation purposes (to be stipulated in the detailed rehabilitation plan)</li> </ul>	Council	Prior to commencement of each quarry pit	Species diversity in seed collection	EA Sections 6.3.6 and 6.4.4 'Rehabilitation and final landform'
<ul style="list-style-type: none"> <li>Relocate hollow trees and woody debris to corridors and areas not designated for clearing</li> </ul>	Council	Prior to commencement of each quarry pit		EA Section 7.2.2 'Onsite Measures'
<ul style="list-style-type: none"> <li>Clearing of hollow-bearing trees will be undertaken outside of the main bird breeding periods and trees will be inspected for resident fauna by a suitably qualified ecologist. Appropriate action will be taken prior to removal should the presence of native fauna be confirmed</li> </ul>	Qualified NSW Parks Officer or equivalent	Prior to commencement of each quarry pit	Property Vegetation Plan ( <i>Native Vegetation Act 2003</i> )	EA Section 7.2.2 'Onsite measures'
<ul style="list-style-type: none"> <li>Undertake detailed flora and fauna assessments of proposed offsets</li> </ul>	Council	Prior to the commencement of each quarry pit	<i>Consultant Brief 2007</i> 'Objectives and Assessment Tasks', and in consultation with DECC	EA Section 10.2
<ul style="list-style-type: none"> <li>Refine the offset package described in <b>Appendix C</b> to the satisfaction of the Department of Planning and implement it prior to the commencement of the new quarrying activities in order to compensate</li> </ul>	Council	Prior to the commencement of each quarry pit	Approval from the Department of Planning and verified number of hectares protected and reported as offsets	EA Section 7.2.2 'Offsets' EA Section 10.4

for the native vegetation to be cleared				
<ul style="list-style-type: none"> <li>Enhance onsite vegetation in areas not designated for clearing through direct seeding, thinning, grazing exclusion, weed and fire management</li> <li>Develop and implement a weed and pest management strategy for the control and eradication of weed species and incorporate into the rehabilitation plan, and QOEMP and LOEMP</li> <li>Monitor success of revegetation and enhancement works onsite and in offset areas</li> </ul>	Council	Ongoing		EA Section 7.2.2 EA Section 10.5
<ul style="list-style-type: none"> <li>Prepare a detailed rehabilitation plan for the quarry and landfill components to achieve the rehabilitation outcomes identified in the EA. The rehabilitation plan will describe short, medium and long-term measures what will be implemented to rehabilitate the site, manage the remnant vegetation and habitat on the site and landscaping of the site to mitigate any visual impacts of the project.</li> <li>Performance monitoring and completion criteria will be designed to demonstrate that the rehabilitation outcomes identified in the EA and rehabilitation plan are met.</li> </ul>	Council	Project commencement and ongoing	DECCW approval	EA Section 6.3.6 and 6.4.4
<ul style="list-style-type: none"> <li>Progressively clear vegetation for each quarry pit</li> <li>Progressively rehabilitate each quarry pit</li> </ul>	Council/Contractors	Ongoing	Number of hectares successfully rehabilitated Species survival counts	EA Section 6.3.6
<ul style="list-style-type: none"> <li>Cap and rehabilitate the landfill on completion</li> </ul>	Council/Contractors	Landfill closure	Species survival counts	EA Section 6.4.4

#### GROUNDWATER

<ul style="list-style-type: none"> <li>Install 2 new licensed groundwater monitoring bores west of the site</li> </ul>	Landfill Operations Manager	Project commencement	<i>Minimum Construction Requirements for Water Bores in Australia 2003</i>	EA Section 7.3.2 & figure 7.3
<ul style="list-style-type: none"> <li>Licence new groundwater monitoring bores</li> </ul>	Landfill Operations Manager	Prior to installation of new bores	<i>Water Act 1912 (NSW)</i>	EA Section 7.3.2
<ul style="list-style-type: none"> <li>Establish and implement groundwater monitoring program in accordance with DECCW requirements</li> </ul>	Quarry and Landfill Operations Managers	Project commencement	<i>EPA Environmental Guidelines: Solid Waste Landfill 1996</i> <i>Guidelines for Water Quality Monitoring and Reporting ANZECC 2000</i> <i>Approved Methods for the Sampling and Analysis of Water Pollutants in NSW 2004</i>	EA Section 7.3.2
<ul style="list-style-type: none"> <li>Construct appropriately engineered landfill cells lined with an impermeable liner (i.e. with a permeability less than <math>10^{-9}\text{ms}^{-1}</math>) and a</li> </ul>	Council, project designers and	Construction	<i>EPA Guidelines for Aqueous Liquid Treatment Ponds</i>	EA Section 6.4.3 Monitoring and



drainage layer <ul style="list-style-type: none"> <li>Construct a leachate collection system with appropriate holding pond and/or tanks to divert leachate back to landfill</li> <li>Construct surface water diversions around landfill</li> <li>Install high level alarm to the leachate pond interlocked with the drainage system to prevent overfilling</li> <li>Install monitoring and alarm system to detect possible failures in the leachate collection system and liner</li> </ul>	contractor		<i>EPA Leachate Barrier System Guidelines</i> <i>EPA Leachate Collection System Guidelines</i> <i>EPA Environmental Guidelines: Solid Waste Landfills 1996</i>	maintenance' & Section 7.3.2
<ul style="list-style-type: none"> <li>Establish assessment procedures to determine extent of leachate system failure</li> <li>Establish and maintain a landfill incident response register and assessment of potential risks</li> </ul>	Landfill Operations Manager	Ongoing		EA Section 7.3.2
<ul style="list-style-type: none"> <li>Visual inspections of engineering works on a daily basis</li> </ul>	Site Manager	Ongoing		EA Section 9.5
<ul style="list-style-type: none"> <li>Install operational backflow device on potable water supply pipeline</li> <li>Identify, map and colour code all pipelines on site</li> </ul>	Landfill Operations Management	Project Commencement	<i>National and State plumbing regulations</i>	EA Section 6.5
<ul style="list-style-type: none"> <li>Contour, cap and revegetate to top profile of the landfill form to maximum 5% gradient</li> </ul>	Landfill Operations Manager	Closure	<i>EPA Environmental Guidelines: Solid Waste Landfills 1996</i>	EA Section 6.4.4
<ul style="list-style-type: none"> <li>Conduct ongoing groundwater monitoring post closure and action non-compliances</li> </ul>	Council	Closure	<i>EPA Environmental Guidelines: Solid Waste Landfills 1996</i>	EA Section 7.3.2
<b>GROUNDWATER DEPENDANT ECOSYSTEMS</b>				
<ul style="list-style-type: none"> <li>Progressively rehabilitate quarry voids to limit area of disturbance potential for loss / gain of water accession to groundwater</li> </ul>	Quarry contractor	Completion of extraction in each pit		EA Section 6.3.6
<ul style="list-style-type: none"> <li>Install leachate collection system for landfill cells.</li> </ul>	Council, project designers and contractor	Construction		EA Section 7.3.2
<ul style="list-style-type: none"> <li>Construct / install stormwater and sedimentation controls</li> </ul>	Council, project designers and contractor	Construction		EA Sections 7.5.2
<ul style="list-style-type: none"> <li>Assess the significance of the various ephemeral swamps and water bodies as part of the Griffith Biodiversity Strategy</li> </ul>	Council	Ongoing		EA Section 5.11

## SURFACE WATER

<ul style="list-style-type: none"> <li>Council will prepare a surface water management plan to the satisfaction of the NSW Office of Water. This should include measures to ensure that contaminated runoff will not leave the site.</li> </ul>	Council	Prior to project commencement	<i>Approval of plan by NSW Office of Water</i>	EA Sections 7.4.2 and 7.5.2
<ul style="list-style-type: none"> <li>Construct diversion drains and bunds around perimeter of quarry pits</li> <li>Install pumps to divert surface water to settlement and stormwater detention ponds</li> <li>Install sediment trap at discharge point</li> <li>Incorporate energy dissipation and erosion protection measures in surface water diversions</li> </ul>	Council, project designers and contractor	Construction	<i>Managing Urban Stormwater: Soils and Construction (Landcom, 2004)</i>	EA Section 7.5.2
<ul style="list-style-type: none"> <li>Install table drains, culvert pipes and silt traps on all access new roads, i.e. to pit 101</li> <li>Undertake all engineering works to minimise erosion and soil contamination</li> </ul>	Council, project designers and contractor	Construction	<i>RTA Roadside Handbook - environmental guidelines for road construction and maintenance workers 1995</i> <i>RTA Road Design Guidelines (draft Chapter 7 – drainage)</i>	EA Section 6.2.2
<ul style="list-style-type: none"> <li>Ensure all water storages are engineered for peak weather events (1 in 100 year 72 hour rainfall event)</li> <li>The stormwater detention pond will be lined with a flexible membrane and the water quality monitored on a quarterly basis</li> </ul>	Council, project designers and contractor	Construction and ongoing	<i>ANCOLD Guidelines on Design Floods for Dams 1994</i> <i>ANCOLD Guidelines Environmental Management for Dams 2001</i>	EA Section 6.5 Appendix J, Section 7.2
<ul style="list-style-type: none"> <li>Install bunding and spill kits in the vicinity of any chemicals or fuels stored or used onsite</li> </ul>	Quarry and Landfill Operations Managers	Ongoing	<i>AS 1940 The storage and handling of flammable and combustible liquids 2004</i> <i>Dangerous Goods Regulations 2005</i>	EA Section 6.3.4
<ul style="list-style-type: none"> <li>Install operational backflow device on potable water supply pipeline</li> <li>Identify, map and colour code all pipelines on site</li> </ul>	Landfill Operations Manager	Project Commencement	<i>National and State plumbing regulations</i>	EA Section 6.5
<ul style="list-style-type: none"> <li>Visual inspection of engineering works</li> </ul>	Site Manager	Ongoing		EA Section 9.5

## SOILS

<ul style="list-style-type: none"> <li>Containment spill kit will be kept on site at all times</li> <li>Contaminated soils will be removed and placed in the active putrescible landfill cell</li> <li>Soils testing will be conducted down gradient of the landfill, leachate collection system, leachate pond, quarry pits and settlement pond to ensure soil quality remains intact</li> </ul>	Site Manager	Commencement of works and ongoing	Number of spills and remediation action	EA Sections 6.3.4 and 7.6.2
<ul style="list-style-type: none"> <li>Construct cut-off drains and diversions with erosion control measures</li> </ul>	Council, project designers and	Construction	<i>Managing Urban Stormwater: Soils and</i>	EA Section 7.6.2

	contractor		Construction (Landcom, 2004)	
▪ Periodically check and empty sediment trap at settlement dam	Contractor	Ongoing		EA Section 7.6.2
▪ Wet down stockpiles as per the Dust Management Plan	Contractor	Ongoing		EA Section 7.6.2
▪ Enhance vegetation in edge areas (landfill, roads, quarry edges etc)	Council	Ongoing	Species survival counts	EA Section 7.2.2
▪ Cover edges with mulch as a temporary measure			Evidence of erosion	'Onsite measures'
▪ Progressively revegetate quarry stages	Contractor	On completion of each quarry stage	Number of hectares successfully rehabilitated Species survival counts	EA Section 6.3.6
<b>SALINITY</b>				
▪ Install closed leachate collection system and surface water controls around landfill	Council, project designers and contractor	Construction	Managing Urban Stormwater: Soils and Construction (Landcom, 2004)	EA Section 7.7.2
▪ Install sedimentation dam and drainage channels to direct water from quarries				
<b>AIR QUALITY</b>				
▪ Implement procedures for investigating complaints	Council	Ongoing	Number of complaints registered and finalised	EA Section 7.17
▪ Water cart for dust suppression on unsealed roads	Contractor	Ongoing	Compliance with Dust Management Plan	EA Section 7.8.2
▪ Water down uncovered stockpiles				
▪ Conduct odour modelling in the event of a complaint / incident	Council	Ongoing	Approved Methods for the Sampling and analysis of Air Pollutants NSW 2007	EA Section 7.8.2
▪ Water sprayers will be used on the crusher whenever it is operating	Council	Ongoing	Compliance with Dust Management Plan	
▪ When the 10 minute average wind speed measured at the quarry exceeds 30km/hr from the north-east quadrant (between 0 degrees and 90 degrees) operation of the quarry will cease or as specified in Dust Management Plan	Council	Ongoing	Compliance with Dust Management Plan	
▪ When the average wind speed measured at the quarry in any direction exceeds 35km/hr (10 minute average), then all construction and operation of the quarry will cease or as specified in Dust Management Plan.	Council	Ongoing	Compliance with Dust Management Plan	
▪ A Dust Management Plan incorporating dust monitoring to be developed and submitted to DECCW.	Council	Prior to Project Commencement	Approval from DECCW	

## GREENHOUSE GAS EMISSIONS

<ul style="list-style-type: none"> <li>Capture and flare landfill gases and monitor emissions</li> <li>Once data is available, a greenhouse gas target will be set and incorporated into the landfill operational environmental management plan</li> </ul>	Landfill Operations Manager	Ongoing	<i>POEO (Clean Air) Regulations 2002 - schedule 2</i> <i>EPA Environmental Guidelines: Solid Waste Landfills 1996</i>	EA Section 7.9.2
<ul style="list-style-type: none"> <li>Construct and operate waste transfer station to reduce waste to landfill</li> </ul>	Council	Within 2 years of project commencement	<i>Handbook for the Design and Operation of Rural and Regional Transfer Stations 2006</i>	EA Figure 6.11
<ul style="list-style-type: none"> <li>Cover active tip face daily with green waste to improve bioreaction process</li> </ul>	Council	Ongoing	<i>Environmental Guidelines: Solid Waste Landfills</i>	EA Section 7.9.2

## NOISE AND VIBRATION

<ul style="list-style-type: none"> <li>Implement procedures for investigating complaints</li> </ul>	Council	Ongoing	Number of complaints registered and finalised	EA Section 7.17
<ul style="list-style-type: none"> <li>Where quarry plant noise is found to exceed the intrusive goal of 35dB (L<sub>Aeq, 15 min</sub>) at affected residences, the plant will be moved or modified to ensure the noise impact from plant is below 35dB (L<sub>Aeq, 15 min</sub>).</li> </ul>	Contractor	Ongoing	Number of exceedences	EA Section 7.7.2
<ul style="list-style-type: none"> <li>Blasting airblast overpressure (in dB Linear Peak) and ground vibration peak particle velocity (in millimetres per second) will be measured for the first three blasts at the nearest affected residence. If these are well within the limits and there are no complaints, then monitoring will be undertaken once a year. The results will be reported to DECCW.</li> <li>Blasting will only occur between 9.00am -3pm, Monday to Friday excluding public holidays.</li> </ul>	Contractor	Ongoing	Number of exceedences	
<ul style="list-style-type: none"> <li>Restrict operating hours of the quarry to 8.30am - 6pm</li> </ul>	Contractor	Ongoing		EA Section 6.4.3
<ul style="list-style-type: none"> <li>Notify residents within 2,000m of intention to blast at least 7 days in advance</li> </ul>	Council / Contractor	Ongoing		EA Section 7.8.2

## HAZARDS

<ul style="list-style-type: none"> <li>Erect fencing above quarry walls</li> </ul>	Contractor	Prior to commencement of quarry works	<i>DPI Safety Bulletin: working near quarry benches 2008</i>	EA Section 7.10.2
<ul style="list-style-type: none"> <li>Implement procedures for refusing prohibited wastes</li> <li>Construct defined asbestos disposal zone</li> </ul>	Landfill Operational Manager	Construction	<i>Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes 2004</i>	EA Table 7.13
<ul style="list-style-type: none"> <li>Construct bunded area for diesel containers</li> </ul>	Quarry Operational	Construction	<i>AS 1940 The storage and handling of</i>	EA Section 6.3.4

	Manager		<i>flammable and combustible liquids 2004 Dangerous Goods Regulations 2005</i>	
<ul style="list-style-type: none"> <li>Develop and implement fire management procedures in consultation with the Griffith Fire Control Centre, and submit to emergency services</li> <li>Develop emergency response and contingency procedures as part of the operational plans</li> </ul>	Landfill Operational Manager	Construction		EA Table 7.13
<ul style="list-style-type: none"> <li>Store chemicals and explosives offsite</li> </ul>	Landfill Operational Manager	Ongoing	<i>Explosives Act 2003 and Regulations 2005</i>	EA Table 7.13
<ul style="list-style-type: none"> <li>Public education and additional inspection for prohibited wastes and burning materials</li> </ul>	Landfill Operational Manager		<i>Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes 2004</i>	EA Table 7.13
<ul style="list-style-type: none"> <li>Reduce tip face and cover daily to reduce risk of ignition from lightening strikes</li> <li>Spread green waste in thin layers to minimise risk of self-combustion</li> <li>Street sweeper waste to be stockpiled with green waste</li> <li>Manage and monitor waste prior to disposal in the landfill cell and implement other measures outlined in Table 7.13 of the EA</li> <li>Create vertical and horizontal layers in inert cell with clay to isolate volume of waste prone to a fire event</li> </ul>	Landfill operational manager	Ongoing		EA Table 7.13
<ul style="list-style-type: none"> <li>Limit access to quarry face and exposed edges</li> <li>Conduct safe work methods statements for potentially hazardous tasks</li> <li>Ensure appropriate supervision for personnel for all tasks</li> <li>Conduct site inductions and periodic refresher training for all employees , contractors and transport contractors</li> </ul>	All personnel	Ongoing	<i>DPI Safety Bulletin: working near quarry benches 2008</i>	EA Section 7.10.2 & Table 7.13

#### WASTE MINIMISATION

<ul style="list-style-type: none"> <li>Construct waste transfer station</li> </ul>	Project design and contractor	Construction	<i>Handbook for the Design and Operation of Rural and Regional Transfer Stations 2006</i>	EA Figure 6.4.3 'Infrastructure and equipment'
<ul style="list-style-type: none"> <li>Re-direct recyclables for processing</li> </ul>	Landfill Operations Manager	Within 2 years of project commencement	<i>NSW Waste avoidance and Resource Recovery Strategy 2007</i>	EA Section 8.3
<ul style="list-style-type: none"> <li>Record the waste stream and amount received, recovered and recycled, and disposed of in landfill</li> </ul>	Landfill Operations Manager	Ongoing	<i>NSW Waste avoidance and Resource Recovery Strategy 2007</i>	EA Section 8.3

			DECC Online Tracking Service Pack DECC Online Waste Reporting Service Pack and User Guide	
--	--	--	---	--

#### TRAFFIC

<ul style="list-style-type: none"> <li>Implement procedures for investigating complaints</li> </ul>	Council	Prior to commencement of works	Number of complaints registered and finalised	EA Section 7.17
<ul style="list-style-type: none"> <li>Undertake regular traffic and road inspections and any works required will be undertaken in accordance with road and rail design standard applicable at the time</li> </ul>	Council	Every 5 years	In consultation with RTA and the rail authorities, and standards current to the time	EA Section 7.11.2
<ul style="list-style-type: none"> <li>Compile Transport Management Plan</li> </ul>	Council	Prior to commencement of works	Approval of plan by RTA.	
<ul style="list-style-type: none"> <li>Upgrade auxiliary right turn treatment at the intersection with Kidman Way and ensure that there is no cost to the RTS associated with the development</li> </ul>	Council	In accordance with the RTA approved Transport Management Plan	Approval of plan by RTA.	
<ul style="list-style-type: none"> <li>The operator to maintain a log book of extraction quantities, waste deliveries and traffic movements.</li> </ul>	Council	Ongoing		

#### HERITAGE

<ul style="list-style-type: none"> <li>Implement procedures to investigate and protect culturally significant material if discovered during construction and operation</li> </ul>	Site Manager	Prior to commencement of works	<i>Guidelines for Aboriginal Heritage Impact Assessment in the Exploration &amp; Mining Industries</i>	EA Section 7.12.2 and <b>Appendix D</b> of this Response to Submissions
<ul style="list-style-type: none"> <li>The two surveyor scarred trees will be preserved and protected and a 20 m radius development exclusion zone will be maintained around each tree</li> </ul>	Council	Prior to commencement of works		<b>Appendix D</b> of this Response to Submissions
<ul style="list-style-type: none"> <li>The two Bluedot Speedway signs will be carefully removed and handed over to the car racing club for safe-keeping, reuse or displayed at Griffith Pioneer Park Museum.</li> </ul>	Council	Prior to commencement of works		<b>Appendix D</b> of this Response to Submissions

# **VISUAL AMENITY**

<ul style="list-style-type: none"> <li>Erect 2.6m perimeter fence to prevent windblown rubbish leaving the site</li> <li>Ensure rubbish pickup along the fence line and more generally is undertaken regularly</li> </ul>	Site Manager	Prior to commencement of works and ongoing	Number of complaints regarding rubbish	EA Section 7.13.2
<ul style="list-style-type: none"> <li>The landfill will be rehabilitated and revegetated to replicate areas of open grassy woodland.</li> </ul>	Council	Ongoing		EA Section 6.4.4
<ul style="list-style-type: none"> <li>Construct batters with fissures (offset at each bench) and benches to minimise extend of the cut face. These will mimic the natural scarps and reduce the formation of unnatural straight lines.</li> <li>The benches and floor of the quarries will be revegetated with suitable native species</li> </ul>	Quarry Operations Manager and Contractor	Ongoing	<i>NSW Minerals Council Rehabilitation by Design Practice Notes</i> <i>DITR Mine Rehabilitation</i> <i>Landform Design for Rehabilitation 1998</i>	EA Sections 6.3.4 and 7.13.2
<ul style="list-style-type: none"> <li>Ensure strategic landscaping is incorporated into new residential developments within line of sight and in close proximity to the development</li> </ul>	Planning division Council	Ongoing	<i>Griffith Land and Environment Plan</i>	EA Section 7.13.2

## **SOCIOECONOMIC**

<ul style="list-style-type: none"> <li>Maintain ongoing and inclusive consultation with nearby landholders</li> <li>Respond to all community concerns and the complaints register</li> </ul>	Council	All project stages	Number of complaints registered and finalised	EA Sections 7.14 and 7.17
--	---------	--------------------	---	---------------------------



## **APPENDIX B**

# Asbestos Procedure and Disposal at Tharbogang Waste Management Centre

---

## **Asbestos Disposal at Tharbogang Waste Management Centre**

Griffith City Council will still be accepting Asbestos at Tharbogang Waste Management Centre; however loads will now have to comply with the following restrictions;

- Asbestos Disposal Days will only be on a Monday and Wednesday between the times of 9am and 12pm
- Customers must book on (02) 69636491 and provide Council employees with the following description;
  - Approximate size of load.
  - Type of asbestos Friable ( i.e.: insulation, asbestos fibre) or Non Friable(i.e. roof or fence corrugated sheeting, eave or fibro wall sheeting)
  - Contact name and phone number
  - Registration of the vehicle and trailer that the load will be delivered in to Tharbogang Waste Management Centre main gate for assessment and acceptance.
  - Asbestos Removalist Name and Licence Number
  - Location of site when asbestos has been removed
  - Has load been registered on EPA Waste Locate?
- Loads must be double wrapped in “black builders” type plastic and sealed with “silver duct tape” and loaded onto a pallet.
- Wrapping and taping must be robust enough to allow council employees to handle the asbestos pallet, without the contents breaking through thus exposing the asbestos material contents.
- Council employees will unload the pallet that contains the Asbestos on top of it. During this processes the general public are to remain in their vehicles for their own safety.
- Each loaded pallet must not exceed a height of 10msq and a weight of 100kg.
- Contractors with Large Amounts of asbestos will have to pre arrange the disposal by contacting (02) 69636491. It is important to note that the contractor at their own cost will cover the load at the time of disposal

### **IMPORTANT NOTICE TO THE PUBLIC**

- If a load is deliver to Tharbogang Waste Management Centre and is not declared as asbestos by the customer, then the load will not be accepted until it is wrapped correctly as required above.
- If asbestos is dumped at the Tharbogang internal active tipping site and the offending customer is identified, then a fine will be imposed. The load charge will then be recalculated and the offending customer will be asked to remove the asbestos and wrap it correctly as required above. If the offending customer refuses to remove the asbestos, then a professional asbestos removalist contractor will be engaged and their fee will be passed onto the offending customer.

**If you are not sure if it is Asbestos, then always assume it is Asbestos!**

**Council employees and the public’s safety is Councils priority and adherence to the above procedures and processes will assist this.**



**Assets | Engineering | Environment | Noise | Spatial | Waste**

Talis Consultants  
ABN 85 967 691 321

**HEAD OFFICE**

604 Newcastle Street,  
Leederville  
Western Australia 6007

PO Box 454,  
Leederville  
Western Australia 6903

**NSW OFFICES**

**Nowra**

76 Bridge Road, Nowra  
New South Wales, 2541

PO Box 1189, Nowra  
New South Wales, 2541

**Newcastle**

58 Cleary Street, Hamilton  
New South Wales, 2303

P: 1300 251 070  
E: [enquiries@talisconsultants.com.au](mailto:enquiries@talisconsultants.com.au)