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2021 Annual Environmental Management Report



Tharbogang Waste Management Centre

Annual Environmental Management Report 2021

Prepared for: Griffith City Council

April 2022

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PREPARED FOR	Griffith City Council		
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REVIEW	Tammy Paartalu		
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Glossary and Acronyms

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

TWMC	Tharbogang Waste Management Centre
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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 and is located approximately 10 km north-east of Griffith, NSW (**Figure 1.1**). A summary of the site details is included below in **Table 1.1**.

Table 1.1: Site summary

Name of operation	Tharbogang Quarry and Landfill		
Name of operator	Griffith City Council		
Development consent / project approval	Project approval: MP_06_0334, 2010 Environmental Protection Licence No: 5875 (EPL)		
Name of holder of development consent / project approval	Griffith City Council		
Mining lease #	Lots 201 and 202 // DP 756035		
Name of holder of mining lease	Griffith City Council		
Water licence #	NA		
Name of holder of water licence	NA		
Operation Plan commencement date	31/12/1997	Operation Plan completion date	TBA
AEMR commencement date	1 January 2021	AEMR end date	31 December 2021
Name of landowner and operator	Griffith City Council		
Site contact	John Roser – Waste Operations Manager		
	<p>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 2021 – 31 December 2021 and that I am authorised to make this statement on behalf of Griffith City Council.</p> <p><i>Note.</i></p> <p>a) <i>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</i></p>		

	<p><i>misleading in a material respect. The maximum penalty is, in the case of a corporation, \$1 million and for an individual, \$250,000.</i></p> <p><i>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).</i></p>
Name of authorised reporting officer	John Roser
Title of authorised reporting officer	Waste Operations Manager
Contact details of authorised reporting officer	John Roser Waste Operations Manager P: 02 6962 8162 M: 0428 421 443
Signature of authorised reporting officer	
Date	Tuesday, 24 May 2022

This AEMR provides a summary of activity, environmental performance, compliance and community relations between the period of 1 January 2021 to 31 December 2021. The AEMR includes the following:

- Description of the works completed in 2021,
- Review, summary and analysis of environmental monitoring results that were carried out in 2021,
- Analysis of trends,
- Identification of non-compliance and assessment of measures undertaken to ensure compliance, and
- Summary of complaints received during the assessed period.

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 (Risk Property

Australia 2018). A new filling sequence for the new landfill development was also approved as part of this modification.

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

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 (**Figure 1.1**). 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**).

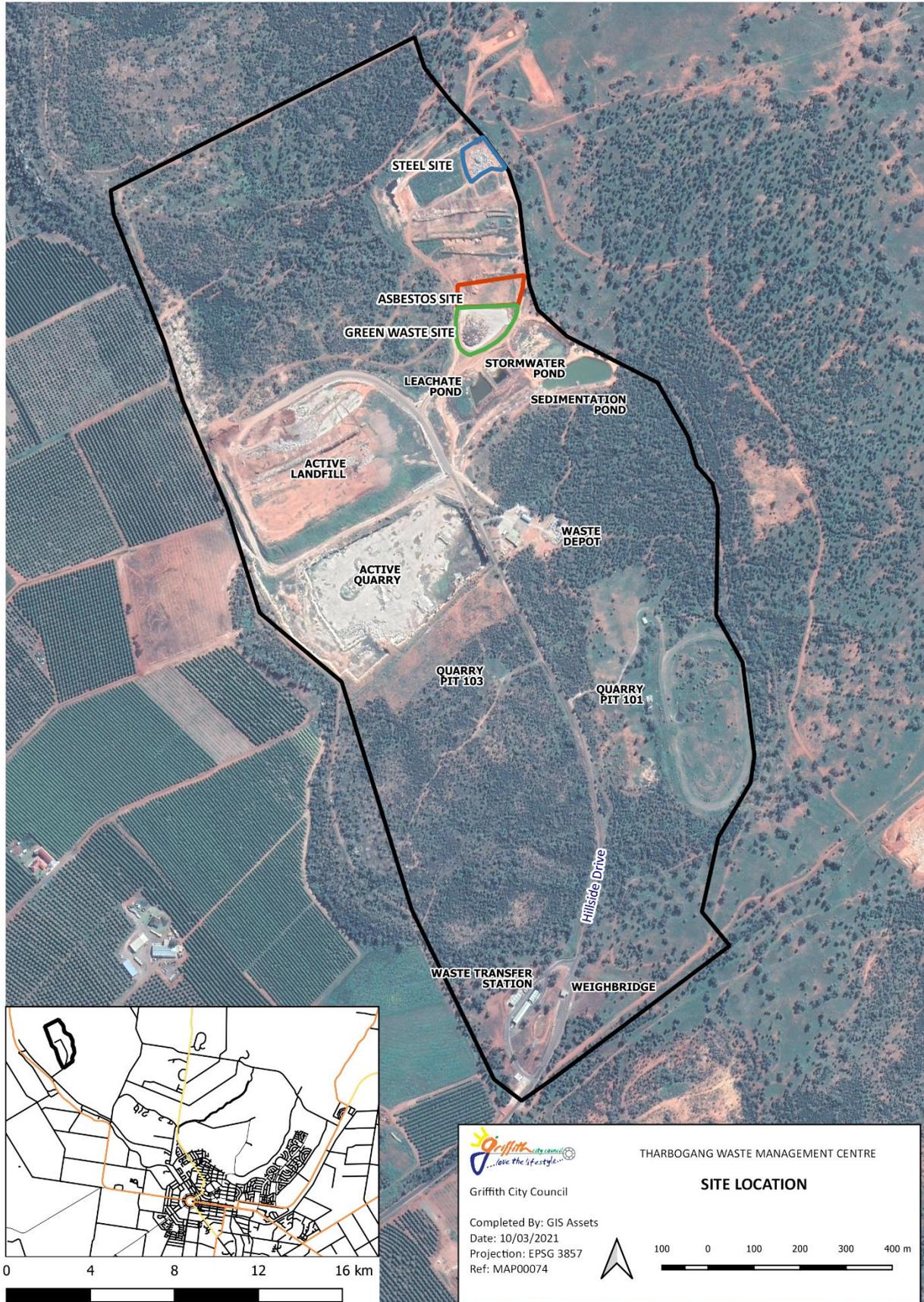


Figure 1.1: Site location.

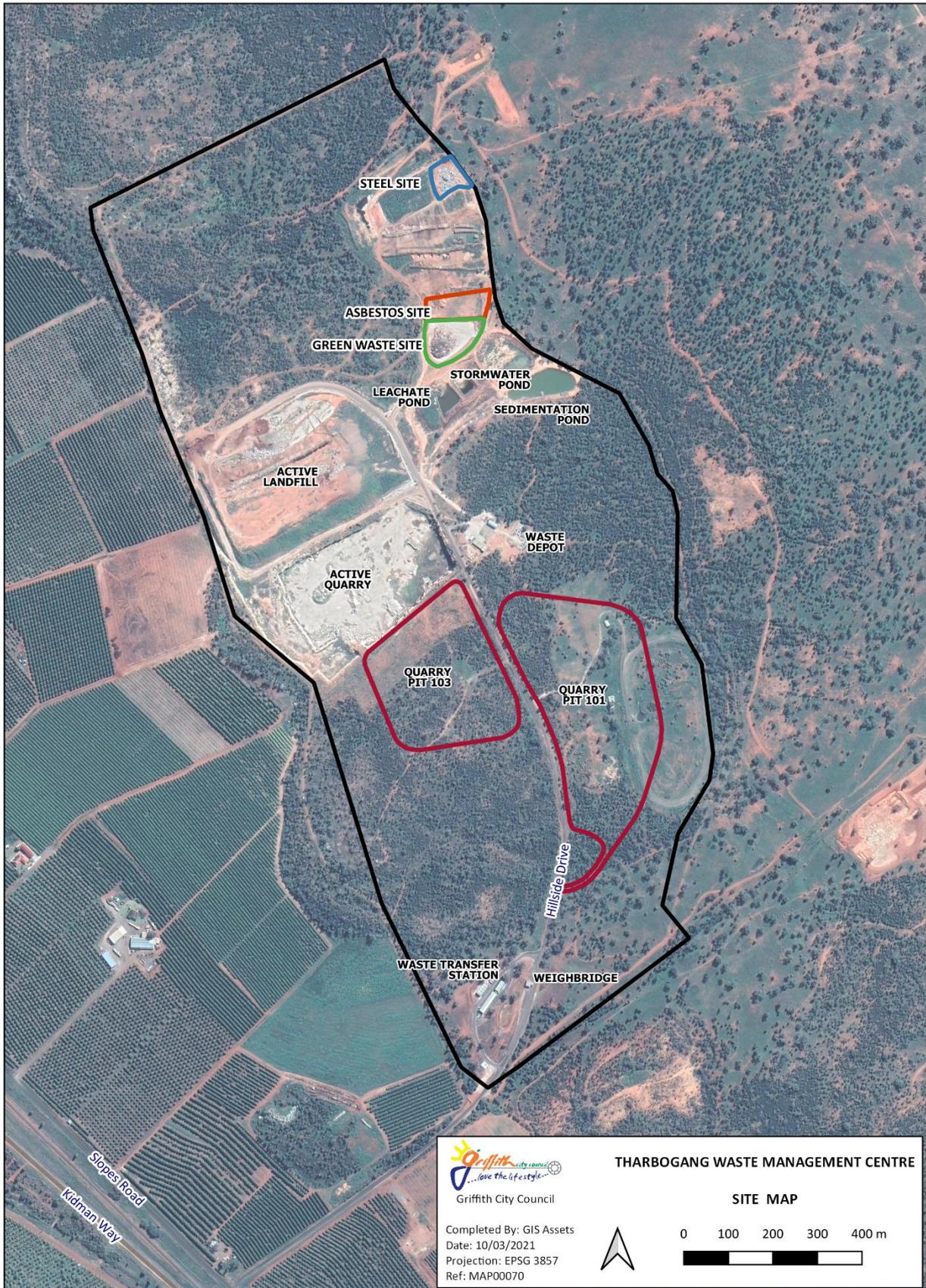


Figure 1.2: Project layout

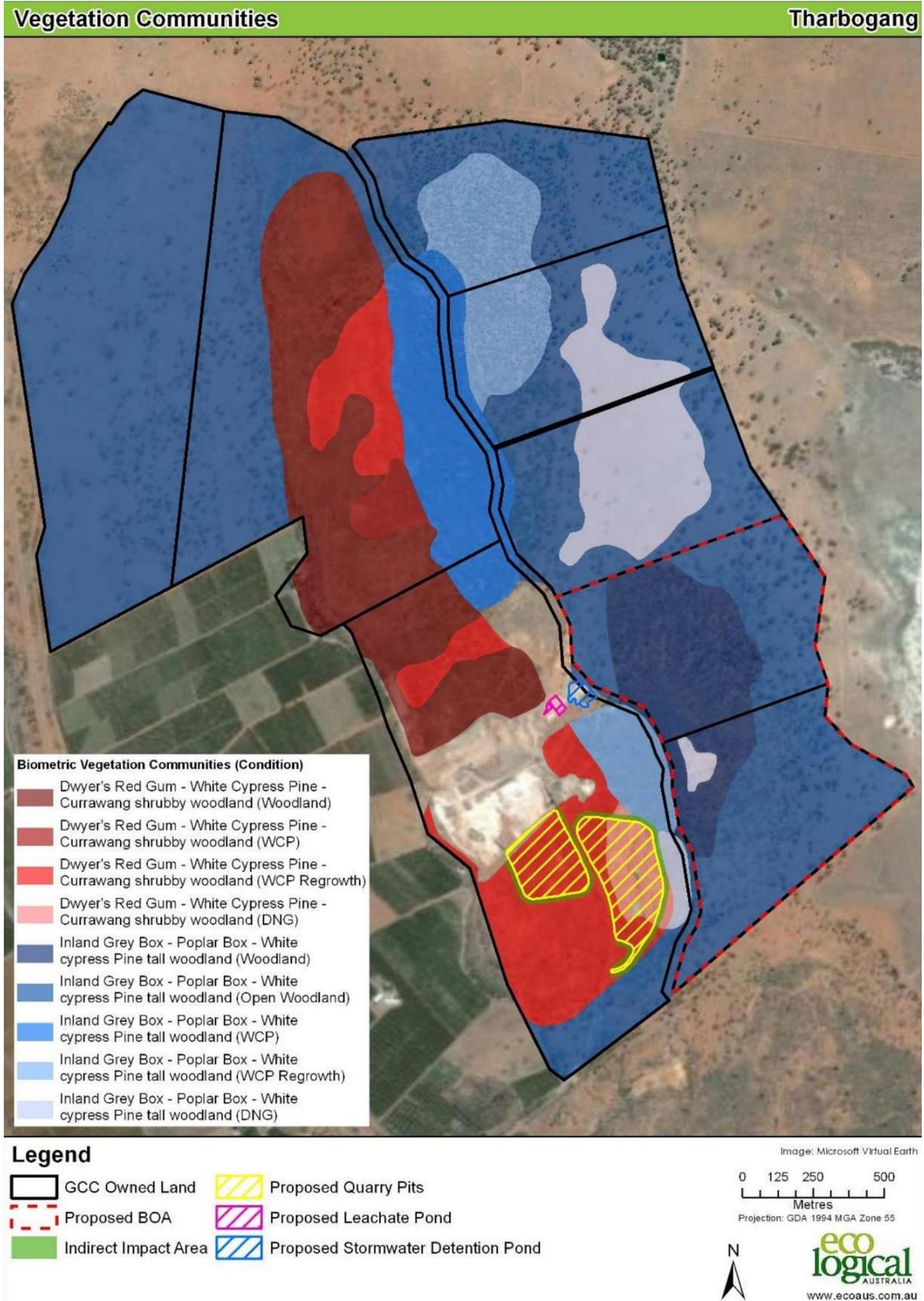


Figure 1.3: Biodiversity offset areas (taken from Eco Logical 2011)

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
Schedule 2: Administrative Conditions		
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
Schedule 3: Specific Environmental Conditions		
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

Compliance Condition	Project Approval Compliance Requirement (06_0334)	Section of AEMR
3	All waste generated during construction must be classified and disposed of according to DECCW's <i>Waste Classification Guidelines, Part 1: Classifying waste</i> .	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 <i>Biosecurity Act 2015</i>) on site are managed and inspected regularly.	4.4
11	Composting is undertaken in accordance with <i>Australian Standard AS 4454-2003</i> .	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 <i>Protection of the Environment Operations Act 1997</i> (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 <i>Environment and Health Protection Guidelines – On-site Sewage Management for Single Households (1998)</i> .	4.5
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

Compliance Condition	Project Approval Compliance Requirement (06_0334)	Section of AEMR
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 <i>Approved Methods for Sampling Air Pollutants in NSW</i> 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
42	Requires that odour complies with section 129 of the <i>POEO Act</i> 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

Compliance Condition	Project Approval Compliance Requirement (06_0334)	Section of AEMR
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
61	Prescribes criteria for recording of annual production data and the inclusion of this data in the AEMR.	4.1
Schedule 4: Additional Procedures		
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

Compliance Condition	Project Approval Compliance Requirement (06_0334)	Section of AEMR
2-5	Prescribes the criteria for an independent review.	NA
Schedule 5: Environmental Management, Reporting and Auditing		
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"> • Keep local community and relevant agencies informed about the operation and environmental performance, • Receive, hand, respond to and record complaints • Resolve any disputes that may arise during the course of the project, • Respond to any non-compliance, and • Respond to emergencies <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 documents must be provided to the relevant agencies and that copies are made publicly available on its website and at the site.	4.1
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
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

Compliance Condition	EPL Compliance Requirement (No. 5875)	Section of AEMR
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
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 and 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* (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 2021 AMER is the fourth report, with the following identified in the 2020 AMER for action:

Based on the recommendations of the EPA, the leachate capture system has undergone a full redesign process. In 2021 the Council completed a final peer review of the new design plans which are currently back with the designers. Engineering works are yet to begin.

Previous AMERs have recommended the implementation of a community education program and an indication of landholder consultation. A Waste Education Plan (GCC 2020a) has been implemented which outlines the waste education programs undertaken across the community. The includes school education programs, media campaigns, new resident packs, a plastic free July campaign and a waste and recycling calendar. The education program was arranged through the RAMJO Waste Group (Riverina & Murray Organisation of Councils), however, was not approved by the Director General (DG). Further clarification is required to determine if wider landholder consultation has occurred.

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.

The NGH report noted that while the recorded noise levels at each of the sensitive receivers ($L_{Aeq(15\text{ min})}$) exceeded the assessment criteria of 35 dB(A) $L_{Aeq(15\text{ min})}$, this was due to a range of noise sources at the sensitive receiver sites. As such it is likely that noise from the Landfill or Quarry was not consistently the main contributor to noise at any of the sensitive receiver locations (NGH Environmental 2020b).

A compliance assessment found that the TWMC had a moderate level of compliance with the PA, EPL conditions and EA revised statement of commitments, and that compliance has been increasing of the life of the AEMR's. There was an overall improvement in compliance in the 2020 AEMR and this trend has continued for the 2021 AEMR. Several compliances were unable to be adequately assessed in the 2020 monitoring due to insufficient information and 28 non-compliances were identified across each of the fields.

Compliance was 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

- Meteorological monitoring
- Noise and Vibration
- Blasting
- Air quality (Dust)
- Heritage
- Dangerous goods and hazardous materials
- Monitoring and recording conditions

There was an absence of the following information and / or monitoring data (this list is not exhaustive and the compliance table in each section on the 2020 report 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

Non-compliance was recorded for the following categories (see **Table 1.5**):

- Community relations
- Operations
- Waste
- Landfilling
- Biodiversity
- Surface water
- Odour
- Leachate
- Greenhouse gas emissions
- Rehabilitation and landscape management
- Traffic and transport
- Incident management and response

The EPA audit (2019) also noted several non-compliances, some of which were addressed in the 2020 monitoring year. Remaining non-compliance from the EPA audit is outlined below in **Table 1.6**. Compliance colours used in **Table 1.5** are consistent with those outlined in the document *Post-approval requirements for State significant mining developments – Annual Review Guideline* (NSW Government 2015). Any tasks that are now compliant are indicated in 'green' in **Table 1.5**.

Table 1.4: Compliance status key (taken from NSW Government 2015).

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

Table 1.5: Non-compliances 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	Timing of proposed action
Requested by Project Approval #06_0334							
Landfilling							
#06_0334	Condition 7 Schedule 3	Lists the site manger responsibilities in term of the exposed tip face, revegetation, capping, filling the landfill cells and the incident response register.	Compliant	Waste is not covered at the end of the day. 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. Compliance was achieved in 2021.	Section 4.3.3	Waste is compacted in accordance with O6.7 of the Closure/Rehabilitation Plan.	Completed 2021 and ongoing
#06_0334	Condition 11 Schedule 3	Composting should be undertaken in accordance with AS 4454-2003	Non-compliant	Composting does not occur on the site. All green waste is mulched and stockpiled north of the asbestos landfill area for cover use.	Section 4.3.3	Composting is not proposed.	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	The Landfill Environmental Management Plan to be completed.	TBC

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment / Action required from previous Annual Review	Where addressed in Annual Review	Proposed Action	Timing of proposed action
Leachate							
#06_0334	Condition 18 Schedule 3 (e)	The PA requires that the leachate storage dams: Are capable of accepting leachate generated in a 1 in 100 year, 72 hour duration storm event without overflowing; 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 1×10^{-9} m/s, or, some other suitable liner approved by DECCW;	Non-compliant	Leachate storage dams are designed to cater for a 1 in 100 year, 72 hour storm event. The EPA is concerned that the rill and gulley erosion observed on the walls of the leachate dam and the growth of vegetation is likely to compromise the present permeability of the leachate dam's base and banks increasing the likelihood of the leachate pond being breached and unable to contain a design storm event (EPA 2019).	Section 4.7.3	The Council has advised that the current leachate collection system is suitable for existing landfill. To address the concerns raised by the EPA, the leachate capture system has undergone a full redesign process. Council have completed the final peer review of the new design plans and are currently waiting for the completion of the design specifications.	2022/23 financial year

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment / Action required from previous Annual Review	Where addressed in Annual Review	Proposed Action	Timing of proposed action
Odour							
#06_0334	Condition 42 Schedule 3	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.	Non-compliant	No odour monitoring data has been provided.	Section 4.12.3	Despite the lack of odour monitoring, no complaints have been made regarding odour in the reporting period.	NA
Greenhouse Gas Emissions							
#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 is not proposed.	NA
#06_0334	Condition 12 Schedule 3	A feasibility report is required	Non-compliant	No feasibility report has been provided.	Section 4.13.3	Feasibility report to be completed.	TBC

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment / Action required from previous Annual Review	Where addressed in Annual Review	Proposed Action	Timing of proposed action
		to be prepared for within 5 years of the Planning Approval					
Rehabilitation and Landscape Management							
#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 has been removed, no information regarding a 1.8 m high fence is provided, no indication of weekly litter removal, however Council has advised that daily inspections began in 2021.	Section □	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). The construction of a 1.8m high boundary fence around the landfill site will commence in the 2021/22 financial year.	2021/22 financial year
Requested by EPL #5875							
Operations							
#5875	O5.5	Measures must be implemented to prevent	Non-compliant	The licensee has not installed and maintained a high wire mesh of less than	Section 4.1.3	There is no 1.8m high mesh fence around the active tipping area. Due to	2021/22 financial year

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment / Action required from previous Annual Review	Where addressed in Annual Review	Proposed Action	Timing of proposed action
		unauthorised entry.		1.8 metres around the active tipping face.		the fluid nature of the active tipping area Council uses litter fences as these are mobile and can be relocated when the active tipping area changes (GCC 2020b). The construction of a 1.8m high boundary fence around the landfill site will commence in the 2021/22 financial year.	
Waste							
#5875	O5.8	A litter management program is to be implemented.	Non-compliant	Litter onsite is collected by the staff. There is no specific Litter Management Program.	Section 4.2.3	Litter Management Program to be completed.	TBC
#5875	O6.6 and O6.13 – O6.15	Criteria for the screening, disposal, burning and covering of waste.	Compliant	The EPA annual return report states that burning of green waste has not occurred for some time and is used for mulch. Green waste is eventually shredded	Section 4.2.3	TWMC state in the Annual Return (2020) that due to a lack of cover material, operationally it is difficult to meet this license requirement. Whilst the full landfill area is not covered each day, the active cell is compacted	Ongoing On 9 December 2020, Council obtained approval from the EPA to compact waste in accordance with O6.7 given the

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment / Action required from previous Annual Review	Where addressed in Annual Review	Proposed Action	Timing of proposed action
				<p>and stockpiled north of the asbestos landfill area.</p> <p>The EPA audit (2019) states:</p> <ul style="list-style-type: none"> the stockpile is greater than 20 m diameter neither the green waste nor the biosolids are stored on an impermeable bunded area. full area of waste is not covered daily, but is compacted at the end of each day the licensee was not applying cover material over all exposed landfilled waste prior to ceasing operations at the end of each day. 		<p>each day which alleviates wind blow rubbish.</p> <p>Council progressively covers waste maintaining minimum area exposed to 1,000 to 2,000m². The system still appears to meet the goals of preventing fires in the waste, controlling vermin and achieving good compaction (GCC 2020b).</p>	<p>difficulty in sourcing clean fill to cover the landfilled waste. Compliance was achieved in 2021.</p>

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment / Action required from previous Annual Review	Where addressed in Annual Review	Proposed Action	Timing of proposed action
#5875	O6.16 – O6.17	Green waste and biosolids are stored on an impermeable bunded area	Non-compliant	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.	Section 4.2.3	<p>The green waste pad has been completed and includes a bunded area capable of capturing all leachate in accordance with the EPL performance conditions.</p> <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>Ongoing</p> <p>The Green waste pad construction was concluded on the 24/2/20 and has been in use ever since (GCC 2020b).</p> <p>An impermeable Biosolids pad has been designed, however, building will not commence until suitable material has been sourced.</p>
Landfilling							
#5875	O6.14 and O6.15	Cover exposed landfill prior to ceasing operations each day.	Compliant	The EPA audit (2019) states that the licensee was not applying cover material over all exposed landfilled waste	Section 4.3.3	TWMC state in the Annual Return (2020) that due to a lack of cover material, operationally it is difficult to	On 9 December 2020 Council obtained approval from the EPA to compact waste in accordance with

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment / Action required from previous Annual Review	Where addressed in Annual Review	Proposed Action	Timing of proposed action
				prior to ceasing operations at the end of each day.		<p>meet this license requirement.</p> <p>The full landfill area is not covered daily but is compacted at the end of each day which alleviates wind blow rubbish. Council progressively covers waste maintaining minimum area exposed to 1,000 to 2,000m². The system still appears to meet the goals of preventing fires in the waste, controlling vermin and achieving good compaction (GCC 2020b).</p>	<p>O6.7 given the difficulty in sourcing clean fill to cover the landfilled waste daily.</p> <p>Therefore, compliance was achieved in 2020 and is ongoing.</p>
Leachate							
#5875	O6.2	Leachate collection system must be capable of capturing all leachate generated from the waste	Compliant	Current storage dams are designed to cater for a 1 in 100 year, 72 hour storm event.	Section 4.7.3	The Council has advised that the current leachate collection system is suitable for existing landfill.	Ongoing

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment / Action required from previous Annual Review	Where addressed in Annual Review	Proposed Action	Timing of proposed action
		disposed of at the premises.					
Requested by EA							
Operations							
EA	A	Visual inspections of engineering works on a daily basis	Compliant	Council was previously not able to provide documentation of daily visual inspections of erosion and sediment controls for the independent audit.	Section 4.1.3	Council has advised that daily inspections began in 2021.	Ongoing
Waste							
-	F	Street sweeper waste to be stockpiled with green waste	Non-compliant	Due to the high moisture level of the street sweeper waste, it is disposed along the side of the landfill or along a cell wall.	Section 4.2.3	Nil	NA
Landfilling							
-	D	Install leachate collection system for landfill cells	Compliant	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	Section 4.3.3	The leachate capture system has undergone a full redesign process. Council have completed the final peer review of the new design plans and are	NA

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment / Action required from previous Annual Review	Where addressed in Annual Review	Proposed Action	Timing of proposed action
				engineered when the new Landfill development occurs. Leachate currently remains diverted solely to existing leachate ponds. All leachate is kept on site and evaporated.		currently waiting for the completion of the design specifications. 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.	
Biodiversity							
-	L	Develop and implement a weed and pest management strategy for the	Non-compliant	The required works (action plan) LOEMP defines the offset land, weed and pest animal monitoring requirements and outlines	Section 4.4.3	The LOEMP is still under review. Weed and Pest Control Plans have been prepared	TBC

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment / Action required from previous Annual Review	Where addressed in Annual Review	Proposed Action	Timing of proposed action
		control and eradication of weed species, and incorporate this strategy into the rehabilitation plan, QOEMP and LOEMP		the relevant plans regarding how the work is to be undertaken.		and the works have commenced.	
-	M	Monitor success of revegetation and enhancement works onsite and in offset areas	Compliant	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. 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 2021b). Annual monitoring of revegetation and	Section 4.4.3	The Closure/Rehabilitation Plan has been approved and covers the works required for revegetation of the site.	Ongoing

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment / Action required from previous Annual Review	Where addressed in Annual Review	Proposed Action	Timing of proposed action
				enhancement works onsite and in offset areas should continue.			
-	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 pencilled in as a priority for review.	Section 4.4.3	Nil	NA
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	Nil	NA

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment / Action required from previous Annual Review	Where addressed in Annual Review	Proposed Action	Timing of proposed action
-	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.	Section 4.5.3	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 has been major formalisation stormwater works up stream.	Council looking at the Stormwater and Sedimentation Ponds in the 22/23 financial year budget. Water quality monitoring more than twice a year is not proposed.
-	Q	Visual inspection of engineering works on a daily basis	Compliant	Council was previously unable to provide documentation of daily visual inspections of erosion and sediment controls for the independent audit.	Section 4.5.3	Council has advised that daily inspections began in 2021.	Ongoing
Groundwater							
-	A & B	Install two new groundwater monitoring bores west of the site	Non-compliant	No new boreholes have been installed in the past 10 years. However, a hydrogeological investigation carried out by Geolyse (2015) concluded that installation of additional	Section 4.6.3	Nil	NA

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment / Action required from previous Annual Review	Where addressed in Annual Review	Proposed Action	Timing of proposed action
		Licence new groundwater monitoring bores		piezometers and/or implementing a more rigorous groundwater monitoring program is not considered necessary.			
Greenhouse Gas Emissions							
-	B	Set greenhouse gas targets and incorporated into the landfill operational environmental management plan.	Non-compliant	No Greenhouse Gas (GHG) monitoring has been undertaken or a target set.	Section 4.13.3	Council is considering what can be done in this regard.	NA
Traffic and Transport							
-	B	Undertake regular road inspections.	Compliant	No documentation of traffic and road inspections have previously been provided.	Section 4.16.3	Council has advised that daily inspections began in 2021.	Ongoing
Incident Management and Response							
-	D	Public education	Compliant	No previous indication of public education or additional inspections for prohibited wastes and burning material.	Section 4.18.3	A Waste Education Plan (GCC 2020a) has been prepared and outlines the waste education programs undertaken across the community. The includes	Ongoing The Waste Education Plan

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment / Action required from previous Annual Review	Where addressed in Annual Review	Proposed Action	Timing of proposed action
						<p>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>Council has advised that the site is not left until the area is fully extinguished and that each section is quarantined for a day or two.</p> <p>When there is an extreme fire season (summer; > 40 °C overnight) site inspections occur throughout the night.</p> <p>Council trialled IR cameras in 2019 which alerted if the active cell was superheating.</p>	was implemented throughout 2021.

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment / Action required from previous Annual Review	Where addressed in Annual Review	Proposed Action	Timing of proposed action
-	E	Cover tip face daily to reduce risk of ignition from lightning strikes	Compliant	The EPA audit (2019) states that the licensee was not applying cover material over all exposed landfilled waste prior to ceasing operations at the end of each day.	Section 4.18.3	The entire active cell is not covered each day, however it is compacted daily which alleviates wind blow rubbish. Council progressively covers waste maintaining minimum area exposed to 1,000 to 2,000m ² . The system still appears to meet the goals of preventing fires in the waste, controlling vermin and achieving good compaction (GCC 2020b).	Ongoing 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.
-	F	Self-combustion minimisation	Compliant	No information was provided regarding the spreading of green waste in layers to minimise self combustion. The EPA audit (2019) states that the licensee was not	Section 4.18.3	Green waste is not used as a direct cover material, it is only used on the top of the final cover. The entire active cell is not covered each day, however it is compacted	Ongoing. On 9 December 2020 Council obtained approval from the EPA to compact waste in accordance with O6.7 given the

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment / Action required from previous Annual Review	Where addressed in Annual Review	Proposed Action	Timing of proposed action
				applying cover material over all exposed landfilled waste prior to ceasing operations at the end of each day.		<p>daily which alleviates wind blow rubbish.</p> <p>Council progressively covers waste maintaining minimum area exposed to 1,000 to 2,000m². The system still appears to meet the goals of preventing fires in the waste, controlling vermin and achieving good compaction (GCC 2020b).</p>	<p>difficulty in sourcing clean fill to cover the landfilled waste daily. Therefore, compliance was achieved from 2021.</p>

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
Requested by EPA Audit (2019)								
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 ² . 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 of covering waste daily.	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. 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	Non-compliant	The licensee must comply with the condition and construct the required 1.8m high meshed fence	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	6 months from the date of final report.	The construction of a 1.8m high boundary fence around the active landfill site will commence in

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
		around the active tipping area		around the active landfill area.		relocated when the active tipping area changes (GCC 2020c). There is fencing to the west of the current landfill that was greater than 1.5m mesh fencing but this was a boundary fence.		the 2021/22 financial year.
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	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
				kept under control at the site.				
			Compliant	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. The controls used must have minimal impact on native fauna species.	Section 4.4.3	Noxious weed and feral animal controls occur throughout the year. 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. Council had a Weed Control plan developed in 2019, this will be reviewed (desktop and in the field)	6 months from the date of final report then ongoing	Ongoing
EPL #5875	O6.14	The completed landfill cells are to follow the prescribed requirements and the criteria for the covering of waste.	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.	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 ² . The system still appears to meet the goals of preventing fires in the	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

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
				The licensee must also ensure that asbestos disposed of on site is immediately and properly covered with VENM.		waste, controlling vermin and achieving good compaction (GCC 2020b).		fill to cover the landfilled waste daily.
EPL #5875	O6.15	The completed landfill cells are to follow the prescribed requirements and the criteria for the covering of waste.	Compliant	The licensee must ensure that cover material over the landfill is maintained. The licensee upon receipt of a 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	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
				daily cover is applied.				
EPL #5875	O6.16 / O6.17	Green waste and biosolids are stored on an impermeable bunded area	Non-compliant	<p>An impermeable pad with bunding is required to be constructed on the site where biosolids are to be “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</p>	Section 4.2.3	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.	Construction 6 months from date of final report Biosolids transfer to landfill 2 months from date of final report	TBA A Biosolids pad has been designed, however, building will not 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
				liner with a permeability of 1 x 10 ⁻⁹ m/s or less and a thickness of no 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 Error! Reference source not found.	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 Error! Reference source not found.	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	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
				pollution incident, 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	There were no fire events in this reporting period (GCC 2021).	Ongoing	Ongoing
EPL #5875	R4.1g)	Criteria for recording fires	NA	Provide estimate of amount of waste combusted.	Section 4.18.3	There were no fire events in this reporting period (GCC 2021).	Ongoing	Ongoing
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	There was no fire in this reporting period (GCC 2021).	Ongoing	Ongoing

NA = not available; TBC = to be confirmed

It was recommended that the compliance tables in Section 4 of the 2020 AEMR and the above **Table 1.5** and **Table 1.6** are used as a 'checklist' for future compliance and ensuring conditions are met as additional criteria are triggered (blue).

Areas of non-compliance (red) were flagged to be addressed promptly and areas where insufficient information was available (white) be reviewed by Council. 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.

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 and 2021
- Blast Management Plan
- Cultural Heritage Management Plan
- Independent Environmental Audit
- Landfill & Environmental Management Plan
- Noise & Vibration Monitoring Program
- Noise Monitoring Report
- Pest Animal Control
- Pollution Incident Response Management Plan (PIRMP)
- Landscape & Biodiversity Management Plan (LBMP)
- Soil, Water & Leachate Management Plan
- Tharbogang Waste Management Centre Pre-Incident Plan (Fire)
- Transport Management Plan
- Waste Monitoring Program
- Waste Screening & Tracking Program
- Weed Control Plan
- Landfill Closure and Rehabilitation Plan
- 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.

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.
Undetermined	White	Unable to determine with current data.
Not triggered	Blue	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 the Landfill Environmental Management Plan can be updated:

- Soil, Water and Leachate Management Plan
- Landscape and Biodiversity Management Plan
- Transport Management Plan

An independent environmental audit of the TWMC was undertaken by Property Risk Australia in March 2018. An EPA annual report was also undertaken in 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 33,017.4 tonnes in 2021, 35,457 tonnes in 2020, 33,235.2 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 472.44 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 six years.

Table 2.1: Waste received at TWMC (tonnes)

Activity	2015	2016	2017	2018	2019	2020	2021
Waste leaving landfill (e.g. steel, tyres, oil, mattress) - recycling	430.0	398.3	303.3	797.1	752.4	671.07	472.44
Gravel	16,665.6	50,361.9	45,942.9	8,360.6	10,923.6	1,359.0	45,765.8
MSW	8,599.2	8,763.8	8,477.6	8,348.7	8,477.2	9,570	9,740.1
C&D	5,642.02	5,284.8	11,446.0	8,124.8	9,355.0	11,814	9,524.3
Green waste	1,134.8	1,016.8	2,621.4	1,344.6	741.7	1,021	3,727.2
C&I	11,606.07	11,456.4	11,614.2	12,655.9	15,403.0	13,073	13,753.0
Clean fill	0.0	0.0	631,330.8	29,393.1	36,958.8	28,396	53,662.2
Total waste in landfill (MSW, C&D, C&I)	25,847.3	25,505.1	31,537.8	29,129.4	33,235.2	34,457	33,017.4

Quarry extraction figures for the past seven 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

2.2 Work completed this reporting year

There were no Capital Works completed at TWMC during 2021, however there are multiple projects awaiting approval before work commences.

2.3 Works scheduled

The following works schedule is an estimate only:

- Extension of Phase 3 power: the designs are currently awaiting approval from Essential Energy (2022/23 financial year).
- Construction of a new Leachate Containment System: currently waiting for the design specifications to be completed (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 (2022/23 financial year).
- Extending the weighbridge (2022/23 financial year).
- Construction of a 1.8 m security fence around the boundary of the landfill site (2021/22 financial year).
- Quarrying within Pit 101: 2030 (calendar year).
- Quarrying within Pit 103: 2040 (approximately).

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 operations 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 or 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) (Griffith City Council 2018a) 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).

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 Environmental Management Plan (LEMP)

A Landfill and Environmental Management Plan (LEMP) (Griffith City Council 1999) 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'. This plan was prepared in 1997 and revised in 1999.

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 3rd stormwater siltation basin is located downstream of the quarry and leachate detention basins. The 3rd 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. (Griffith City Council 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 dams 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 Measure	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 (µSCm ⁻¹) and pH (pH).	Biannually
8	Alkalinity (as calcium carbonate), Calcium, Chloride, Chlorinated volatile compounds, Conductivity, Fluoride, Iron, Magnesium, Manganese, Nitrate, Potassium, Sodium, Sulphate, Total Phenolics, Total Organic carbon, Total suspended solids, pH	All mgL ⁻¹ except conductivity (µSCm ⁻¹) and pH (pH).	Biannually
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 ⁻¹ except pH (pH).	Biannually

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 398.6 mm (BOM 2022). The annual mean daily evaporation is recorded at 4.8 mm. (Site name: Griffith CSIRO. Site number: 075028) (BOM, 2020). Mean monthly rainfall across 2021 varies between 0.0 mm (April) and 22.0 mm (March). Mean maximum air temperature for 2021 varies between 9.8°C (June) and 24.5°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 (Eco Logical Australia 2011).

Annual offset monitoring has been completed by Ecoplanning for the 2017, 2018, 2019, 2020 and 2021 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* (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 18-393 was undertaken by NGH in 2021 using six sensitive receivers in close proximity to quarry operations. Note that while the sensitive receivers are located in the same place as previous surveys, the numerical nomenclature of the receivers has changed since 2020. An additional two sensitive receivers were positioned within the quarry footprint. Monitoring was conducted three times during operating hours on the 1st and 2nd of December 2021. The landfill site and quarry were in operation during the time of the monitoring (NGH 2021b).

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

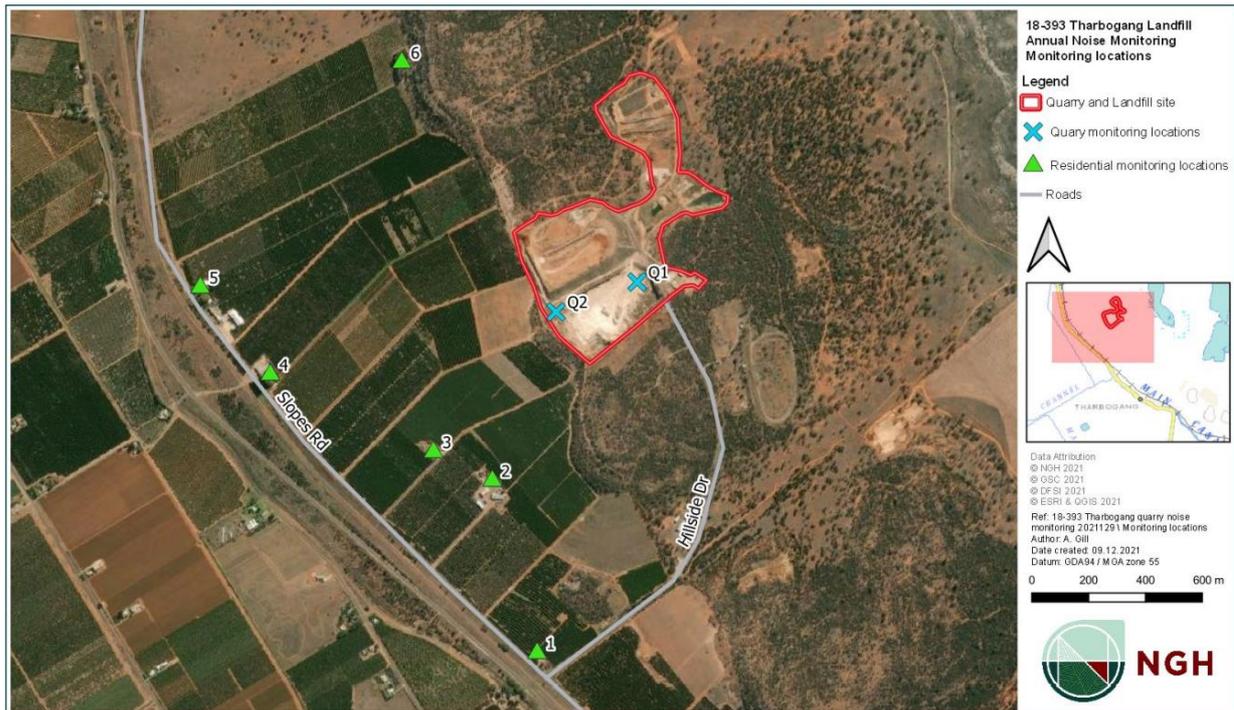


Figure 2.1: Location of noise sensitive receivers (monitoring locations) – taken from NGH 2021b

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*, 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.

Two blasts occurred within the reporting period, one on the 30th of September 2020 and another on the 23rd of February 2021.

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 4.23**. Air quality monitoring has been undertaken monthly from September 2018.

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/m²/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 dependant 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 4.23** in 2018.

Dust gauges measure the level of particulate matter in the ambient air. The NSW EPA Air quality guidelines are 4g/m²/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 – Gavitmetric 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.

Odour

An odour impact assessment was completed by Griffith City Council in 2007 (GCC 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, two scarred trees occur 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 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) (Griffith City Council 2012) 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 2021 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 nor 2020 annual reporting period.

3.3 Community involvement

The Utilities Committee was removed as a Council Committee back in 2017. As part of the RAMJO (this is a network of member councils in the Riverina area), funding is provided by the EPA to provide a number of initiatives that include:

- The EnviroMentors program, run by Keep Australia Beautiful, where mentors visit schools in the region and talk about preselected topics. Due to COVID-19 restrictions during the reporting period no schools were visited.

- A "Love Food hate waste" stall where TWMC select major events in the region and an educator runs workshops based on reducing waste. Due to COVID-19 restrictions there were no such events during the reporting period.
- A Waste Education Plan (GCC 2020) has been commenced which 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.

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	
Criteria 1, Schedule 4	No notification was required as no impacts occurred which were greater than the specified criteria.
Criteria 10, Schedule 5	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).
EPL	
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.
EA	
A	Two blasts occurred during the recording period, one on 30 September 2020 and another on 23 February 2021. Evidence of landholder notification is available on the Blast Notice Registration Form.
B	No complaints have been received for the reporting period.

4. Environmental Monitoring and Management

This section summarises and reviews the environmental monitoring data obtained over the monitoring period (1 January 2021 to 31 December 2021 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, blue 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 and management criteria

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).

Monitoring of the boreholes on site has been published on the council's website <https://www.griffith.nsw.gov.au/cp_themes/default/page.asp?p=DOC-KCB-52-46-17> and are available to staff via the website.

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
Project Approval	
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 2020b).
Condition 29, Schedule 3	Site operates within specified hours.

Condition	Review
Condition 61, Schedule 3	Production data is included in Section 2.1 of this report and the completed 'standard form' included in Appendix C .
Condition 8, Schedule 5	<p>The following plans are provided on the council website:</p> <ul style="list-style-type: none"> • Waste Monitoring Program • Waste Screening & Tracking Program • Landfill & Environmental Management Plan • Soil, Water & Leachate Management Plan • Noise & Vibration Monitoring Program • Air Quality Monitoring Program • Transport Management Plan • Cultural Heritage Management Plan • Landscape & Biodiversity Plan • Independent Environmental Audit • Annual Tharbogang Offset Monitoring - 2016 • Annual Tharbogang Offset Monitoring - 2017 • Blast Management Plan • Pollution Incident Response Management Plan • Tharbogang Waste Management Centre Pest and Animal Control Plan. <p>Additionally, the EPA annual return, EPA Annual Report (2019) and EPA analysis is provided. The Independent Environmental Audit (Property Risk Australia 2018) is also on the website.</p> <p>A link to the Conservation Agreement is present but is not active - A Conservation Agreement between the Minister administering the NPW Act and Griffith City Council for the TWMC Conservation Agreement was executed on 12 July 2017 and registered on 17 November 2017, for Lots 181 and 182 in DP 756 035. This was provided as evidence for the AEMR.</p>
Condition 9, Schedule 5	Council has advised that relevant monitoring results are available on their website.
EPL	
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	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.

Condition	Review
	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.
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 2020b).
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	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 was fencing to the west of the current landfill that was greater than 1.5m mesh fencing but this was a boundary fence. The construction of a 1.8m boundary fence around the landfill will begin in the 2021/22 financial year.
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 Environdata have been provided demonstrating compliance with approved methods.
EA	
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.

Condition	Review
D	Council provided the Waste Departments WHS records which includes details of all those inducted and other training and the date of completion.
E	Logbooks were filled out by the operator before and after operation of plant equipment. Logbook sheets are forwarded to workshop for scheduled maintenance. Logbooks are held in landfill site office. All gravel that leaves the quarry goes over the weighbridge which is where the information for the extractive record is kept.
Not Triggered	
Criteria 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), and
- 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 2018c).

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⁻³ and is compacted using the 26 tonne Tana Compactor (EPA 2018).

Table 4.2: Waste monitoring results

Year - EPA reporting period	Waste to landfill (Tonnes)	Waste Recycled (Tonnes)
2021	33,017	472
2020*	35,478	671
2019	33,235	752
2018	29,129	797
2017	31,538	303
2016	25,505	398
2015	25,847	430

* = reporting period 11 September 2019 – 10 September 2020

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
Project Approval	
Condition 2, Schedule 3	<p>The EPL for the facilities where products from TWMC get recycled include:</p> <ul style="list-style-type: none"> • Mattress and Tyre Recycling: Transport Licence - 20568; Cootamundra Depo Licence (where our product goes) - 21294 • Batteries Recycling – EPA Licence - 20006 • Waste Oil (motor) – Transport Licence 7100; Facility Licence 854 • Ewaste - EPA Licence 20661 • MGB - EPA Licence - 20661 • Steel – Victorian EPA Licence - 1451
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"> • Asbestos • DrumMuster • Community Recycling Centre <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>
Condition 8, Schedule 2	<p>The weighbridge data provided indicates that the current waste input does not exceed the 35,000-tonne threshold imposed on the landfill.</p>
EPL	
L2.1	<p>Only waste permitted under this section of the licence is accepted on site and there are signs regarding this at the weighbridge</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 <i>ad hoc</i> management. However, all tyres disposed of on site have been recycled since 2018.</p>
O5.8	<p>Litter on site is collected by staff. There is no specific Litter Management Program.</p>
O6.6	<p>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).</p>

Condition	Review
6.7	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. With the purchase of the new compactor, it is thought that greater compaction is being achieved.
6.8	Achieved compaction rate of landfill waste (excluding cover material) is included in the annual report for the waste premises submitted to the EPA.
6.9	A filling plan has been designed and has been submitted to the local EPA office. See the LEMP by Barton (1997).
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>Green waste is eventually shredded and stockpiled north of the asbestos landfill area. The EPA audit (2019) states that the stockpile is greater than 20 m diameter and therefore, is non-compliant with the allowed 10 m diameter (condition O6.13).</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 1,000 to 2,000m². 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. The design of the Biosolids pad has occurred, however, building will not commence until suitable material has been sourced.</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 2020b).</p> <p>The green waste pad includes a bunded area capable of capturing all leachate in accordance with the EPL performance conditions.</p>
EA	
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.

Condition	Review
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 – 2021.
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 . 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.

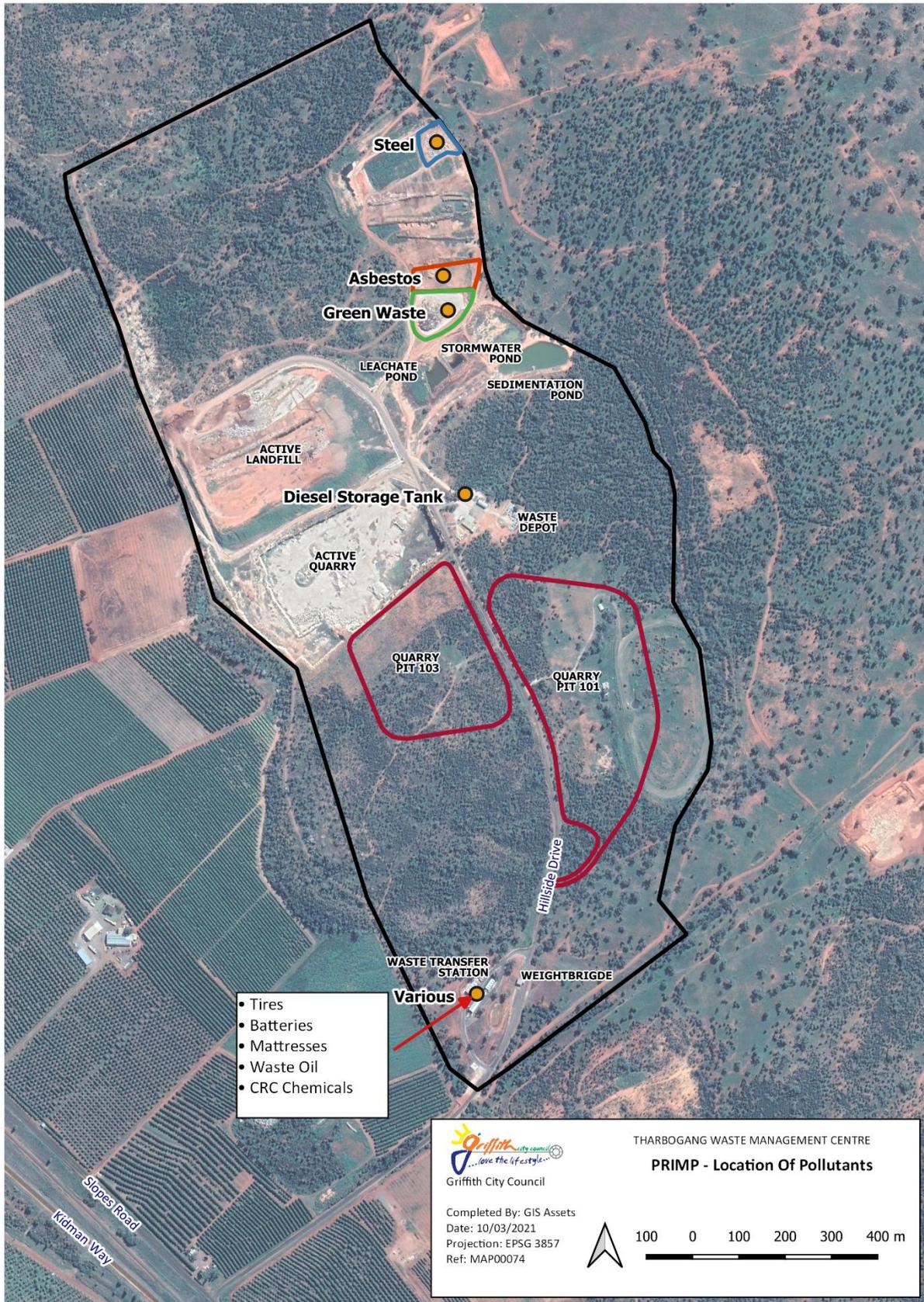


Figure 4.1: Location of pollutants / waste materials

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 (refer “Environmental Guidelines Solid Waste Landfills” 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
Project Approval	
Condition 7, Schedule 3	<ul style="list-style-type: none"> • 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. • 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. • 80% of the access road into the active cells is sealed. Further road sealing will occur next financial year (21/22). • No mud leaves the site. • Cells are filled in a systematic manner - once a cell is filled, the next cell is used. It is always covered. • 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 to 2,000m². The system still appears to meet the goals of preventing fires in the waste, controlling vermin and achieving good compaction (GCC 2020b). • 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. • There is a register for all incident reports. This is championed by the WH&S team.
Condition 11, Schedule 3	Given composting is not undertaken at the site, it cannot be undertaken in accordance with the Australia standard.

Condition	Review
	All green waste is mulched and stockpiled north of the asbestos landfill area for cover use.
Condition 13, Schedule 3	The <i>Landfill Environmental Management Plan</i> was most recently updated in March 1999.
EPL	
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 to 2,000m². The system still appears to meet the goals of preventing fires in the waste, controlling vermin and achieving good compaction (GCC 2020b).</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>The minimum compaction rate is 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>
EA	
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 2020b).</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. Council have completed the final peer review of the new design plans</p>

Condition	Review
	and are currently waiting for the completion of the design specifications. Council hopes this process will be finished soon.
Not Triggered	
A	Not triggered: Landfill cells are not completed and do not require rehabilitation.
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 (Condition 8, schedule 3).

Vegetation Community	Ratio	Area cleared (ha)	Offset Area (ha)
Bimble Box-Pine	1:12.5	12.2	152.5
Dwyer's Red Gum-Currawong	1:10	3	30
Total		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 described in Appendix C 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 2021b) is presented below. A conservation area has been developed for the site (Eco Logical Australia 2011) and monitoring is regularly undertaken. For further information refer to the Tharbogang Quarry and Landfill Offset Monitoring report (Ecoplanning 2021b).

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 2021b):

- 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 2021b).
- Weed management occurred between August and November 2021. Primary target species included *Opuntia stricta* (Prickly Pear), *Lycium ferocissimum* (African Boxthorn), *Asparagus asparagoides* (Bridal Creeper) and *Bryophyllum delagoense* (Mother of Millions) (MA & WM Robb Environmental Management Services 2021a, b, c, d & e).
- Several weeds were dead or not found during the survey. Follow up spraying is required for some weeds as some have resprouted or remain untreated. Weed control has proven to be most effective for *Opuntia stricta* and *Lycium ferocissimum*, although some *L. ferocissimum* has resprouted.
- There was evidence of rabbit and fox scats during the monitoring program (Ecoplanning 2021b), 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 December 2020, March, June and September 2021 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 2021b and Riverina Agriconsultants 2021).

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.
- Above average rainfall can result in high biomass and litter levels, and a high fuel load. Fire breaks and fire trails must be maintained.

Feral fox and cat control was undertaken in April, September and November 2021, which removed 14 European Red Fox (*Vulpes vulpes*) shot and 22 Feral Cats (*Felis catus*) across the waste management centre.

Table 4.6: Completed management actions for year 6 (2021) of the required monitoring period (Ecoplanning 2021b).

Management action	Timing	Status
Monitoring Biobanking monitoring plots and photo points	Year 6	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 2021
Pest animal control (local co-ordination with LLS and OEH)	Years 1 - 10	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. Foxes have been observed in the Conservation Area.
	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 the survey.
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.
	Year 2-10 – maintain fences and gates	Fences and gates re-inspected during monitoring.

Management action	Timing	Status
Quarterly inspections and stock management data	Years 1 - 10	Inspections were conducted in December 2020, March, June and September 2021. No grazing occurred in year 6.
Annual Reports for Monitoring Program	Years 1 -10	Monitoring was conducted in September 2021.

Note: Biobanking monitoring data can be found in the Tharbogang Quarry and Landfill Offset Monitoring report (Ecoplanning 2021b) .

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
Project Approval	
Condition 10, Schedule 3	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. Targeted weed management, particularly of <i>Opuntia stricta</i> and <i>Lycium ferocissimum</i> , occurred between August and November 2021 (MA & WM Robb Environmental Management Services 2021a, b, c, d & e). Feral cat and fox control was undertaken in April, September and November 2021 with several animals removed.
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 2013) incorporates the BOS and addresses this condition.
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.
EPL	
O5.9	Pests are currently managed at site although ongoing work is required.
EA	
A	The Biodiversity Management Strategy is included in the TWMC Landscape and Biodiversity Management Plan – Rehabilitation and Biodiversity Offset Strategy Plan (ELA 2013).
B	An in-perpetuity Conservation Agreement was placed over the land in 2015.

Condition	Review
H	Detailed flora and fauna assessments have been undertaken.
K	The TWMC Landscape and Biodiversity Management Plan – Rehabilitation and Biodiversity Offset Strategy Plan (ELA 2013) incorporates the weed and pest management strategies and addresses this condition.
L	The LOEMP is still under review. 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.
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 regeneration of the overstorey be absent after five years (ELA 2013). The management works are currently in year 6. 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 2021b). 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 2013).
O	Outlined in the TWMC Landscape and Biodiversity Management Plan – Rehabilitation and Biodiversity Offset Strategy Plan (ELA 2013).
Q	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. The Strategy was last updated in December 2011. It has been advised from the Environment Health and Sustainability Coordinator that until an Environmental Officer 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 pencilled in as a priority for review.
Not Triggered	
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

Condition	Review
G	No information regarding the removal of hollow-bearing trees outside the main bird breeding period has been provided.
I	Offset areas have been acquired and a Conservation Agreement reached in 2015. However, PA states that prior to the commencement of each quarry pit the offset package is to be refined to the satisfaction of 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 Surface Water

4.5.1 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; Points 1, 3-7- groundwater) (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 and drainage channels to direct water from quarries (O),
- Periodically check and empty sediment trap at settlement dam (P), and
- Visual inspection of engineering works on a daily basis (Q).

4.5.2 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 following areas are to be monitored twice yearly at Tharbogang:

- Leachate Pond
- Sedimentation Pond
- Boreholes 1-7
- Tharbogang Swamp

Surface water monitoring was undertaken in June and September 2021 within the Leachate Dam and Sediment Pond (results supplied by Griffith City Council). However, no monitoring was undertaken for Tharbogang Swamp as the swamp was dry. The pollutants monitored for, and the results of the monitoring, are presented within the groundwater monitoring in **Section**

4.6.2. 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. No events have occurred over this monitoring period.

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).

4.5.3 Review

An assessment of the monitoring results against the regulatory framework is presented in **Table 4.8**.

Table 4.8: Surface Water compliance assessment.

Condition	Review)
Project Approval	
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 dams 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 dam.
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.
EPL	
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). EPA point 8 and 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. Council is now going through the process of redesigning the leachate capture system which will cater for the: <ul style="list-style-type: none"> • Existing Landfill currently • Existing Landfill though the Closure and Rehabilitation process

Condition	Review)
	<ul style="list-style-type: none"> New landfill development (existing quarry)
L1.1	No water is discharged from site.
EA	
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	Construction of a sedimentation basin has been completed although Council advised that there are no sediment traps installed.
E	Reinstatement of drainage swale works commenced 27/3/18 and were completed 3/5/18.
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>
K	Water, sewer and electrical lines are easily identifiable onsite, and Council has mapped the location of these within their GIS mapping.
M	<p>All surface water is contained on site, any water in contact with the landfill site is treated as leachate.</p> <p>Construction has been completed for the Stormwater, Sedimentation and Leachate ponds, resulting in a more formalised contaminant system.</p>
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.

Condition	Review)
Q	Council has advised that daily visual inspections of erosion and sediment controls began in 2021, following the recommendations of the independent audit.
Not Triggered	
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.

4.6 Groundwater

4.6.1 Monitoring and management criteria

Monitoring of groundwater includes six Boreholes, two leachate dams and one swamp monitoring point. Boreholes range in depth between 7 and 22 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 seven boreholes (although Borehole 2 is dry and no longer requires monitoring) on site (P1.1) which must comply with section 120 of the *POEO Act* (L1.1) and that specific pollutants are monitored for (M1). 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 80th 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 (by sampling and obtaining results by analysis) 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 4.9** below and taken from Stygoecologia 2019.

Table 4.9: Analytes, threshold criteria for groundwater monitoring sites (taken from 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 ₄	N/A	513
Sp. Conductance (µS/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.

4.6.2 Results

Griffith City Council 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 2021* (NGH 2021a).

Groundwater Boreholes are located throughout the site (**Figure 4.2: Groundwater Borehole Monitoring Sites and Leachate Control**). Borehole depths are recorded two times in a calendar year. The results from the 2021 reporting period are shown in **Table 4.10** and **Figure 4.3**. The pollutants which are required to be monitored during the reporting period are identified in **Table 4.11** and a summary of the results presented in **Table 4.12**. 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 north, 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).

Depth data for each borehole was collected on 1 June and 17 September 2021 (GCC 2021). Groundwater levels have somewhat fluctuated over the past seven years, with the majority of the fluctuation since the start of 2019. This variation is comparable to trends in rainfall seen over the same period, where a lower rainfall period between 2018-19 was followed by intermittent months of higher rainfall over 2020-2021 (BOM 2022). Upward trends and peaks in groundwater levels correlate with increases in monthly rainfall (NGH 2021).

Borehole 2 was found to be inaccessible in 2015 and has not been sampled since 2006. The replacement of this borehole was deemed unnecessary (EPA 2015). Therefore, borehole 2 shows nil results for all attributes. Similarly, the water level of Tharbogang Swamp over the 2021 reporting period was negligible and thus shows nil results for all attributes.

There was a large drop in bore hole depth at Bore 5 from June 2021 to September 2021 and a large increase in depth at Bore 4 over the same period. While the water depth of Bore 5 has previously been relatively stable, the standing water levels of Bore 4 have substantially fluctuated since 2019 in comparison to the other boreholes.

The pH values across all boreholes for the 2021 reporting period remained relatively stable and all were within the desired range. The pH levels were slightly alkaline to alkaline within all boreholes, ranging from pH values between 7.39 and 8.36 which are within the ANZECC guidelines. Over the last twelve months the pH was highest in Leachate Dam 1 and Sediment Pond 2, ranging between 8.81 and 9.83 (**Figure 4.4**). Across all sample sites pH was consistently higher in June 2021 compared with September 2021, following increased rainfall events (NGH 2021). The 2020/21 pH values for all boreholes are consistent with the long-term averages (GCC 2021b).

The pH has remained relatively constant over the past seven years, varying less than 1.6 pH units throughout the entire monitoring program for all sites except Leachate Dam 1. Landfilling activities are not considered to influence the pH levels of the groundwater (Geolyse 2015) as there is little to no connection between the leachate dam waters and groundwaters at the nearby bore locations (Stygoecologia 2019).

Over the course of the entire monitoring period alkalinity has been very consistent within each of the groundwater bores, with only a large increase occurring in Leachate Dam 1 in March 2018. This peak quickly subsided by August 2018 (**Figure 4.5**). The cause of this peak is unknown, however, as there was minimal rainfall at the time it is suggested to be an input from an anthropogenic source. Stygoecologia (2019) suggest that the consistent values recorded for each of the other sites indicate there has been no connectivity with the leachate dam and therefore, no contamination of either the groundwater or surrounding surface waters. Furthermore, the consistently elevated alkalinity (above the 80% threshold values) in Bores 4-7 are considered natural background levels within groundwater at these sites due to the higher clay content of the substrate (Stygoecologia 2019).

During the 2021 reporting period there were no major spikes in alkalinity recorded and values remained within acceptable levels for the sampled boreholes. Alkalinity values were recorded between 136 and 1310 mg/L across the sample sites, which were above the trigger values for Bores 1, 4, 5, 6, 7 and Sediment Pond 2. The highest alkalinity values were recorded in Bore 4, which ranged 1300 – 1310 mg/L between June and September 2021. Notably, the alkalinity of Sediment Pond 2 increased in September 2021 relative to the previous seven years of records. The alkalinity values recorded in the 2021 monitoring period are approximate to the long-term averages (GCC 2021), which are likely elevated due to the higher clay content of the substrate (Ecoplanning 2019).

The fluoride values in Bore 1 dropped significantly between June and September 2021. This trend is seen previously in the data, with fluoride levels in Sediment Pond 2 decreasing substantially following heavy rainfall and increasing during drier periods, corresponding with the dilution of the waterbody (**Figure 4.6**). Stygoecologia (2019) suggest that the relative consistency of the fluoride concentrations within most bores over the entire monitoring period indicates that there has been little to no connectivity with the sedimentation dam, and therefore no contamination of groundwater or surrounding surface waters.

Fluctuations in fluoride levels were most prominent within Bores 1, 6 and Leachate Dam 1 over the 2021 reporting period, with all sample sites above the required trigger value in June 2021 and all sites except Bore 1, Leachate Pond 1 and Sediment Pond 2 above the required trigger value in September 2021.

Nevertheless, fluoride levels overall are relatively low throughout most boreholes. Bore 6 contained the highest level of fluoride at 1.50 mg/L in September 2021, which is equal to the Groundwater Investigation Levels (GILs) – drinking water threshold (NEPM 1999), and below the initial fluoride record for Bore 6 in 2014. The fluoride values for the 2021 recording period are consistent with the observed long-term averages (GCC 2021). Fluoride records are consistently higher than the 80% threshold values for Bores 1 – 7 due to the higher clay content of the substrate which elevates the natural background fluoride levels (Stygoecologia 2019).

Chloride, sulphate, specific electrical conductivity, dissolved sodium, total organic carbon, total phenol, volatile organics and dissolved potassium levels were relatively consistent across all sites over the June to September 2021 period.

Throughout the 2021 recording period levels of chloride were very consistent within each of the groundwater bores (**Figure 4.7**). The highest level of chloride recorded during the previous monitoring year was 4320 mg/L in Bore 4, while the lowest was 68 mg/L in Sediment Pond 2. Whilst Bore 4 is located down-gradient of the quarry, leachate pond and sedimentation pond (GCC 2021), Stygoecologia (2019) suggest that the consistent values recorded for each of the bore sites indicate there has been no connectivity with the leachate dam, and therefore no contamination of either the groundwater or surrounding surface waters. Chloride levels are consistently above the 80% threshold value in Bore 4 due to the higher clay content of the substrate, which increases the natural background levels at this site (Stygoecologia 2019).

The values recorded for alkalinity (**Figure 4.5**), sulphates (**Figure 4.8**), specific electrical conductivity (**Figure 4.9**), sodium (**Figure 4.10**), total organic carbon (**Figure 4.12**) and dissolved potassium (**Figure 4.14**) replicate the trends exhibited by chloride over the entire monitoring period, where pollutant levels are largely consistent apart from a significant yet short-lived peak occurring in Leachate Dam 1 between late 2017 and early 2019. Pollutant

levels which have consistently elevated values above the ANZECC guidelines threshold values in all sample sites are considered natural background levels by Stygoecologia (2019). Levels of sulphate, specific electrical conductivity, sodium, total organic carbon, and dissolved potassium have remained relatively constant since the reporting of Stygoecologia (2019).

In continuation of the historical trend, both Bore 1 and Bore 4 indicated the highest levels of sulphate concentration in comparison to the other boreholes (**Figure 4.8; Table 4.12**). In June 2021, both Bore 1 and Bore 4 exceeded the 500 mg/L threshold GILs for drinking water (NEPM 1999) and the 513 mg/L Tharbogang threshold value, while only Bore 4 exceeded both thresholds in September 2021. All other sample sites met these thresholds during the 2021 monitoring period. Sulphate levels in Bore 1 have slightly fallen since September 2021 whilst sulphate levels in Bore 4 have risen over the same period. Overall, the level of sulphate in all boreholes is fairly consistent with their long-term averages.

Concentrations of dissolved sodium were within the required threshold range at all sites except Bore 4, which exceeded the 1775 mg/L threshold value in both June and September 2021 (**Figure 4.10**). Sodium levels in Bore 4 decreased from 2470 mg/L in June 2021 to 2350 mg/L in September 2021. On average, these records are slightly higher than the previous monitoring year. The consistently elevated levels of dissolved sodium in Bore 4 may be partly attributed to the location of the bore, which is situated down-gradient of the sedimentation pond, leachate pond and quarry (GCC 2021). Overall, the level of sulphate in all boreholes is consistent with their long-term averages. Measures of specific conductance exceeded the 350 uS/cm threshold at all sampled sites in both June and September 2021. Whilst historical records of specific conductance have exceeded this threshold value at every site for the past seven years, the conductivity results for the 2021 monitoring period are slightly higher than the long-term averages. Measures of specific conductance were greatest at Bore 4, increasing from 13,800 uS/cm in September 2020 to 15,900 uS/cm in June and September 2021 (**Figure 4.9**).

Levels of Total Suspended Solids (TSS) typically increase substantially during periods of lower rainfall, particularly in surface water sites, which has contributed to the variability of the historical records. The largest increase in TSS in the previous recording period occurred at Bore 6, where levels increased from 31 mg/L to 1200 mg/L between June to September 2021 (**Figure 4.11**). TSS concentrations exceeded the 138 mg/L threshold at Bore 1 and Bore 6 in September 2021. TSS levels also exceeded the threshold value in Leachate Dam 1 in both June and September 2021. The historical fluctuations of TSS concentration in Bore 6 are considered within the natural background range due to the high clay content of the substrate (Stygoecologia 2019). It has been suggested that TSS concentration is not a suitable parameter for assessing groundwater pollutants (GCC 2021). Concentrations of total organic carbon (TOC) were above trigger values for all sites except for Bore 6 and Bore 7 in June 2021 and Bore 3 for both June and September 2021. Within the 2021 recording period, Leachate Dam 1 contained a substantially greater level of organic carbon compared with the other sample sites (**Figure 4.12**).

Since analysis began in 2014, total organic carbon levels have fluctuated substantially within most sample sites, particularly within Leachate Dam 1. June 2021 sampling indicates an increase in total organic carbon for Bore 5, Leachate Dam 1 and Sediment Pond 2, and a decrease in total organic carbon for Bore 1, 3, 4, 6 and 7, compared with the previous sampling period. Total organic carbon levels rose between June and September 2021 for all sites except Sediment Pond 2. For the previous three years Bore 5 has contained the highest levels

of TOC across the bore sites. The elevated concentrations of total organic carbon in Bore 5 (**Table 4.12**) could be due to metabolic by-products from the microbial breakdown of organic matter present in the landfill (Geolyse, 2015), which are then displayed down-gradient. Elevated levels of TOC could also be a result of leaching of hydrocarbon-based contaminants from the landfill (Geolyse, 2015).

Concentrations of dissolved calcium up to the period of the September 2021 survey differ to the trends shown by other pollutants in that while calcium levels in Leachate Dam 1 and Sediment Pond 2 have been low and consistent over time, elevated values have been recorded at Bore 7 and more recently at Bore 4 and 5 (**Figure 4.13**). All sample sites except Bore 4, 5 and 7 were below the 102 mg/L recommended threshold for dissolved calcium in the 2021 recording period. The substantial rise in dissolved calcium concentration in Bore 7 between late 2016 and early 2018 is suggested to be the result of high clay constitution of the substrate and a high rainfall event following a low rainfall period which produced an input of clay sediments into the waterbody (Stygoecologia 2019). Therefore, the consistently elevated levels of dissolved calcium within Bore 7 are considered natural background levels for this site (Stygoecologia 2019). Despite the influence of the clay substrate, Bore 7 is located down-gradient of the buried green and animal waste site, which may influence pollutant levels (GCC 2021). The dissolved calcium levels for the 2021 recording period are consistent with the long-term averages (GCC 2021).

Concentrations of dissolved potassium were within the required threshold range for all sample sites in the 2021 recording period (**Figure 4.14**). Bores 4 and 7 had slightly elevated levels of dissolved potassium in comparison to the other boreholes, however these concentrations were still below the 410 mg/L threshold value. In the previous recording period, the concentration of dissolved potassium in Bore 4 has continued to fluctuate around 150 mg/L as has occurred since measurements began in 2014. Levels of dissolved potassium have declined in Bore 7 since a peak in April 2017 and ranged between 138 and 144 mg/L in 2021. These results may be influenced by the location of the boreholes; Bore 7 is located down-gradient of the buried green and animal waste site and Bore 4 is located down-gradient of the sedimentation pond, leachate dam and quarry. The dissolved potassium levels for the 2021 recording period are consistent with the long-term averages (GCC 2021).

In the 2021 recording period concentrations of dissolved iron were above the 0.3 mg/L required threshold at all sites, except for Bore 1 and Sediment Pond 2 in the September record. From September 2020 to September 2021 concentrations of dissolved iron increased at Bore 1, Bore 4, Bore 5, Bore 6 and Leachate Dam 1 (**Figure 4.15**). Levels of dissolved iron slightly declined in Bore 3, Bore 7 and Sediment Pond 2 over the same period. The largest increase in dissolved iron in the previous recording period was observed within Bore 6, which grew from 2.51 to 5.18 mg/L between June and September 2021. The dissolved iron concentration has been consistently higher than the ANZECC Guidelines Trigger value for most sample sites since measurements began in 2014. It is thought that these are the natural background levels within the groundwater due to the higher clay content of the substrate and geology (Stygoecologia 2019). The dissolved iron levels for the 2021 recording period are consistent with the long-term averages (GCC 2021).

The concentration of total phenols has been consistently recorded below the 80% interim threshold value of 1 mg/L at each site since measurements began in 2014. This threshold is greater than the ANZECC Guidelines trigger value of 0.32 mg/L, however, as there is no

variation between sites or across time, Stygoecologia (2019) have suggested that this must be assumed to be the natural background levels of phenols within the substrate.

Concentrations of dissolved magnesium exceed the 80% interim trigger value of 184 mg/L at Bore 1, 4 and 7 throughout the 2021 recording period (**Figure 4.16**). Dissolved magnesium levels also exceeded the trigger value at Bore 5 in September 2021, however values for Bore 3, Bore 6, Leachate Dam 1 and Sediment Pond 2 are within range. Levels of dissolved magnesium have been substantially elevated at Bore 7 since the start of measurements in 2014, which is likely influenced by the high clay content of the substrate and possibly by the location of the bore, which is down-gradient of the buried green and animal waste site. Dissolved magnesium levels for all other boreholes are consistent with concentrations in up-gradient Bore 1 (GCC 2021). Overall, the measured concentrations of dissolved magnesium are consistent with the long-term averages (GCC 2021).

Levels of dissolved manganese were below the ANZECC Guidelines trigger value of 1.9 mg/L for all sample sites during the 2021 reporting year. Between June and September 2021, the concentration of dissolved manganese increased in Leachate Dam 1 from 0.046 to 1.22 mg/L, the steepest rise in manganese levels across all sites since measurements began in 2014 (**Figure 4.17**). Levels of dissolved manganese increased from 0.035 to 0.356 mg/L between September 2020 to June 2021 and remained fairly consistent into September 2021. The dissolved manganese levels observed in the 2021 recording period are slightly higher than the long-term averages (GCC 2021). The concentration of manganese in groundwaters is dependent upon several factors, including rainfall chemistry, aquifer lithology, the geochemical environment, groundwater flow paths and residence time (GCC 2021).

Ammonia levels exceeded the ANZECC Guidelines trigger value of 0.9 mg/L at Bore 5 and Bore 7 throughout the 2021 reporting period. Between June and September 2021, the ammonia concentration in Leachate Dam 1 increased from 0.09 to 19.4 mg/L, far exceeding the threshold value (**Figure 4.18**). Ammonia levels increased in Bore 7 across the same period, rising from 5.09 to 9.94 mg/L. Ammonia levels increased substantially in multiple boreholes following a high rainfall event between late 2016 and early 2017. It was suggested that this peak was the result of an increase in sewage discharge into the Waste Treatment Centre, runoff from fertiliser on the surrounding landscape or from leaching of the green waste area. As Bore 7 is down-gradient of the buried green and animal waste site, the recent increase in ammonia observed at this bore may be the result of a rainfall event that stimulated overland flow from the waste site. The slight declines in ammonia concentrations observed in Bore 3 and Sediment Pond 2 over the previous monitoring year likely relate to the oxidation of ammonia into nitrate/nitrite, and/or downgradient dissipation (Geolyse 2015). Concentrations of Total Oxidised Nitrogen (TON) were above the ANZECC Guidelines trigger value of 0.4 mg/L for Bore 1, Bore 6 and Bore 7 throughout the 2021 monitoring period. TON values also exceeded the trigger value in Bore 3 and Sediment Pond 2 in September 2021. Excluding Bore 7 and Leachate Dam 1, TON concentrations up to and inclusive of the 2021 monitoring period have been reasonably consistent since measurements began in 2014. The GILs for nitrate levels is 50 mg/L (NEPM 1999), well below the historical and current values for Bore 7. However, the nitrate levels for Bore 1 to 6 meet the 50 mg/L criteria (GCC 2021). Between June and September 2021, TON levels within Bore 7 declined from 379 to 361 mg/L (**Figure 4.19**). The elevated and fluctuating concentrations of TON at Bore 7 is likely due to the location of the bore, which is situated down-gradient of the buried green and animal waste site (GCC 2021). All other boreholes display lower TON concentrations than the up-gradient Bore

1. Overall, the measured concentrations of total organic nitrogen are consistent with the long-term averages (GCC 2021).

Levels of volatile organics have been consistently recorded as less than the 50 ug/L interim trigger value at every sample site since measurements began in 2014. As there is no ANZECC Guidelines trigger value for this parameter and as there is no variation across time or location, Stygoecologia (2019) assumed the observed values must be the natural background levels. General conclusions from the above results include (NGH 2021a):

- 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.
- pH patterns have remained stable for all bores with all peaking in June 2021 following increased rainfall in May and June.
- Elevated levels of dissolved calcium, magnesium and total oxidised nitrogen were recorded in Bore 7. These levels have decreased relative to peaks in August 2017, however they have plateaued since 2020.
- Sulphate, alkalinity, chloride, sodium, potassium, total phenols, total organic carbon, volatile organics and specific conductance levels have remained fairly consistent through the 2020/2021 period for all bores.
- Ammonia levels have increased substantially in Leachate Dam 1 and moderately in Bore 7 through the 2020/2021 period. Ammonia levels in other bores remains consistent.
- The fluoride concentration in Bore 1 dropped substantially between June and September 2021, likely in response to a period of elevated rainfall.

A steep increase in the levels of dissolved manganese and ammonia in Leachate Dam 1 between June and September 2021 warrants further investigation to determine the source of these elevated pollutants. Similarly, elevated levels of ammonia and total oxidised nitrogen in Bore 7 over the 2020/2021 period warrant further investigation into the source of these elevated nutrients (NGH 2021a).

Rainfall over the five years preceding the 2021 monitoring period has varied substantially. From 2016 to 2018 annual rainfall declined to the lowest levels observed throughout the Council's monitoring program. Following 2019, annual rainfall has increased so that 2021 was second wettest year since the start of the monitoring program.

Stygoecologia (2019) found that groundwater levels at the Tharbogang site generally correlate to rainfall activity, such that groundwater levels have typically increased following periods of higher rainfall and have declined during the lower rainfall periods of 2014 and 2018 (**Figure 4.3**). The degree of correlation between these parameters indicates the extent of surface water to groundwater connectivity.

The most significant declines in groundwater level over the drier 2017-18 period occurred in Bore 4 and Bore 5, whereas Bore 6 and Bore 7 recorded higher values. Bore 1 and 3 have remained relatively stable over the last 5 years. Bores 4 and 5 appear most responsive to major rainfall events and indicate a strong connection and rapid recharge of the groundwater within 1-2 weeks. These bores are located adjacent to the sediment pond and main landfill pit respectively. Bore 1, 6 and 7 demonstrate a delayed or minor response of approximately 12 months to rainfall and are therefore predominantly disconnected from surface flows (Stygoecologia 2019).

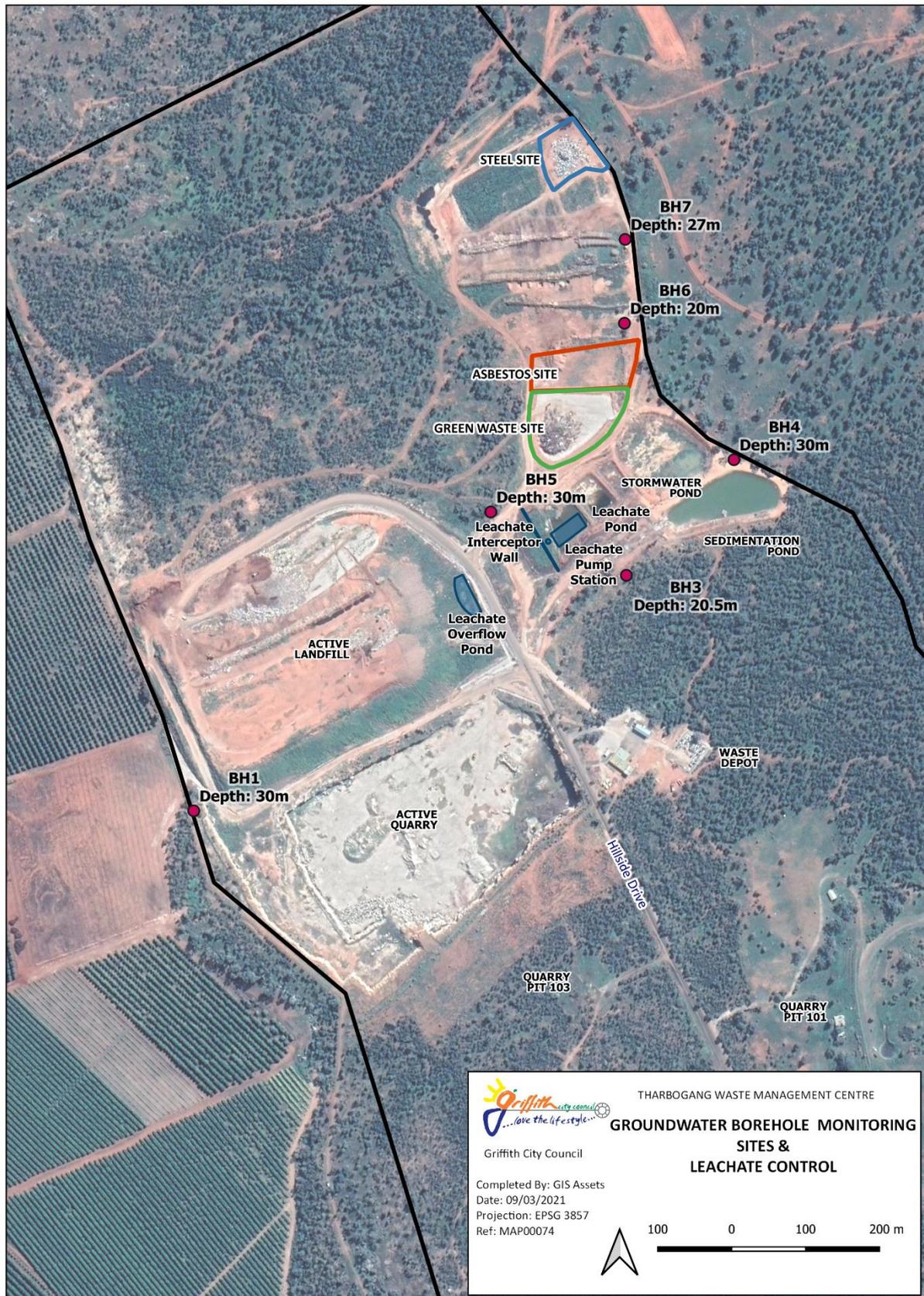


Figure 4.2: Groundwater Borehole Monitoring Sites and Leachate Control

Table 4.10: Borehole depths during the monitoring period

Monitoring Point	Depth (m)	
	Jun-21	Sept-21
Borehole 1	10.45	14.59
Borehole 2	0.00	0.0
Borehole 3	14.56	14.56
Borehole 4	7.25	19.25
Borehole 5	20	7.25
Borehole 6	18	18.26
Borehole 7	20.87	20.74

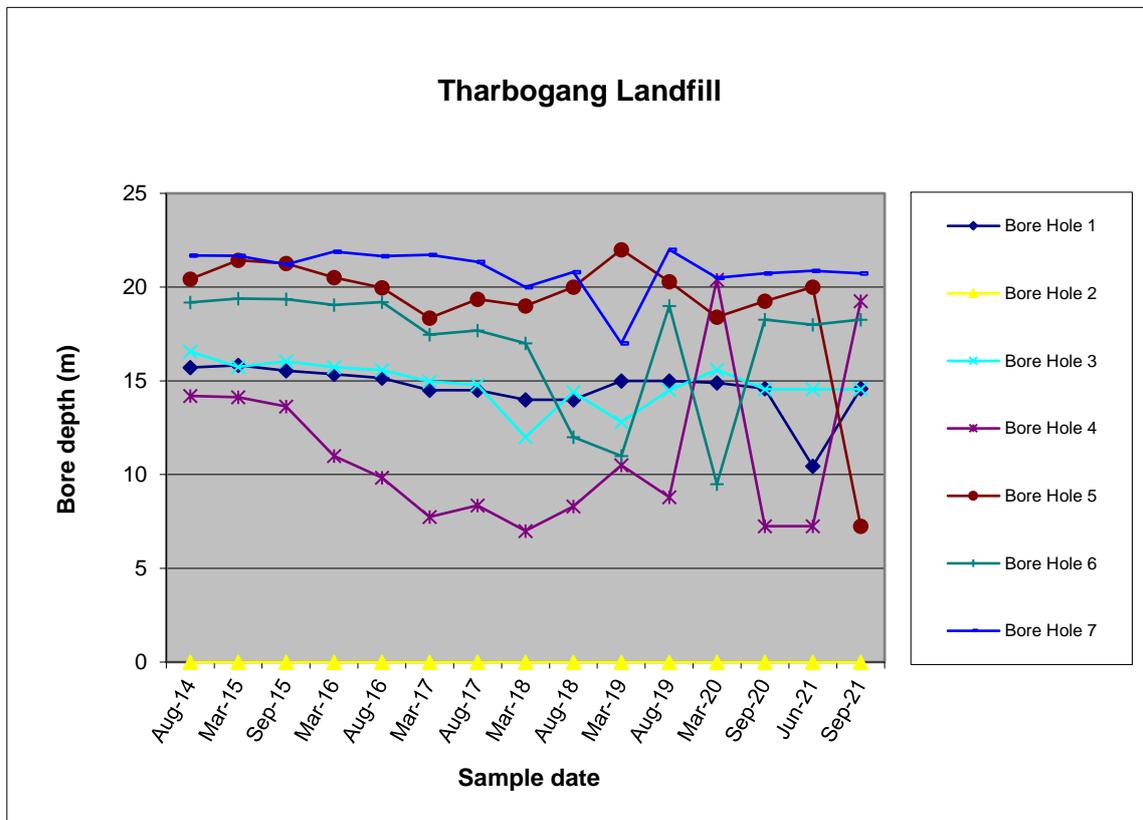


Figure 4.3: Bore water depths recorded for all sites since August 2014.

Table 4.11: Pollutant monitoring required by the EPL and completed during the reporting period.

Pollutant	Borehole Number					
	1-7		8		9	
	Frequency	Completed	Frequency	Completed	Frequency	Completed
Alkalinity (as calcium carbonate)	2 times	Y	2 times	Y	2 times	Y
Ammonia	2 times	Y	2 times	Y	2 times	Y
Calcium	2 times	Y	2 times	Y	2 times	Y
Chloride	2 times	Y	2 times	Y	2 times	Y
Chlorinated volatile compounds	2 times	Y	2 times	Y	2 times	Y
Conductivity	2 times	Y	2 times	Y	Not required	Y
Fluoride	2 times	Y	2 times	Y	2 times	Y
Iron	2 times	Y	2 times	Y	2 times	Y
Magnesium	2 times	Y	2 times	Y	2 times	Y
Manganese	2 times	Y	2 times	Y	2 times	Y
Nitrate	2 times	Y	2 times	Y	2 times	Y
Potassium	2 times	Y	2 times	Y	2 times	Y
Sodium	2 times	Y	2 times	Y	2 times	Y
Sulphate	2 times	Y	2 times	Y	2 times	Y
Total Phenolics	2 times	Y	2 times	Y	2 times	Y
Total organic carbon	2 times	Y	2 times	Y	2 times	Y
Total Suspended solids	Not required	Y	2 times	Y	2 times	Y
pH	2 times	Y	2 times	Y	2 times	Y

N: Not required

Table 4.12: 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) SO4	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
Borehole 1	Jun-21	850	0.01	46	1890	<50	8080	1.3	0.33	208	0.004	15	85	1290	560	<1.0	5	39	7.87
	Sep-21	771	0.1	42	1760	<50	7420	<0.1	4.65	186	0.145	19.50	85	1180	482	<1.0	16	173	7.8
Borehole 2	Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sep-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Borehole 3	Jun-21	344	0.43	10	434	<50	1750	0.9	0.46	19	0.052	0.21	11	327	29	<1.0	<1	<5	7.72
	Sep-21	348	0.1	7	440	<50	2080	0.8	3.32	16	0.036	0.53	11	312	27	<1.0	2	73	7.39
Borehole 4	Jun-21	1300	0.02	111	4210	<50	15900	0.8	1.35	266	0.356	0.19	155	2470	618	<1.0	17	20	7.92
	Sep-21	1310	0.26	115	4320	<50	15900	0.9	1.44	263	0.345	0.19	159	2350	578	<1.0	31	8	7.74
Borehole 5	Jun-21	803	1.36	110	1510	<50	5950	0.8	2.05	183	0.300	0.03	63	855	186	<1.0	38	<5	7.77
	Sep-21	970	1.85	117	1700	<50	7760	1	1.88	194	0.302	0.36	72	935	174	<1.0	43	58	7.52
Borehole 6	Jun-21	948	0.02	48	1850	<50	7550	1.3	2.51	119	0.033	1.15	72	1310	321	<1.0	2	31	8.36
	Sep-21	940	0.07	60	1750	<50	8270	1.5	5.18	120	0.043	2.86	75	1260	272	<1.0	11	1200	8.26
Borehole 7	Jun-21	865	5.09	207	1230	<50	832	0.9	0.59	329	0.166	379	138	939	323	<1.0	1	62	7.89
	Sep-21	869	9.94	219	1240	<50	9240	0.9	0.6	324	0.175	361	144	949	305	<1.0	28	48	7.69
	Jun-21	516	0.09	9	908	<50	3710	0.7	1.78	36	0.046	0.03	178	555	30	<1.0	85	171	9.83

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) SO4	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 dam 1 Pt 9	Sep-21	136	19.4	21	849	<50	4430	0.4	1.43	71	1.22	0.19	213	508	<1	<1.0	192	221	9.71
Sed Pond dam 2 Pt 8	Jun-21	162	0.04	6	79	<50	553	0.8	0.68	10	0.034	0.08	24	82	12	<1.0	27	10	9.31
	Sep-21	835	0.03	7	68	<50	396	0.6	0.27	9	0.02	0.53	23	68	5	<1.0	24	8	8.81
Tharbogang Swamp	Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sep-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

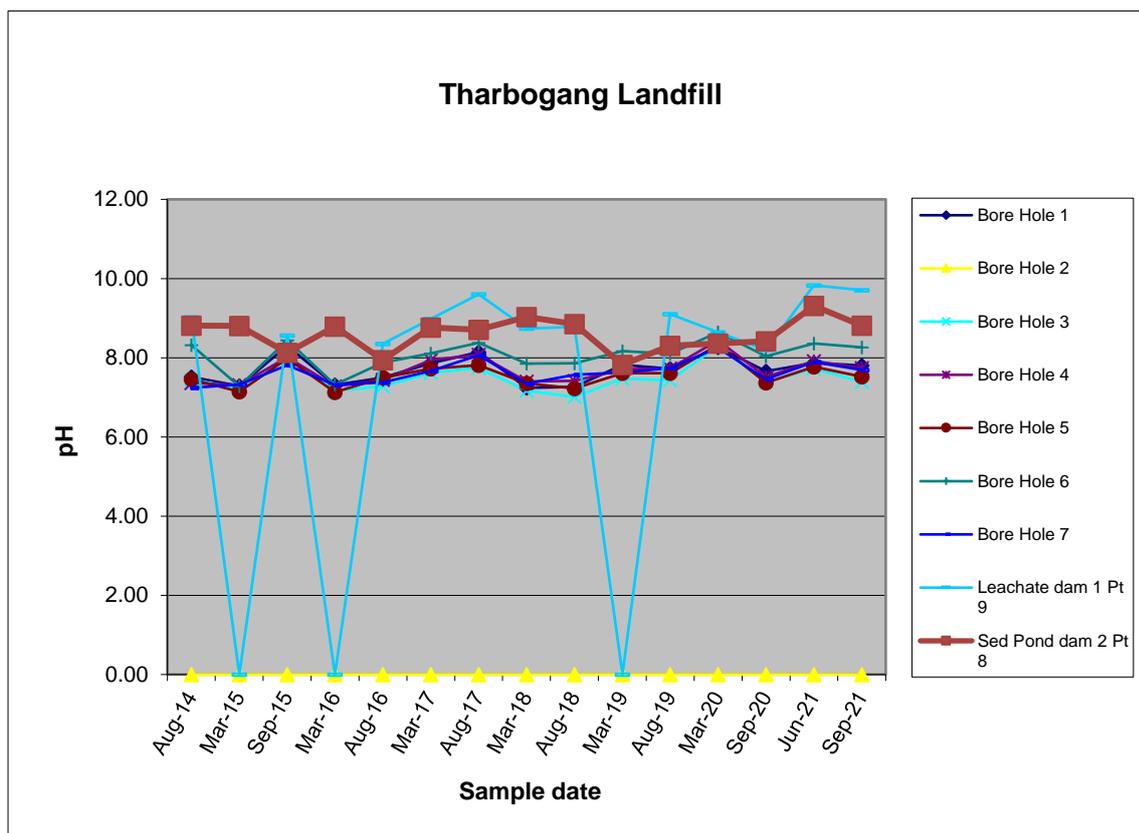


Figure 4.4: pH trends

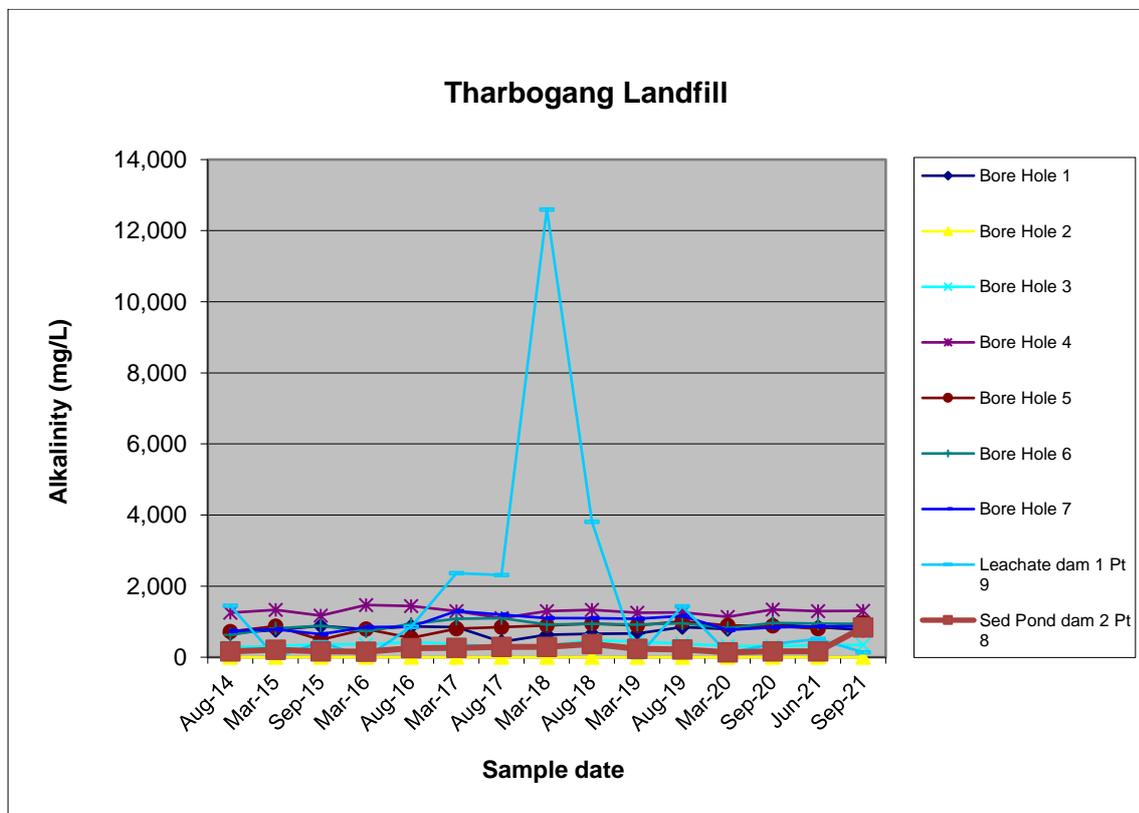


Figure 4.5: Alkalinity trends (mg/L)

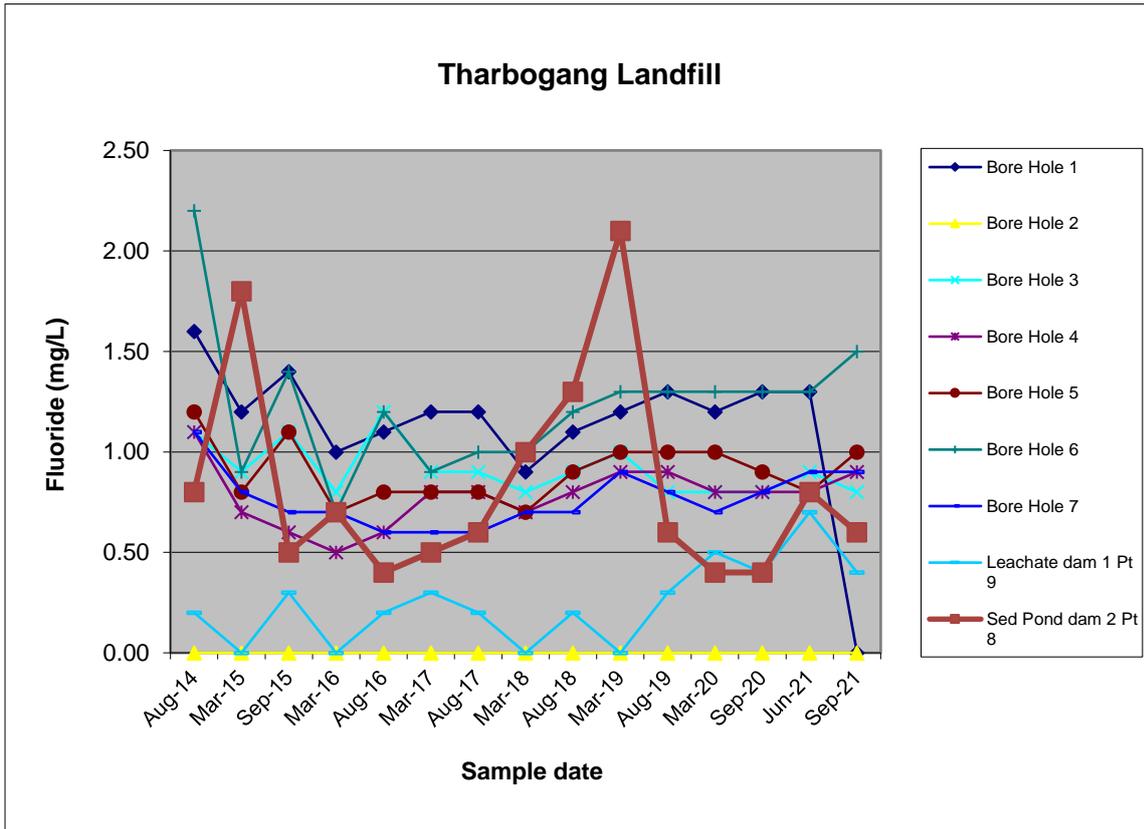


Figure 4.6: Fluoride trends (mg/L)

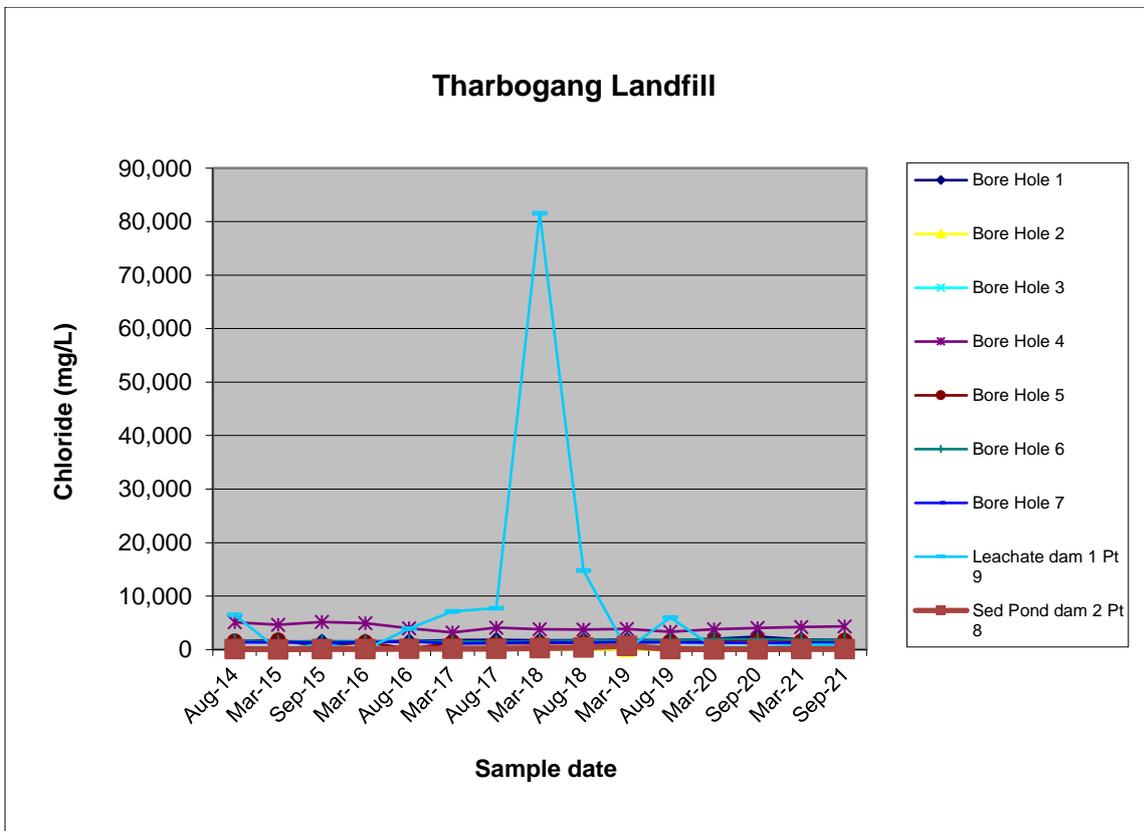


Figure 4.7: Chloride trends (mg/L)

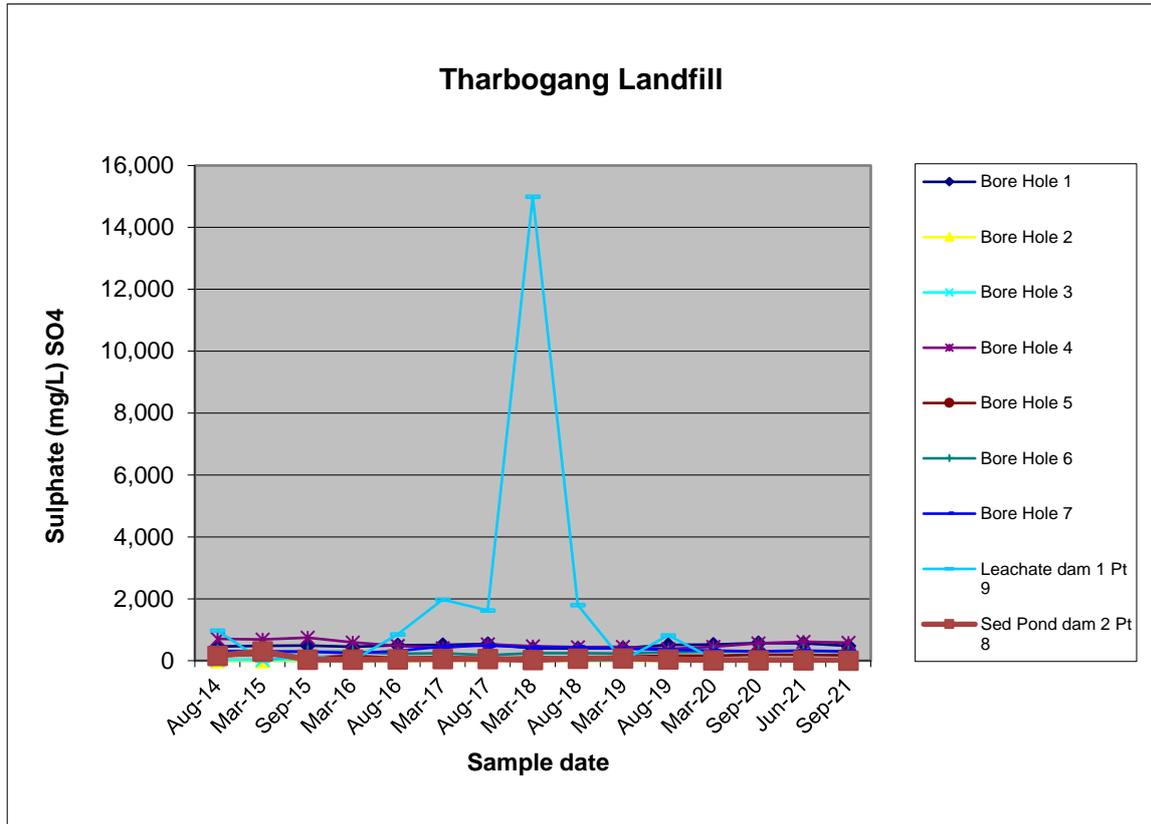


Figure 4.8: Sulphate trends (mg/L)

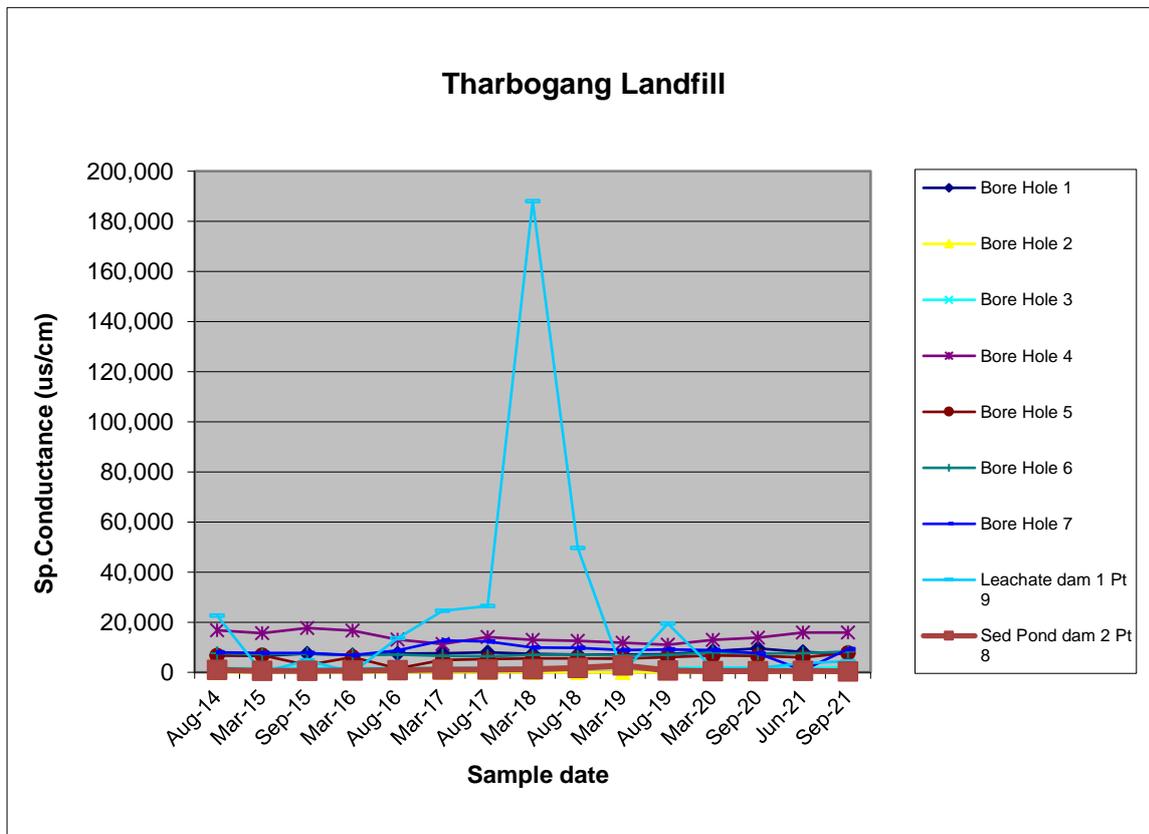


Figure 4.9: Conductivity trends (uS/cm)

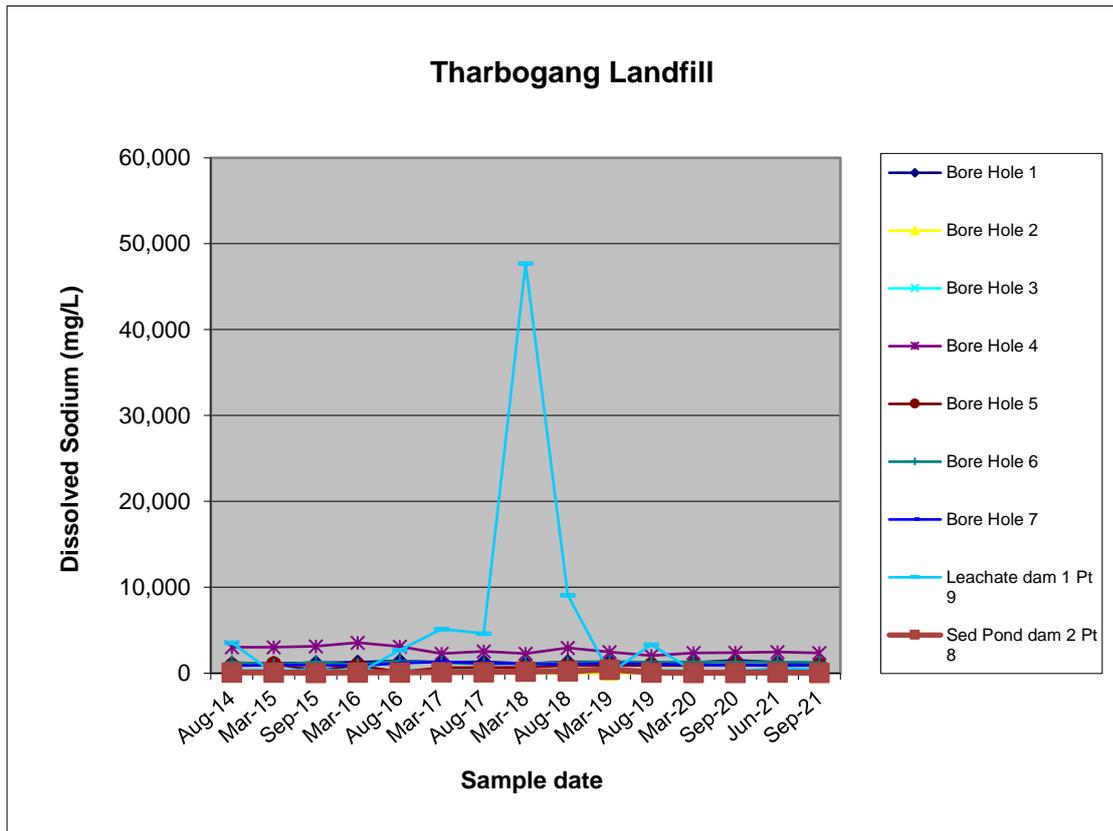


Figure 4.10: Sodium trends (mg/L)

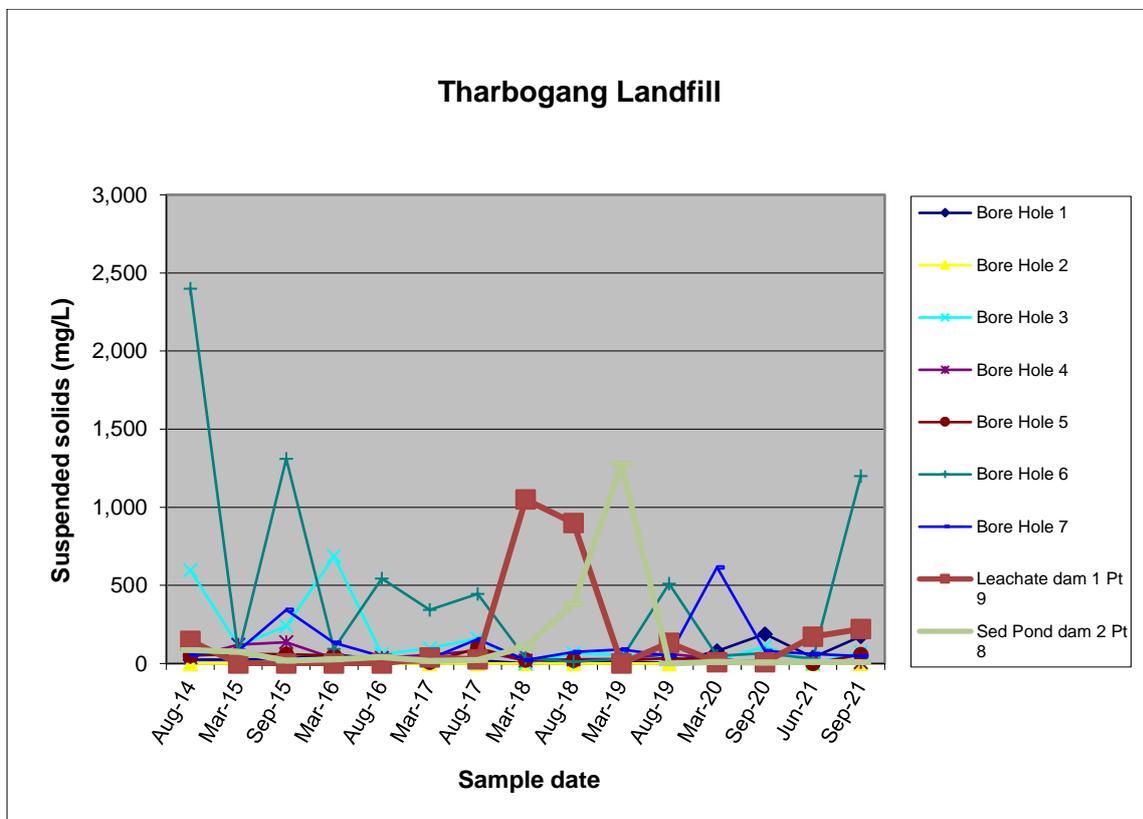


Figure 4.11: Suspended solids trends (mg/L)

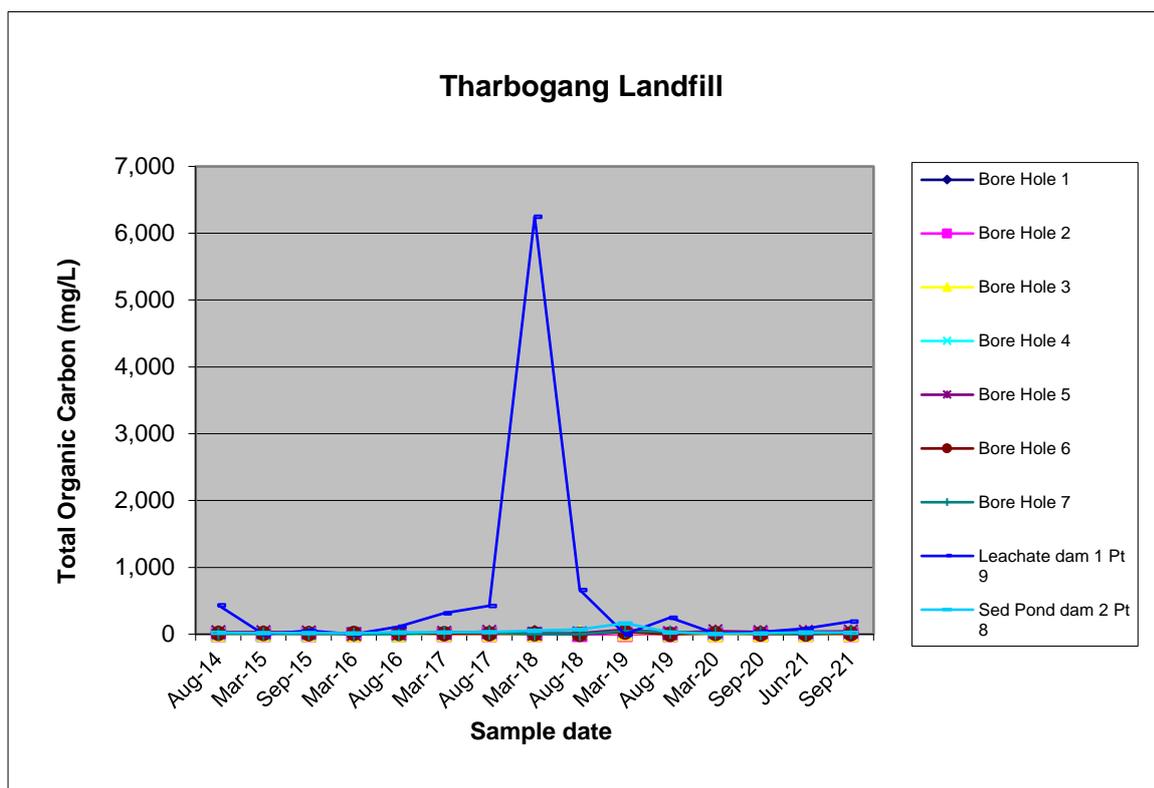


Figure 4.12: Total organic carbon trends (mg/L)

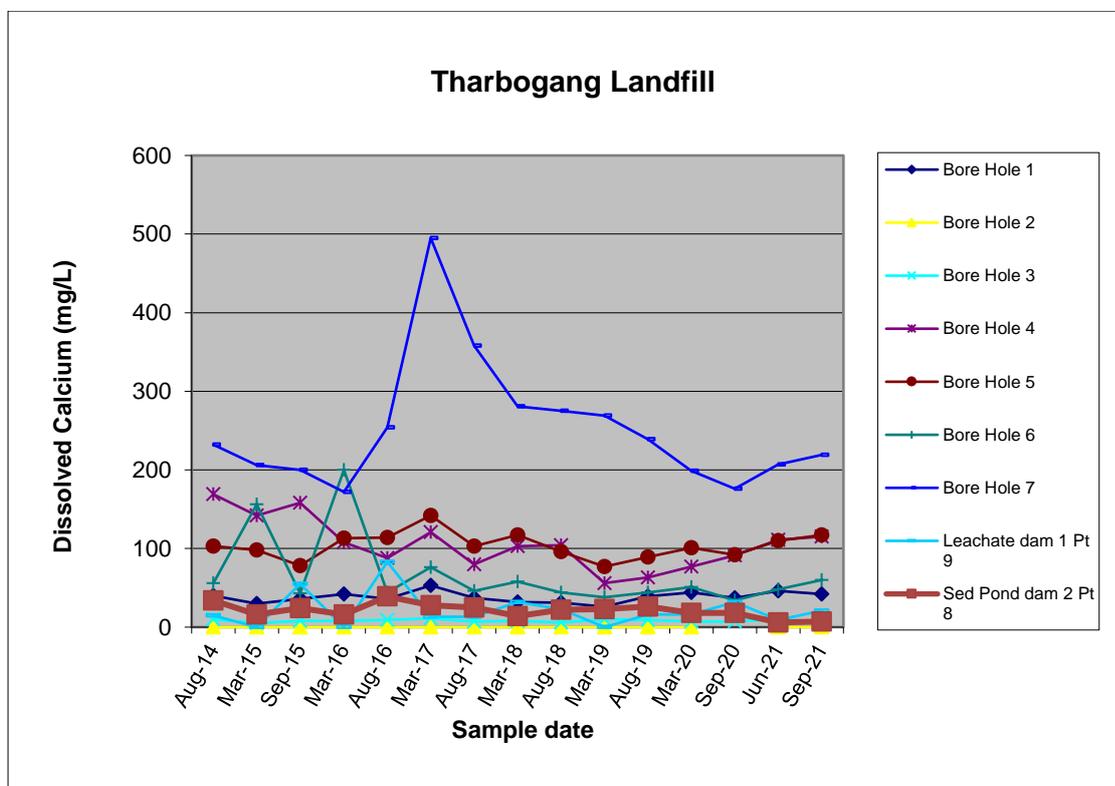


Figure 4.13: Dissolved calcium trends (mg/L)

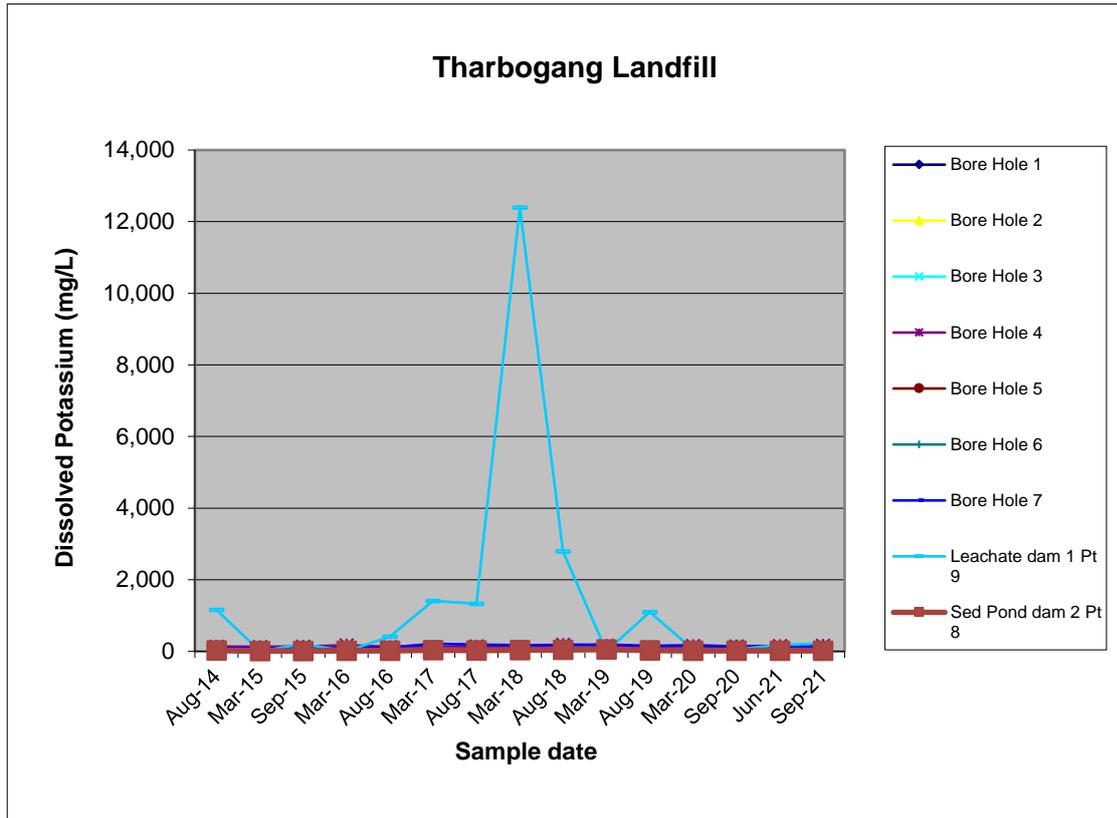


Figure 4.14: Potassium trends (mg/L)

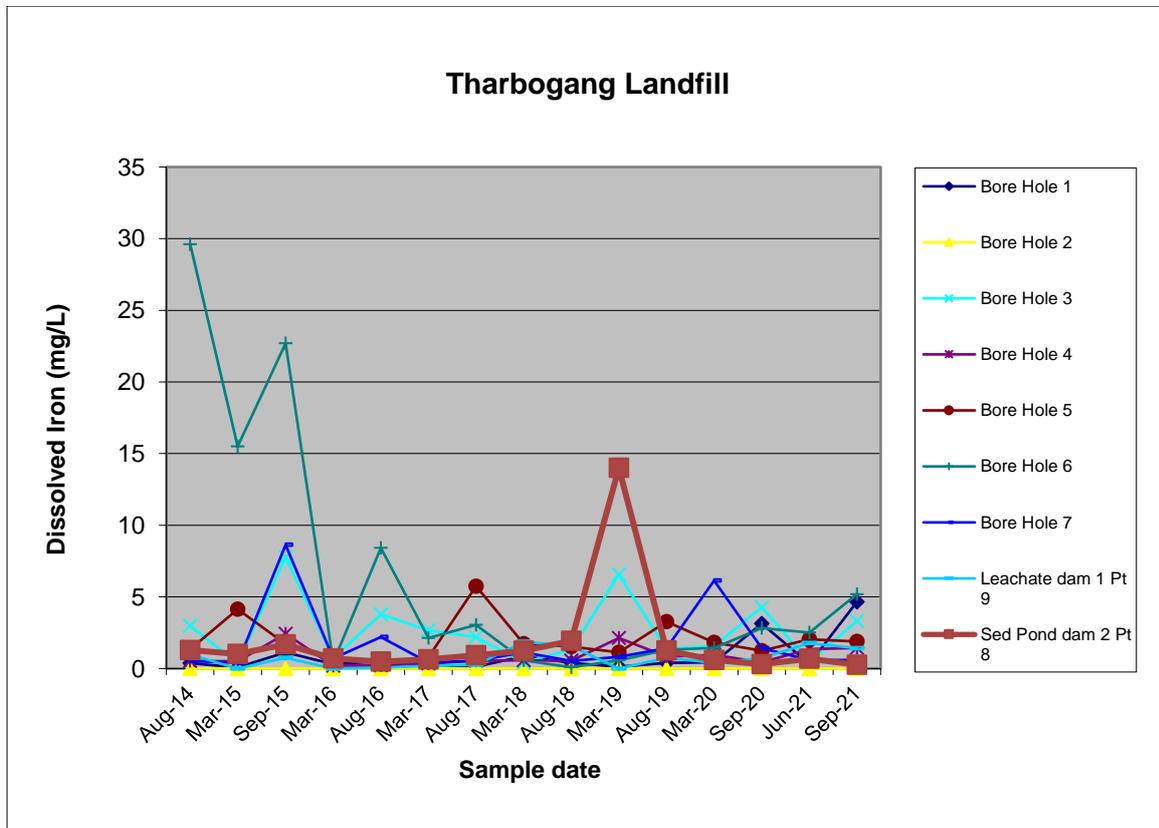


Figure 4.15: Iron trends (mg/L)

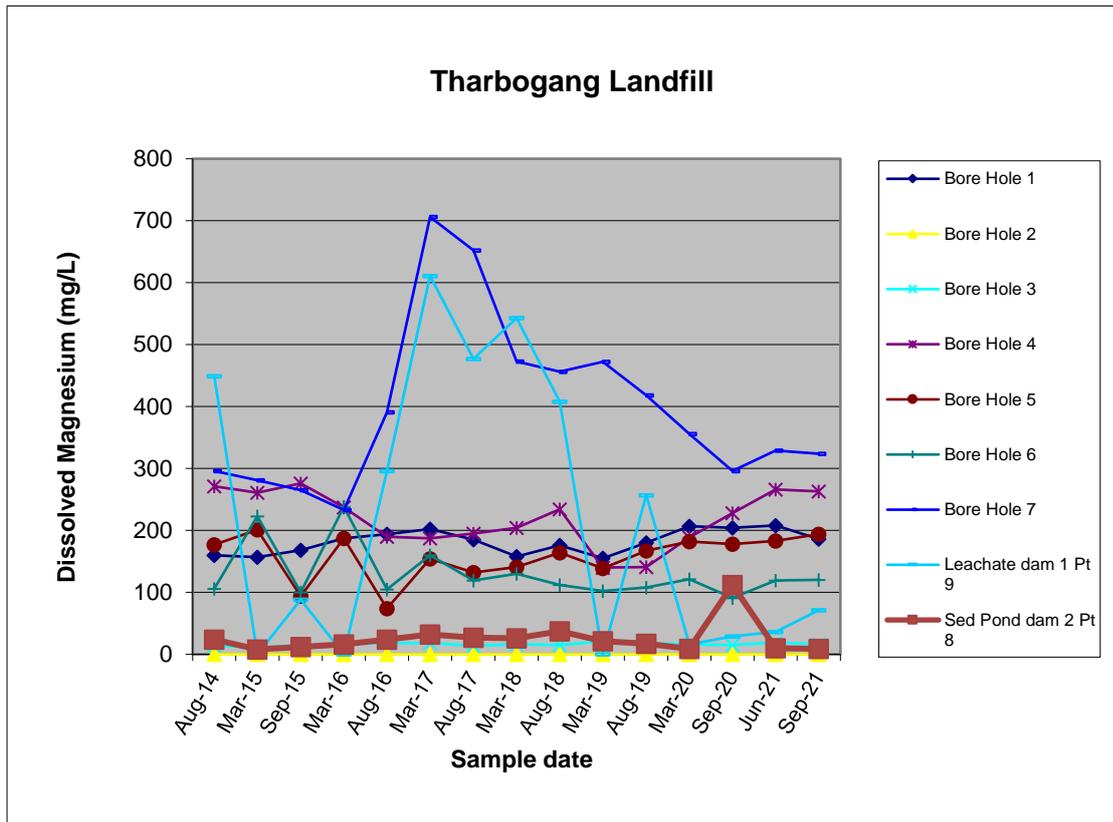


Figure 4.16: Magnesium trends (mg/L)

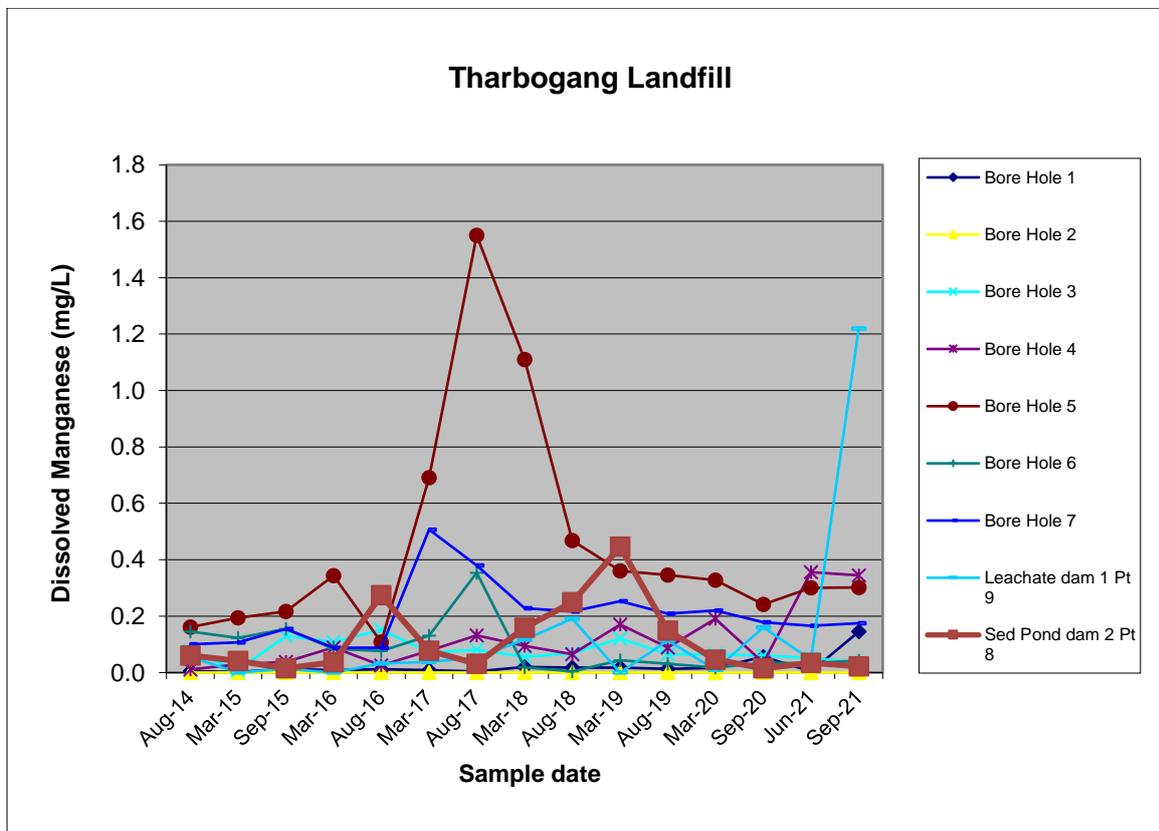


Figure 4.17: Manganese trends (mg/L)

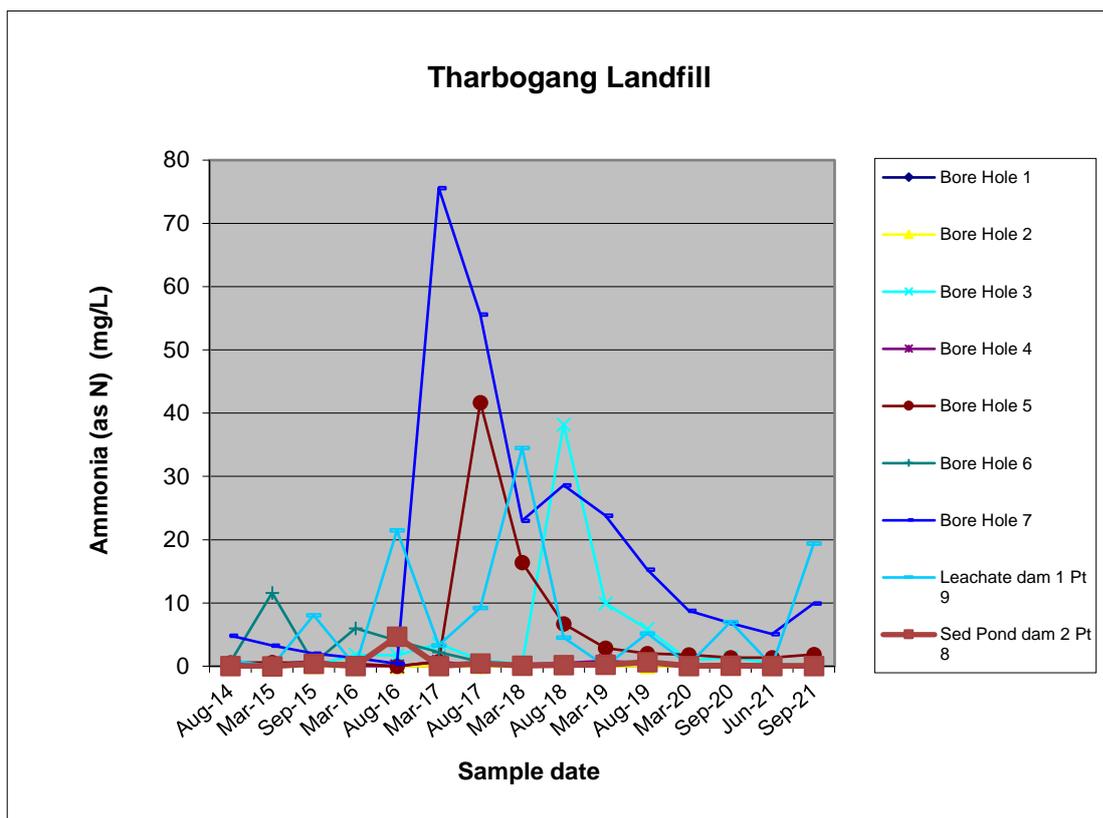


Figure 4.18: Ammonia trends (as N mg/L)

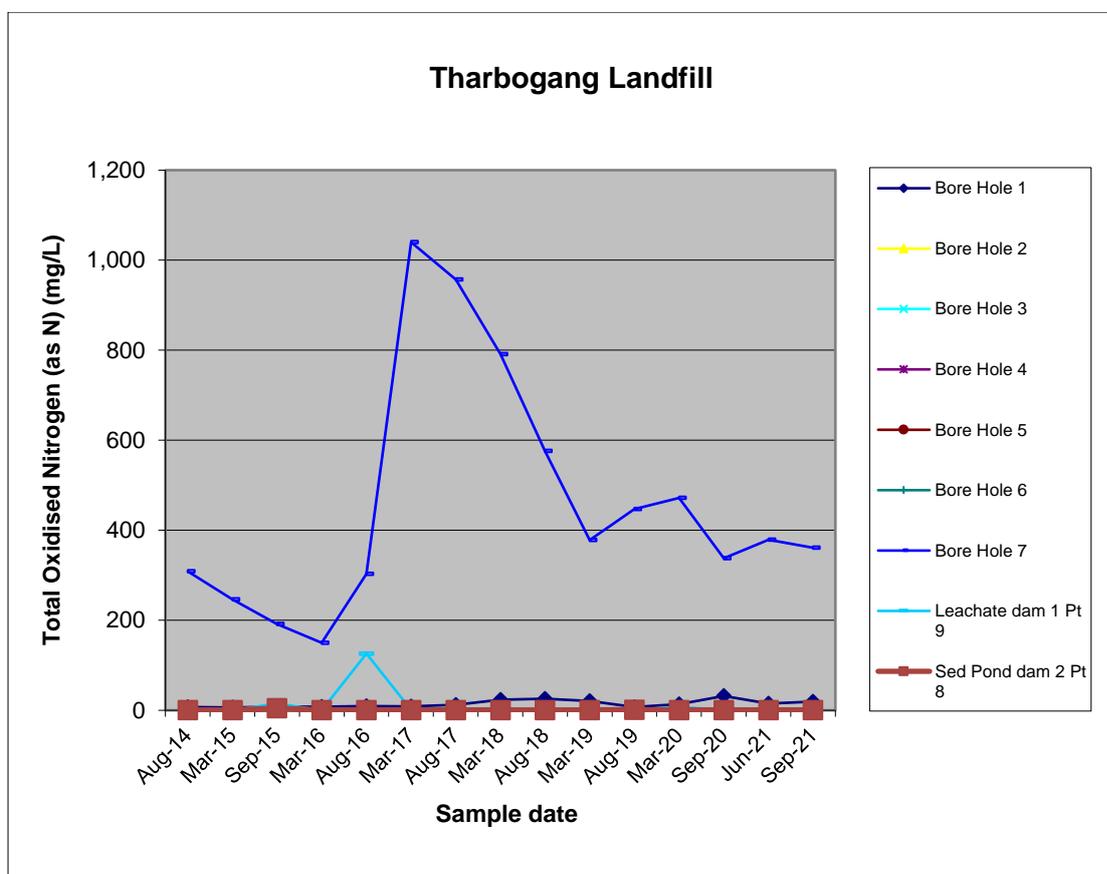


Figure 4.19: Total oxidised Nitrogen (as N mg/L)

4.6.3 Review

An assessment of the monitoring results against the regulatory framework is presented in **Table 4.13**.

Table 4.13: Groundwater compliance assessment

Condition	Review
Project Approval	
Condition 20-26, Schedule 3	A Soil, Water and Leachate Management Plan has been developed.
EPL	
P1.1	Monitoring of EPA points 1, 3-7 and dams 8 and 9 was completed in March and September 2020.
L1.1	No pollution of waters under the POEO Act has occurred.
M1	Monitoring results have been recorded and retained correctly. All records are legible and the date, time, location and person collecting have been recorded. The Sample Receipt Notification and Chain of Custody for all samples are saved in Council's document management system. All six boreholes at Tharbogang Waste Management Centre were sampled twice as per EPL requirements on: <ul style="list-style-type: none"> • 1st of June 2021; • 17th of September 2020.
M2	All required pollutants have been monitored.
M3	No indication as to whether monitoring followed the Approved Methods Publication. 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.
EA	
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.

The site appears to be largely compliant regarding all aspects relevant to the licence conditions above. 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 (2021) produced the following key findings:

- Groundwater parameters were generally higher in Bore 4 and Bore 7 compared with Bore 1, however other bores were generally consistent with Bore 1.
- Typical indicators for landfill leachate include high levels of ammonia and total oxidised carbon. Given the location of Bore 7 relative to the Leachate Pond and the elevated levels of ammonia and TOC within Bore 7, further investigation may be required to determine the source of these elevated nutrients.
- Consultation with the EPA was recommended.

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 1×10^{-9} m/s, or some other suitable liner approved by DECCW; and
 - b. drain to the leachate dams as a minimum gradient of 0.5%.
- c) Collect all leachate in the leachate dams 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:
 - 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 1×10^{-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 overflowing (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 has been completed for monitoring point 9 under the EPL. Monitoring results are presented with groundwater 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 cut-off 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 4.14**.

Table 4.14: Leachate compliance assessment

Condition	Review
Project Approval	
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 discharge point into the leachate dam was obstructed and not functional. 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 dam is not obstructed.
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 dams 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 dams have been installed.
O6.2	Storage dams 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	No surface water which falls on site leaves the site. Whist 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.
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 was completed in March and August 2018.

Condition	Review
EA – Not Triggered	
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 4.20**). Thirteen monitoring parameters are downloaded from the weather station and averages calculated for each parameter. The following have been included in **Table 4.15**:

- Wind Speed AVG
- AVE Wind Speed Max
- Radiant Heat Max
- Radiant Heat Min
- Radiant Heat AVG
- Daily Air Temperature Min
- Air Temperature Max
- 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). Results are shown in **Table 4.15**.

Over the reporting period there was 470 mm of rainfall (BOM 2022). The mean annual rainfall for the Griffith region is 398.6 mm (BOM 2022). The annual mean daily evaporation has been recorded at 4.8 mm. (Site # 075028) (BOM 2020). Annual rainfall has been increasing since 2018. Total monthly rainfall between September 2020 and September 2021 varied between 0.0 mm (April) and 81.4 mm (June).

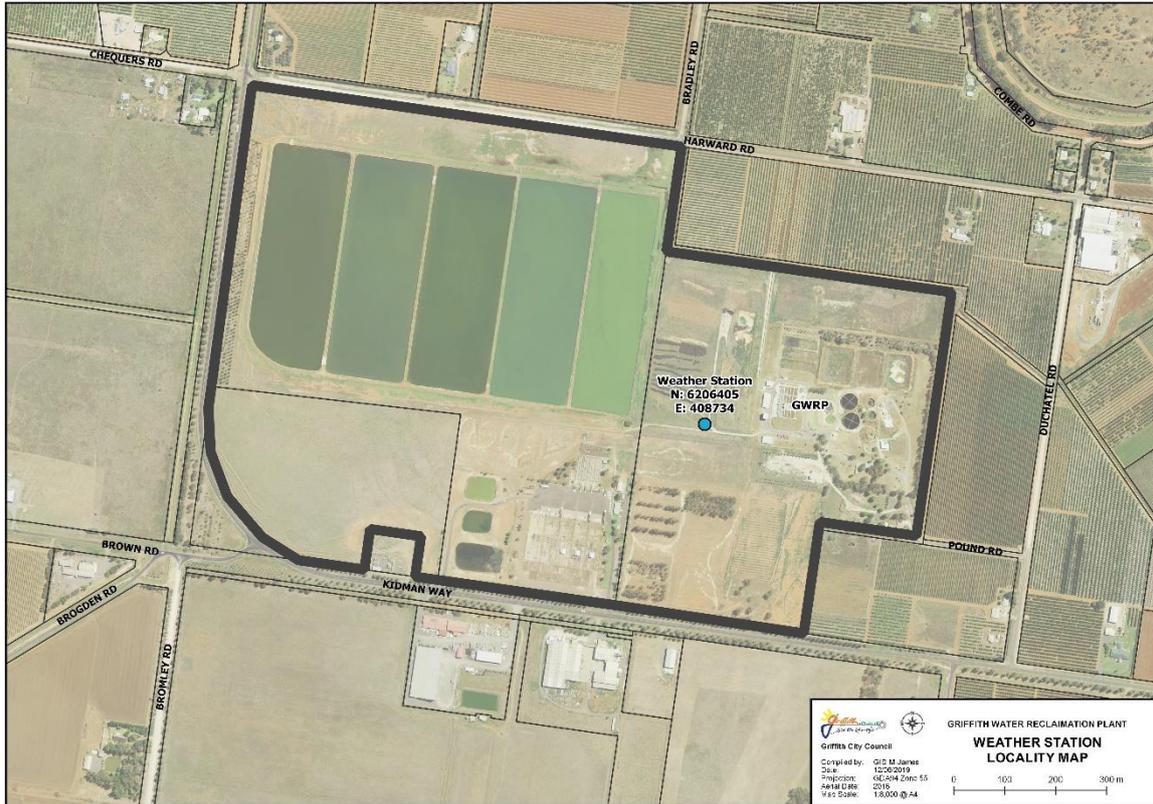


Figure 4.20: GRWP Weather Station Site Map

Table 4.15: Meteorological monitoring data

Parameter	Wind Speed AVG	Radiant Heat AVG	AVG Air Temperature at 2m	AVG Air Temperature at 10m	Monthly Rainfall Data
Month	km/h	W/m ²	C°	C°	mm
January	26	290	24.4	24.4	10.6
February	24	289	23.5	23.5	3.8
March	22	228	20.0	19.8	22.0
April	18	206	16.7	15.5	0.0
May	18	161	13.5	12.6	0.6
June	18	129	10.4	9.8	3.1
July	21	140	9.1	15.5	1.3
August	20	179	11.3	10.2	0.5
September	23	222	13.7	12.8	1.7

Parameter	Wind Speed AVG	Radiant Heat AVG	AVG Air Temperature at 2m	AVG Air Temperature at 10m	Monthly Rainfall Data
Month	km/h	W/m ²	°C	°C	mm
October	23	258	17.0	16.8	2.1
November	22	248	18.3	18.4	3.1
December	21	309	23.9	23.8	0.3

4.8.1 Review

An assessment of the monitoring results against the regulatory framework is presented in **Table 4.16**.

Table 4.16: Meteorological monitoring compliance assessment.

Condition	Review
Project Approval	
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 4.17** (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 4.17: PA operational noise impact assessment criteria dB(A).

Location and Locality	Day $L_{Aeq}(15 \text{ min})$	Evening $L_{Aeq}(15 \text{ min})$	Night $L_{Aeq}(15 \text{ min})$
All Surrounding Sensitive Receivers	35	35	35

Noise restrictions under the EPL (L3.1 and 3.2) are presented in **Table 4.18**.

Table 4.18: Noise limits dictated under the ELP.

Day	Time	Limit dB (L_{A10} (15 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 18-393 was undertaken by NGH in 2021 using six sensitive receivers in close proximity to quarry operations. An additional two sensitive receivers were positioned within the quarry footprint (**Figure 2.1**).

An NGH consultant attended each sensitive receiver location to conduct noise monitoring for 15 minute intervals using a Type 1 sound level meter (Svantek/Svan 959). The sound level meter was positioned between 5 m and 30 m from an external wall of each residential building, mounted on a tripod 50 cm off the ground, with the microphone facing the main noise source(s). Monitoring was conducted three times at each sensitive receiver over three different time periods: morning 8 am – 10:15 am, midday 11:30 – 1:30, and afternoon 2 pm – 6 pm. The afternoon monitoring was completed on the 1st December 2021, with the morning and midday periods being recorded on the 2nd December 2021. The landfill site and quarry were in operation during the time of the monitoring (NGH 2021b).

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, garden birds, tractors working in orange orchards, road traffic from Slope Road and Kidman Way, dogs barking, cicadas, and people talking (NGH 2021b).

The noise impact assessment threshold is defined as 35 dB(A) L_{Aeq} for all times the Quarry and Landfill is operational. All 24 monitoring events exceeded this noise threshold (**Table 4.19**). A combination of noise sources contributed to exceedances of the noise assessment criterion including non-related road traffic, dogs barking, cicadas and machinery associated with the orange orchards surrounding all sensitive receivers. Noise from the landfill was not audible from any of the residential sensitive receivers (NGH 2021b).

Afternoon noise readings from residential receiver 4, 5 and 6 occurred after the quarry and landfill had ceased daily operations. These receivers indicated that noise levels increased after facility operations had ceased, suggesting that noise from neighbouring businesses or private vehicles contributed to the overall noise levels at each location (NGH 2021b).

Noise from the quarry and landfill operations was not observed to be a key contributing factor to overall noise levels at any of the residential receivers. The highest noise reading was observed during the afternoon recording at residential Receiver 1, which is located on the corner of Slopes Road and Hillside Drive. NGH (2021b) states that daily traffic to and from the facility could have contributed to this high measurement. No noise complaints have been received.

Table 4.19: Noise monitoring summary results (taken from NGH Environmental 2021b)

Site	Monitored noise levels $L_{Aeq(15min)}$ (decibels (dB))		
	Morning	Midday	Afternoon
Receiver 1	59.2	65.2	73.7
Receiver 2	52.7	45.2	54.3
Receiver 3	42.6	38.4	37.2
Receiver 4	49.5	41.1	51.6*
Receiver 5	51.5	47.2	43.1*
Receiver 6	42.3	42.4	49.1*
Quarry location 1	46.3	59.7	60.3
Quarry location 2	62.7	59.8	63.1

*Reading was taken after the development had ceased daily operations

4.9.3 Review

An assessment of the monitoring results against the regulatory framework is presented in **Table 4.20**.

The noise report concluded that it is unlikely that the landfill 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. It was clear that noise from the quarry/landfill was not a key noise contributor at any of the sensitive receiver locations (NGH 2021b).

Table 4.20: Noise and vibration compliance criteria.

Condition	Review
Project Approval	
Condition 28, Schedule 3	The monitored noise level L_{Aeq} (15 min) exceeded the assessment criterion of 35 L_{Aeq} (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, except at Receiver 1, where daily traffic to and from the facility may have partially contributed to the high noise levels (NGH 2021b). The EPA audit (2019) states that the licensee is to keep copy of chain of custody of all samples taken for auditable records.
Condition 39, Schedule 3	No evidence of continuous improvement is provided. However, the impact of quarry and landfill noise emission was shown to be relatively

Condition	Review
	minor when attenuated for distance (NGH Environmental 2021b). The site observations at the sensitive receivers reinforce the notion that the facility noise impact is a minor contributor to ambient noise levels.
Condition 40, Schedule 3	Noise and Vibration Plan has been developed.
EPL	
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 & Quarry significantly contributed 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, except at Receiver 1, where daily traffic to and from the facility may have partially contributed to the high noise levels (NGH 2021b).
EA	
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 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, except at Receiver 1, where daily traffic to and from the facility may have partially contributed to the high noise levels (NGH 2021b). No noise monitoring data has been provided as the quarry operations for Pits 101 and 103 have not commenced.
D	Operating hours are that which is recommended (8:30 – 17:30).
Not Triggered	
C	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 (L4.1; **Table 4.21**) and ground vibration (L4.2; **Table 4.22**) 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 4.21: Airblast overpressure limits specified in the EPL.

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 4.22: Ground vibration criteria from the EPL.

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 (C).

4.10.2 Results

Two blasts occurred in the 2020/2021 monitoring period.

A blast occurred at 1:29 pm on 30 September 2020 and evidence of landholder notification is available on the Blast Notice Registration Form. A Blast Monitoring Report was prepared outlining the details of the blast including blast results and Blast Notice Registration Form (GCC 2021b).

Another blast occurred at 12:41 pm on 23 February 2021 and evidence of landholder notification is available on the Blast Notice Registration Form. A Blast Monitoring Report was prepared outlining the details of the blast including blast results and Blast Notice Registration Form (Mibrae Quarries 2021). This blast did not register on the blast monitor and so was assumed to be compliant.

Blast Date and Time	Ground Vibration (mm/s)	Over Pressure (dB – Linear)	Compliant
30/09/2020 – 1.59 PM	1.77	108	Yes
23/02/2021 – 12:41 PM	NA	NA	Yes

4.10.3 Review

One blast occurred at 1.29 pm on 30 September 2020 and another occurred at 12:41 pm on 23 February 2021, both of which are within the designed blasting period for the site.

Table 4.23: Blasting compliance assessment

2019Condition	Review
Project Approval	
Condition 30, Schedule 3	The two blasts within the reporting period were within the specified airblast overpressure criteria.
Condition 31, Schedule 3	The two blasts within the reporting period were within the specified ground vibration levels.
Condition 32, Schedule 3	Both blasts occurred within the hours specified in the EPL. The EPA was contacted to verify the discrepancy, regarding operation and blasting hours, between the PA and EPL and it was advised that the EPL conditions would apply.
Condition 33, Schedule 3	Two blasts occurred throughout the monitoring year.
Condition 34, Schedule 3	The blasts were not within 200m of any privately owned land.
Condition 35, Schedule 3	Not relevant, past 30 November 2010.
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.

2019Condition	Review
Condition 38, Schedule 3	A <i>Blast Management Plan</i> has been prepared by Griffith City Council.
Condition 39, Schedule 3	No indication of continuous improvement within the reporting year although it is doubtful that any is required at this stage.
EPL	
L4.1	Both blasts within the reporting period were within the specified airblast overpressure criteria.
L4.2	Both blasts within the reporting period were within the specified ground vibration levels.
L4.3	Both blasts occurred within the specified hours of operation.
EA	
A	Both blasts within the reporting period did not exceed the specified airblast overpressure criteria. As less than three blasts occurred over the monitoring year, all blasts were monitored. No complaints were received following the blasts. Both blasts within the reporting period did not exceed the specified ground vibration levels.
B	The blasts occurred at 1:59 pm and 12:41 pm, which are within the timeframe specified in the EPL.
C	Residents within 2 km were notified (evidence provided by GCC)

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 September 2018 – September 2020 has been provided with the results shown in **Table 4.26**.

The PA also prescribes air quality criteria which must not be exceeded (Condition 41, Schedule 3), this is listed in **Table 4.24** for suspended particulate matter and **Table 4.25** for dust.

Table 4.24: Impact assessment criteria for particulate matter under the project approval.

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

Particulate matter <10 µm (PM ₁₀)	24 hour	50 µg/m ³
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Table 4.25: 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 ² /month	4 g/m ² /month

The EPL condition O3 specifies that all operations and activities occurring at the premises must be carried out in a 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 (EPA 2016). 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 0° and 90°), 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

Dust and air quality monitoring data for this reporting period is provided below in **Figure 4.21**, **Figure 4.22** and **Table 4.26**. An Air Quality Monitoring Plan has been developed for the site (GHD 2013a) and outlines the air quality criteria. Dust deposition is measured at four locations surrounding the Tharbogang Waste Management Centre (**Figure 4.23**).

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 2019).

During the 2021 monitoring period, two of the four monitoring stations exceeded the project specific monthly average criterion of 4 g/m²/month for deposited dust levels on at least one occasion. Monitoring station 2 exceeded the threshold in October and November 2021 while Station 4 exceeded the threshold in October 2021. This is indicated in red in **Table 4.26**. During the 2021 monitoring period deposited dust levels increased by more than 2 g/m²/month on three occasions; once for monitoring station 2 between August and September, again for monitoring station 3 between July and August, and finally for monitoring station 4 between

September and October. 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.

Total suspended particulate matter (gm) was above the 90 gm threshold at DM02 in October 2021. This is indicated in red in **Table 4.26**. This was the only occurrence where total suspended particulate matter exceeded the recommended threshold during the 2021 monitoring period at any monitoring location. This result is an improvement compared with the previous monitoring period, where TSP matter exceeded the threshold at monitoring site 2, 3 and 4. Council may wish to consider performing an update to the AQMP, in consultation with DPE, to align the criterion averaging period applied to monitoring data to that outlined within the CoA (Northstar Air Quality 2019).

The data indicates that no exceedances of the average annual criteria were observed at any of the dust deposition gauges during the 2021 monitoring period. Based on the requirements of section 4.1 of the AQMP, Northstar Air Quality (2021) recommends that annual dust monitoring at the Tharbogang Recycling and Waste Disposal Centre may cease.

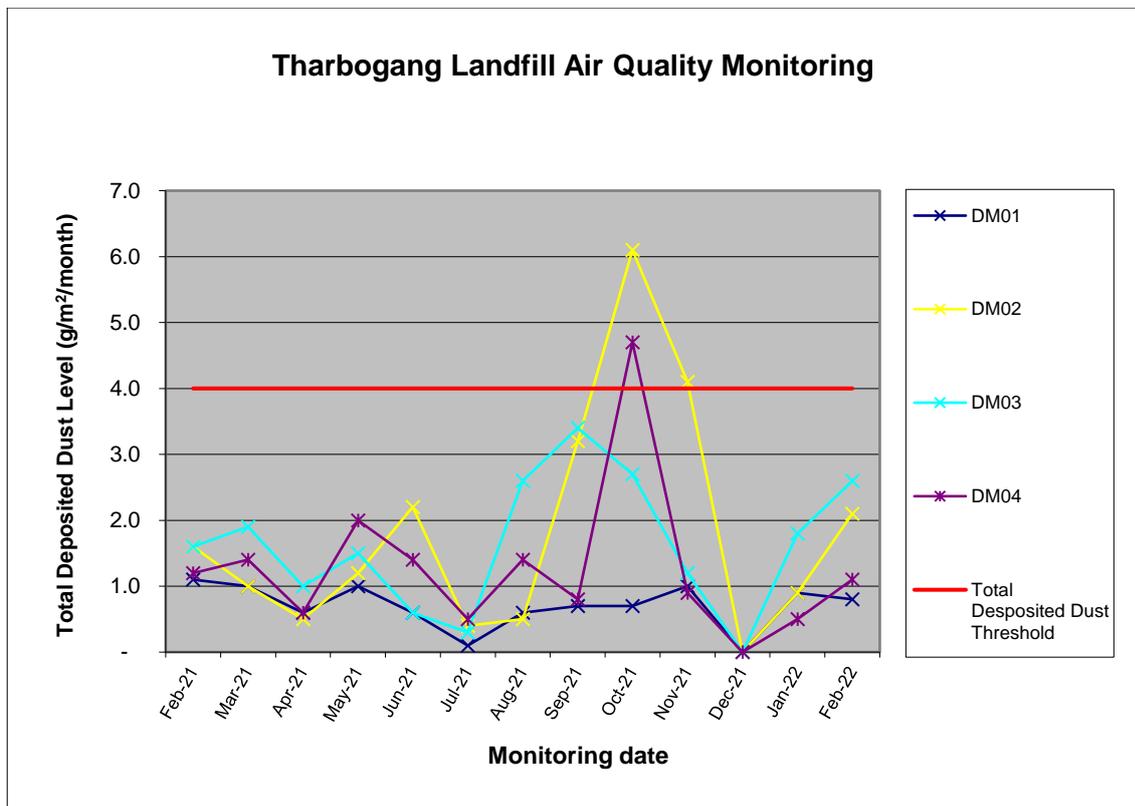


Figure 4.21: Total deposited dust level between February 2021 and February 2022.

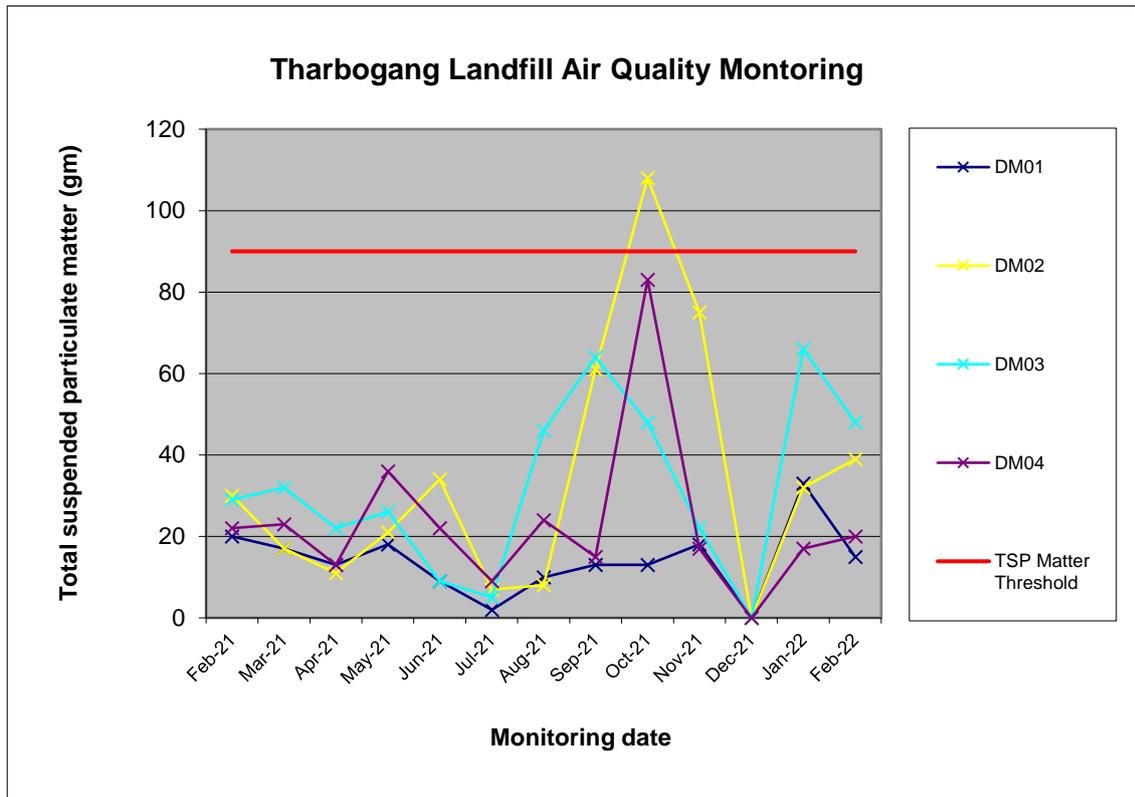


Figure 4.22: Total suspended particulate matter between February 2021 and February 2022.

Table 4.26: Dust and air quality monitoring results

	Total Deposited Dust Level				Total suspended particulate matter			
Trigger threshold	4.0 (g/m ² /month)				90.0 (gm)			
Month	DM01	DM02	DM03	DM04	DM01	DM02	DM03	DM04
Sep-18	3.1	8.70	4.3	2.3	50	138	69.00	36
Oct-18	2.8	2.2	7.5	2.3	55	42	146	45
Nov-18	6.1	5.10	6.2	7.0	111	94	114.00	127
Dec-18	2.5	3.40	3.9	2.5	42.0	56	64.00	41
Jan-19	4.4	2.80	2.6	4.3	85	55	95.00	84
Feb-19	2.8	3.0	3.3	3.5	47	51	57.00	59
Mar-19	3.2	3.0	3.3	3.5	52	49	54.00	58
Apr-19	2.7	3.0	3.2	3.3	50	57	61.00	62
May-19	0.5	1.5	0.5	0.7	9	26	8.00	13
Jun-19	0.3	0.7	0.3	4.3	5	12	5.00	79
Jul-19	0.9	3.2	5.8	2.3	16	57	103.00	40
Aug-19	0.8	1.5	1.9	1.4	14	27	35.00	26

	Total Deposited Dust Level				Total suspended particulate matter			
Trigger threshold	4.0 (g/m ² /month)				90.0 (gm)			
Month	DM01	DM02	DM03	DM04	DM01	DM02	DM03	DM04
Sep-19	1.2	4.1	2.0	1.8	22	74	36	33
Oct-19	2.0	11.2	2.3	2.0	35	198	41	35
Nov-19	3.0	16.8	3.4	4.0	55	307	62	73
Dec-19	1.0	2.1	1.7	1.2	18	37	30	22
Jan-20	5.8	5.3	0.3	5.0	106	97	5	91
Feb-20	2.4	14.5	4.0	2.8	43	265	73	52
Mar-20	2.9	1.6	3.6	2.2	49	28	61	38
Apr-20	1.2	1.6	2.0	1.2	21	30	36	22
May-20	0.2	1.6	2.2	0.2	4	28	38	4
Jun-20	0.1	0.8	2.3	0.2	2	15	44	3
Jul-20	0.3	0.4	1.6	0.3	5	7	27	5
Aug-20	0.7	4.2	8.5	1.2	13	76	155	22
Sep-20	1.6	3.5	2.1	2.5	30	64	39	46

	Total Deposited Dust Level				Total suspended particulate matter			
Trigger threshold	4.0 (g/m ² /month)				90.0 (gm)			
Month	DM01	DM02	DM03	DM04	DM01	DM02	DM03	DM04
Oct-20	0.8	1.8	1.2	1.3	15	31	21	23
Nov-20	1.5	1.8	3.6	1.3	25	30	61	23
Dec-20	1.5	1.6	2.8	2.2	27	30	52	41
Jan-21	1.2	2.7	2.5	1.5	21	49	46	28
Feb-21	1.1	1.6	1.6	1.2	20	30	29	22
Mar-21	1.0	1.0	1.9	1.4	17	17	32	23
Apr-21	0.6	0.5	1.0	0.6	13	11	22	13
May-21	1.0	1.2	1.5	2.0	18	21	26	36
Jun-21	0.6	2.2	0.6	1.4	9	34	9	22
Jul-21	0.1	0.4	0.3	0.5	2	7	5	9
Aug-21	0.6	0.5	2.6	1.4	10	8	46	24
Sep-21	0.7	3.2	3.4	0.8	13	61	64	15
Oct-21	0.7	6.1	2.7	4.7	13	108	48	83

	Total Deposited Dust Level				Total suspended particulate matter			
Trigger threshold	4.0 (g/m ² /month)				90.0 (gm)			
Month	DM01	DM02	DM03	DM04	DM01	DM02	DM03	DM04
Nov-21	1.0	4.1	1.2	0.9	18	75	22	17
Dec-21	-	-	-	-	-	-	-	-
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

4.11.3 Review

Northstar Air Quality were commissioned to perform reviews of the air quality monitoring data between September 2018--19 and between September 2020-21. 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 4.27**.

Table 4.27: Dust compliance assessment.

Condition	Review
Project Approval	
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
EPL	
O3	Dust mitigation activities are considered in the Air Monitoring Plan (GHD 2013a).
EA	
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.
G	Air Monitoring Plan has been prepared by GHD (2013a).
H	A sprinkler system and water carts are in use.

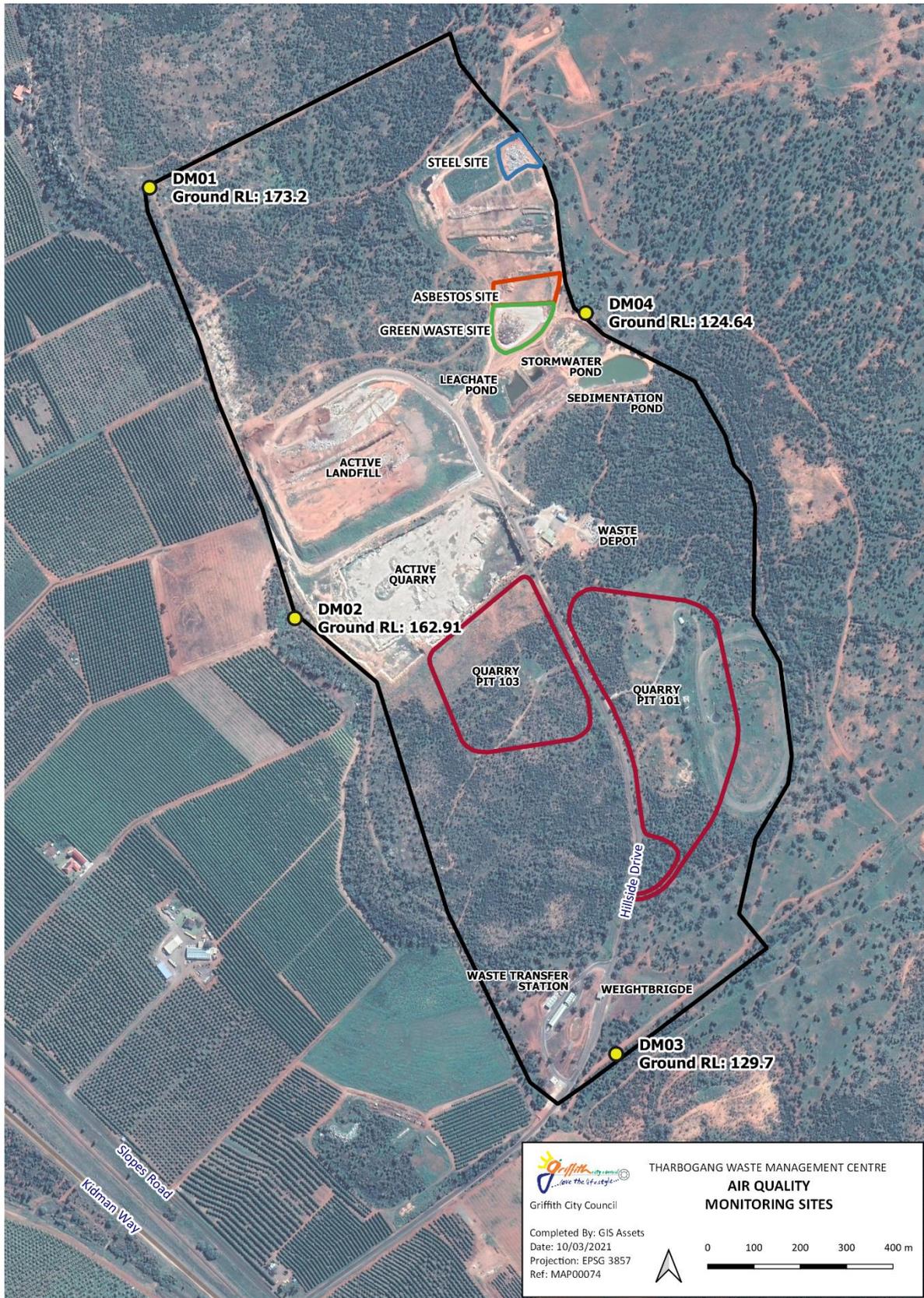


Figure 4.23: Air Quality Monitoring Locations (monitoring began in 2018).

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 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 4.28**.

Table 4.28: Odour (air quality) compliance assessment.

Condition	Review
Project Approval	
Condition 42, Schedule 3	No odour monitoring data has been provided. However, no complaints have been made regarding odour in the reporting period.
EA	
A	Odour Modelling has been completed in an Odour Impact Assessment Study.

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 4.29**. No target has been set and incorporated into the landfill Operational Environmental Management Plan.

Table 4.29: Greenhouse Gas Emissions compliance assessment.

Condition	Review
Project Approval	
Condition 11, Schedule 3	Council has advised that composting will not occur on site.
Condition 12, Schedule 3	No feasibility report has been provided.
EA	
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.
Not Triggered	
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/m² 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 2020b). 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 (Eco Logical Australia 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 (46,785m³) of waste annually (2018/19 base year) based on a compaction rate of 0.65t/m³ 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 (m³) – 328,440
- Approximate net void (m³) – 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 4.30**.

Table 4.30: Rehabilitation and landscape management compliance assessment.

Condition	Review
Project Approval	
Condition 9, Schedule 3	Litter is removed by staff on site. No indication of weekly litter removal, however Council has advised that daily inspections began in 2021. 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). The construction of a 1.8m boundary fence around the landfill will begin in the 2021/22 financial year.
Condition 48, Schedule 3	A Landscape and Biodiversity Management Plan has been developed by Eco Logical Australia (2013). 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. A BMP 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. Biodiversity management actions currently occurring in the offset area (BOAs) under the existing LBMP and the Conservation Agreement (CA).
Condition 49, Schedule 3	The Landscape and Biodiversity Management Plan 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.
EPL	
See 'not triggered' section	
EA	
B	No observation of rubbish along fence-lines during the independent audit.
Not Triggered	
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.

Condition	Review
	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 two surveyor scarred trees and a 20 m exclusion zone maintained around each 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. (C)

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 trees are 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 4.31**.

Table 4.31: Heritage compliance assessment.

Condition	Review
Project Approval	
Condition 53, Schedule 3	A Cultural Heritage Management Plan has been developed.
EA	
A	The Cultural Heritage Management Plan has been prepared, which recommends a 20m development exclusion zones around each 'scar tree'.
B	Council is currently taking steps to include the two 'scar trees' in the LEP Heritage Plan and 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.
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 (Griffith City Council 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 4.32**.

Table 4.32: Traffic and transport compliance assessment.

Condition	Review
Project Approval	
Condition 54, Schedule 3	A Transport Management Plan has been developed (GCC 2020c).
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.
EA	
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 2020c).
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 (Griffith City Council 2018a). 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 4.24**) and at the waste transfer station (**Figure 4.25**). Diesel fuel is stored in an open location in a self-bunded 4000L storage tank on a concrete bund (**Figure 4.26**). Bunds are also utilised for battery storage and chemical storage (**Figure 4.27** and **Figure 4.28**) on site. Chemicals used on site are stored in coloured and clearly signed cabinets within the landfill workshop (**Figure 4.29**). Additionally, there is a MDS folder kept on site, which contains the technical details (safe handling procedures, spill clean-up and disposal) of all the chemicals which are held on site (**Figure 4.30**).

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 4.24: General purpose spill kit located in the landfill workshop.

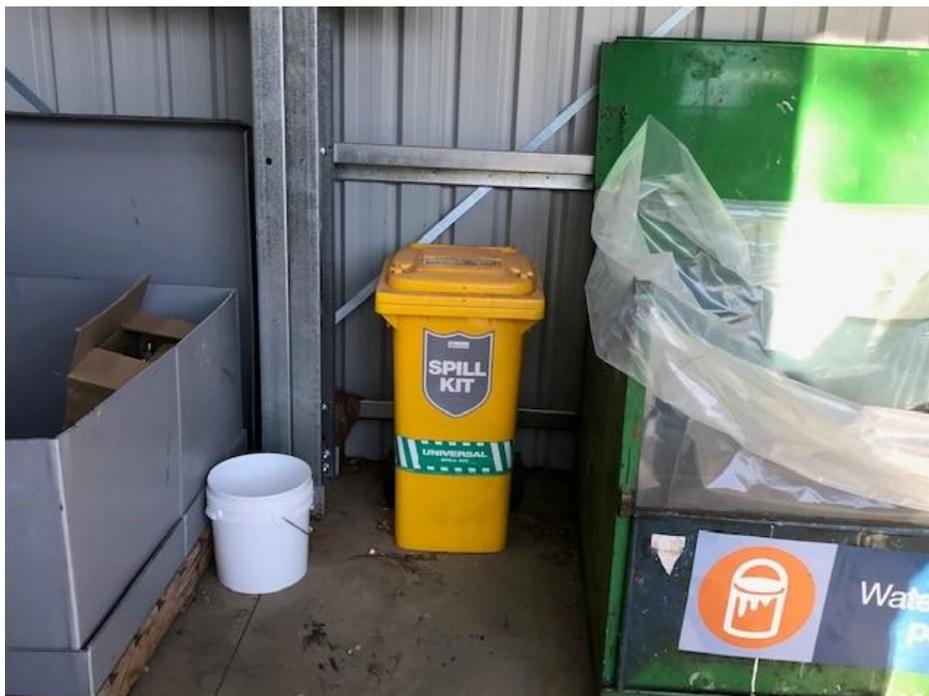


Figure 4.25: Universal spill kit located within the waste transfer station.



Figure 4.26: Concrete diesel fuel bund in an open area.



Figure 4.27: Bund for battery storage in the landfill workshop.



Figure 4.28: Bunded storage shed on site.



Figure 4.29: Chemical storage with signage within the landfill workshop.

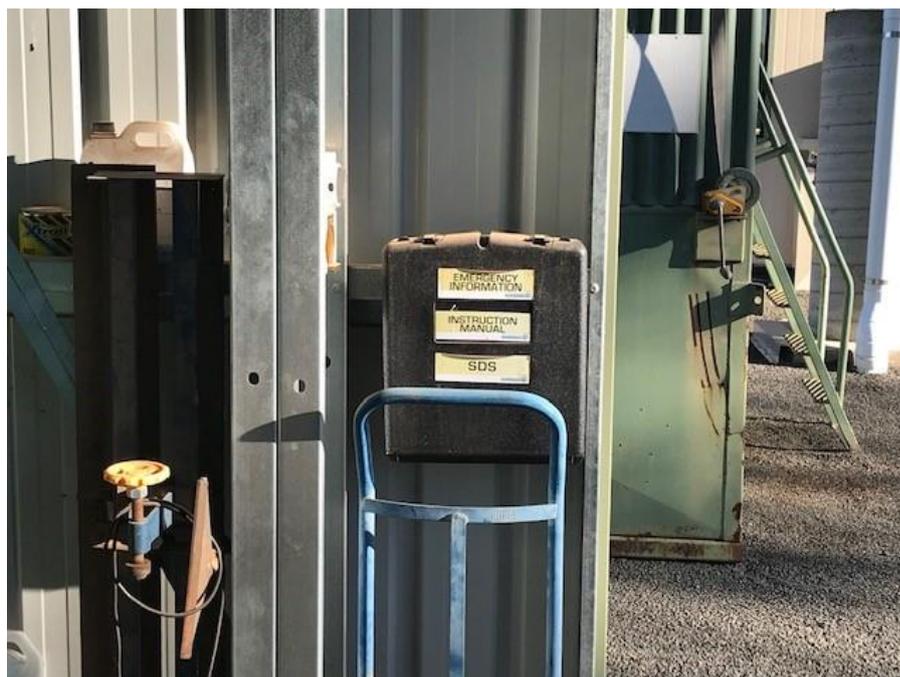


Figure 4.30: MDS folder located on site.

4.17.3 Review

An assessment of the monitoring results against the regulatory framework is presented in **Table 4.33**.

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 4.33: Dangerous goods and hazardous materials compliance assessment.

Condition	Review
Project Approval	
Condition 19, Schedule 3	<p>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.</p> <p>Council has confirmed that the current storage of dangerous goods meets the above requirements.</p>
Condition 59, Schedule 3	<p>The photos provided are evidence storage, handling and transport of fuels and dangerous goods is conducted in accordance with AS 1940 and 1596.</p>
EA	

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	The assessment of chemical management for the existing landfill and quarry was not within the scope of the audit. No information on if there is storage of chemicals and explosives offsite.

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 1997 (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.

Notification of fires must be completed in accordance with condition R2.

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 2021 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 4.34**. 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 4.34: Incident management and response compliance assessment.

Condition	Review
Project Approval	
Condition 8, schedule 3	The site is secured through fencing, CCTV and padlocked gates to ensure public safety.
Condition 60 (b), schedule 3	All fires on site were controlled and managed in consultation with RFS.
EPL	
O4.1	Current fire prevention measures meet the LEMP (1997) requirements. Independent audit notes that fire trails were regraded in November 2017. The EPA Audit (2019) states that emergency response prevention methods were not undertaken. Council has a PIP Fire for landfill fires and this has been sent to NSW Fire & Rescue and NSW Rural Fire Services. The PIP also makes up part of the response to the PRIMP. Staff have undertaken firefighting training (see WHS records) Council has purchased a designated firefighting water tanker.
O4.2	Consultation with the RFS has not been undertaken to decide if the necessary fire-fighting equipment available on site. All fires at the site are extinguished as soon as possible.
O4.3	The landfill has a 10,000L water cart that has a hydraulic pump / spray unit and a 10,000L water tank.
R1	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.
R2	No incidents of environmental harm were recorded during the reporting period (GCC 2021).

Condition	Review
R3	No evidence of written reports submitted to the EPA. This is not required if there were no environmental harm incidents.
R4	There were no fires in this reporting period (GCC 2021).
EA	
B	<p>Council has a PIP Fire for landfill fires and this has been sent to NSW Fire & 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 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 & 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 trialed 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. Council progressively covers waste maintaining minimum</p>

Condition	Review
	area exposed to 1,000 to 2,000m ² . The system still appears to meet the goals of preventing fires in the waste, controlling vermin and achieving good compaction (GCC 2020b).
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 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 to 2,000m². The system still appears to meet the goals of preventing fires in the waste, controlling vermin and achieving good compaction (GCC 2020b).</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 EPA audit (2019) noted that the licensee could not provide a copy of the chain of custody for all samples taken for auditable records nor was the time of sampling recorded for all samples on the chain of custody or other records. This has resulted in some non-compliance.

4.19.3 Review

Table 4.35: Monitoring and recording conditions compliance assessment

Condition	Review
EPL	
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 not been provided for all samples.

5. Conclusion 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 2021 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.

However, it is unclear whether conditions requiring the development and implementation of a community education program and an indication of landholder consultation have been met over this reporting period. It is understood that the Utilities Committee was removed as a Council Committee back in 2017. Whilst community education programs were undertaken during the reporting period, the education program was not approved by the DG, rather it was arranged through the RAMJO Waste Group (Riverina & Murray Organisation of Councils).

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 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 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. Several previous non-compliances have been addressed by this approval for the 2021 monitoring period.

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

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 2021b).

A statement of compliance is included below in Error! Reference source not found. and summary of any non-compliance with the relevant TWMC approvals is outlined below in **Table 5.2** (see **Table 1.4** for compliance colour coding).

Table 5.2 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: Statement of compliance

Were all conditions of the relevant approval(s) complied with?	
Development Consent # 06_0334, EPL #5875	NO
Mining Lease #	NA

Table 5.2: Non-compliance

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed action	Timing of proposed actions
Project Approval #06_0334							
Landfilling							
#06_0334	Condition 11, Schedule 3	Composting should be undertaken in accordance with AS 4454-2003	Non-compliant	Given composting is not undertaken 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	Non-compliant	The Landfill Environmental Management Plan was most recently updated in March 1999.	Section 4.3.3	Nil	NA

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed action	Timing of proposed actions
		Plan be updated					
Air Quality - Odour							
#06_0334	Condition 42, Schedule 3	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	Non-compliant	No odour monitoring data has been provided. However, no complaints have been made regarding odour in the reporting period.	Section 4.12.3	Nil	NA

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed action	Timing of proposed actions
		persons affected are workers on site. This is designed to minimise the nuisance effect to acceptable levels.					
Greenhouse Gas Emissions							
#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
Rehabilitation and Landscape Management							

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed action	Timing of proposed actions
#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	<p>Litter is removed by staff on site.</p> <p>No indication of weekly litter removal, however Council has advised that daily inspections began in 2021.</p> <p>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). The construction of a 1.8m boundary fence around the landfill will begin in the 2021/22 financial year.</p>	Section 4.14.3	NA	NA
EPL #5875							
Operations							
#5875	O5.5	The licensee must install and maintain	Non-compliant	There is no 1.8m high mesh fence around the active tipping area. Due to	Section 4.1.3	The construction of a 1.8m boundary fence around the landfill will	2021/22 financial year

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed action	Timing of proposed actions
		a high wire mesh fence of not less than 1.8 metres around the active tipping area.		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).		begin in the 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 are stored on an impermeable bunded area	Non-compliant	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. 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	Section 4.2.3	The green waste pad has been completed and includes a bunded area capable of capturing all leachate in accordance with the EPL performance conditions. A Biosolids pad has been designed, however, building will not commence until	TBA

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed action	Timing of proposed actions
				be impermeable to that required and have a thickness of not less than 600mm.		suitable material has been sourced.	
Monitoring and recording conditions							
#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 Error! Reference source not found.	Request metadata from all subcontractors and store information with sample data.	Ongoing
EA							
Waste							
-	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
Biodiversity							

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed action	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 still under review. 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
-	Q	Assess the significance of various ephemeral swamps and water bodies as part of the Griffith Biodiversity Strategy	Non-compliant	<p>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</p>	Section 4.4.3	NA	NA

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed action	Timing of proposed actions
				current form. Even with an EO, this project is not likely to be pencilled in as a 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 a more formalised contaminant system. Whilst there is no flexible membrane for the stormwater pond, there has been major formalisation	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 action	Timing of proposed actions
				stormwater works up stream. Monitoring more than twice a year is not proposed.			
Greenhouse Gas Emissions							
-	B	Set greenhouse gas targets 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.	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	NA

Relevant Approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant section	Proposed action	Timing of proposed actions
						condition remains non-compliant as the goal of improving the bioreaction process remains unaddressed.	
Heritage							
-	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

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 (blue). Further **Table 5.2** 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. Twenty-seven non-compliances were identified over the 2021 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

- ANZG (2018). Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines
- ANZECC (2000). *Australian Guidelines for Water Quality Monitoring and Reporting*. Australian and New Zealand Environmental and Conservation Council: Canberra.
- Australian Government. 1999. National Environment Protection Assessment (NEPM) (Assessment of Site Contamination). Schedule B1.
- Barton R.E. (1997). *Landfill Environmental Management Plan Tharbogang Recycling and Waste Disposal Facility*.
- B&B Industrial (2019). 10 Yearly Inspection Report – Portable Fuel Station. Unpublished.
- 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) (2022). Weather Station Griffith Airport AWS 075041. <http://www.bom.gov.au/climate/data/>. Accessed March 2022.
- 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.
- Eco Logical Australia (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.
- Eco Logical Australia (2016). *Tharbogang Waste Management Centre Offset Monitoring, Annual Monitoring Report 2016*. Prepared for Griffith City Council.
- Ecoplanning (2018). *Tharbogang Waste Management Centre Offset Monitoring, Annual Monitoring Report 2016*. Prepared for Griffith City Council.
- Ecoplanning (2018). *Tharbogang Waste Management Centre Annual Environmental and Monitoring Report 2018*. Prepared for Griffith City Council.
- Ecoplanning (2019). *Tharbogang Waste Management Centre Annual Environmental and Monitoring Report 2019*. Prepared for Griffith City Council.

Ecoplanning (2020). *Tharbogang Waste Management Centre Annual Environmental and Monitoring Report 2020*. Prepared for Griffith City Council.

Ecoplanning (2021). *Tharbogang Waste Management Centre Annual Environmental and Monitoring Report 2021*. Prepared for Griffith City Council.

EPA (2019). Compliance Audit - Tharbogang Recycling and Waste Disposal Facility – Environment Protection Licence Number 5875. 20 June 2019.

Ecoplanning (2021b). Biodiversity Management Plan Tharbogang Quarry and Landfill. In preparation.

Geolyse (2015). Hydrogeological Investigation – Tharbogang Waste Management Centre. Prepared for Griffith City Council. June 2015.

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, Griffith, NSW.

GHD (2013b). *Tharbogang Quarry Noise and Vibration Monitoring Plan*. Prepared for Griffith City Council, NSW.

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

Griffith City Council (2010). *Tharbogang Waste Management Centre Expansion – Response to Submissions*. Prepared by Council in February 2010.

Griffith City Council (2018a). *Pollution Incident Response Management Plan (PIRMP) for Tharbogang Waste Management Centre and Tharbogang Quarry (EPA Licence No. 5875) (v.4.0)*.

Griffith City Council (2018b). *Pollution Incident Response Management Plan (PIRMP) for Tharbogang Waste Management Centre and Tharbogang Quarry (EPA Licence No. 5875) (v.4.0)*.

Griffith City Council (2018c). *Asbestos Procedure (WM – PR – 013)*. Version 5

Griffith City Council (2019a). *Leachate Pump Well Investigation*. Unpublished.

Griffith City Council (2019b). Annual Environmental Performance Report EPL5875. Prepared by Griffith City Council.

Griffith City Council (2019c). *Tharbogang Waste Management Centre Pre-incident Plan (Fire)*.

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

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

Griffith City Council (2020). *Annual Report Tharbogang Recycling and Waste Disposal Facility 2019-2020*.

Griffith City Council (2020a). Waste Education Plan 2020/21. Approved November 2020. Prepared by EnviroCon Australia for Griffith City Council.

Griffith City Council (2020b). Annual Environmental Performance Report EPL5875 – 11 September 2020 to 10 September 2021. Prepared by Griffith City Council.

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

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

Griffith City Council (2021b). *Blast Monitoring Report*.

MA & WM Robb Environmental Management Services (2021a). GCC Weed Control Program – Lot 201 Tharbogang – Report 1 – September 2021.

MA & WM Robb Environmental Management Services (2021b). GCC Weed Control Program – Lot 201 & 181 Tharbogang – Report 2 – September 2021.

MA & WM Robb Environmental Management Services (2021c). GCC Weed Control Program – Lot 202 Tharbogang – Report 3 – October 2021.

MA & WM Robb Environmental Management Services (2021d). GCC Weed Control Program – Lot 202 Tharbogang – Report 4 – October/November 2021.

MA & WM Robb Environmental Management Services (2021e). GCC Weed Control Program – Lot 202 Tharbogang – Report 5 – November 2021.

National Environment Protection (Assessment of Site Contamination) Measure (NEPM) Schedule B5a, Ecological Risk Assessment (NEPC, 2013).

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

NGH Environmental (2019). Noise Monitoring – Tharbogang Quarry Operations 18-393. Prepared for Griffith City Council.

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

NGH Environmental (2021a). 18-393 Tharbogang Landfill Groundwater Analysis.

NGH Environmental (2021b). Noise Monitoring – Tharbogang Quarry Operations 18-393. Prepared for Griffith City Council. NSS (2008). *Noise Impact Statement for the proposed Tharbogang Quarry Expansion, Slopes Road, Griffith NSW*. Prepared by Noise and Sound Services, NSW.

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

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

NSW EPA (2001). *Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW*. NSW Environment Protection Authority, Sydney.

NSW EPA (2015). *Notice of Variation of Licence No. 5875*. Date: 9 December 2015.

NSW Environmental Protection Authority (EPA) (2018). Annual Return, Griffith City Council, Licence 5875. 59-61 Goulburn Street, Sydney, NSW 2000.

NSW Government (2015). Post-approval requirements for State significant mining developments – Annual Review Guide.

Mibrae Quarries (2021). Drill and Blast Management Plan. Date 23 February 2021.

Property Risk Australia (2018). *Independent Environmental Audit, Tharbogang Waste Management Centre, Hillside Drive, Tharbogang, NSW*. Prepared for Griffith City Council.

Riverina Agriconsultants (2020). Griffith City Council Tharbogang Waste Management Centre – Biodiversity Offset Area Quarterly Visual Inspections – 12/09/19, 3/03/2020, 19/06/2020, 17/09/2020 and 14/12/2020.

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

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

Talis (2019). Landfill Closure and Rehabilitation Plan – Tharbogang Recycling and Waste Disposal Facility. Prepared for Griffith City Council.

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

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
FLORA AND FAUNA				
<ul style="list-style-type: none"> Develop and implement Griffith Biodiversity Management Strategy 	Council	Project commencement	Strategy review of biodiversity outcomes	EA Section 7.2.2 'Onsite measures'
<ul style="list-style-type: none"> 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 Revegetate and enhance (where possible) to create a contiguous corridor with Lot 201 on the western boundary Maintain and enhance a 40m riparian zone on either side of the ephemeral drainage line 	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"> Collect, store and/or propagate seeds for rehabilitation purposes (to be stipulated in the detailed rehabilitation plan) 	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"> Relocate hollow trees and woody debris to corridors and areas not designated for clearing 	Council	Prior to commencement of each quarry pit		EA Section 7.2.2 'Onsite Measures'
<ul style="list-style-type: none"> 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 	Qualified NSW Parks Officer or equivalent	Prior to commencement of each quarry pit	Property Vegetation Plan (Native Vegetation Act 2003)	EA Section 7.2.2 'Onsite measures'
<ul style="list-style-type: none"> Undertake detailed flora and fauna assessments of proposed offsets 	Council	Prior to the commencement of each quarry pit	Consultant Brief 2007 'Objectives and Assessment Tasks', and in consultation with DECC	EA Section 10.2
<ul style="list-style-type: none"> Refine the offset package described in Appendix C to the satisfaction of the Department of Planning and implement it prior to the commencement of the new quarrying activities in order to compensate 	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"> Enhance onsite vegetation in areas not designated for clearing through direct seeding, thinning, grazing exclusion, weed and fire management 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 Monitor success of revegetation and enhancement works onsite and in offset areas 	Council	Ongoing		EA Section 7.2.2 EA Section 10.5
<ul style="list-style-type: none"> 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. Performance monitoring and completion criteria will be designed to demonstrate that the rehabilitation outcomes identified in the EA and rehabilitation plan are met. 	Council	Project commencement and ongoing	DECCW approval	EA Section 6.3.6 and 6.4.4
<ul style="list-style-type: none"> Progressively clear vegetation for each quarry pit Progressively rehabilitate each quarry pit 	Council/Contractors	Ongoing	Number of hectares successfully rehabilitated Species survival counts	EA Section 6.3.6
<ul style="list-style-type: none"> Cap and rehabilitate the landfill on completion 	Council/Contractors	Landfill closure	Species survival counts	EA Section 6.4.4
GROUNDWATER				
<ul style="list-style-type: none"> Install 2 new licensed groundwater monitoring bores west of the site 	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"> Licence new groundwater monitoring bores 	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"> Establish and implement groundwater monitoring program in accordance with DECCW requirements 	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"> Construct appropriately engineered landfill cells lined with an impermeable liner (i.e. with a permeability less than 10^{-9}ms^{-1}) and a 	Council, project designers and	Construction	<i>EPA Guidelines for Aqueous Liquid Treatment Ponds</i>	EA Section 6.4.3 Monitoring and

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

SURFACE WATER

<ul style="list-style-type: none"> 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. 	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"> Construct diversion drains and bunds around perimeter of quarry pits Install pumps to divert surface water to settlement and stormwater detention ponds Install sediment trap at discharge point Incorporate energy dissipation and erosion protection measures in surface water diversions 	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"> Install table drains, culvert pipes and silt traps on all access new roads, i.e. to pit 101 Undertake all engineering works to minimise erosion and soil contamination 	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"> Ensure all water storages are engineered for peak weather events (1 in 100 year 72 hour rainfall event) The stormwater detention pond will be lined with a flexible membrane and the water quality monitored on a quarterly basis 	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"> Install bunding and spill kits in the vicinity of any chemicals or fuels stored or used onsite 	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"> Install operational backflow device on potable water supply pipeline Identify, map and colour code all pipelines on site 	Landfill Operations Manager	Project Commencement	<i>National and State plumbing regulations</i>	EA Section 6.5
<ul style="list-style-type: none"> Visual inspection of engineering works 	Site Manager	Ongoing		EA Section 9.5

SOILS

<ul style="list-style-type: none"> Containment spill kit will be kept on site at all times Contaminated soils will be removed and placed in the active putrescible landfill cell 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 	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"> Construct cut-off drains and diversions with erosion control measures 	Council, project designers and	Construction	<i>Managing Urban Stormwater: Soils and</i>	EA Section 7.6.2

	contractor		<i>Construction (Landcom, 2004)</i>	
<ul style="list-style-type: none"> Periodically check and empty sediment trap at settlement dam 	Contractor	Ongoing		EA Section 7.6.2
<ul style="list-style-type: none"> Wet down stockpiles as per the Dust Management Plan 	Contractor	Ongoing		EA Section 7.6.2
<ul style="list-style-type: none"> Enhance vegetation in edge areas (landfill, roads, quarry edges etc) Cover edges with mulch as a temporary measure 	Council	Ongoing	Species survival counts Evidence of erosion	EA Section 7.2.2 'Onsite measures'
<ul style="list-style-type: none"> Progressively revegetate quarry stages 	Contractor	On completion of each quarry stage	Number of hectares successfully rehabilitated Species survival counts	EA Section 6.3.6
SALINITY				
<ul style="list-style-type: none"> Install closed leachate collection system and surface water controls around landfill Install sedimentation dam and drainage channels to direct water from quarries 	Council, project designers and contractor	Construction	<i>Managing Urban Stormwater: Soils and Construction (Landcom, 2004)</i>	EA Section 7.7.2
AIR QUALITY				
<ul style="list-style-type: none"> Implement procedures for investigating complaints 	Council	Ongoing	Number of complaints registered and finalised	EA Section 7.17
<ul style="list-style-type: none"> Water cart for dust suppression on unsealed roads Water down uncovered stockpiles 	Contractor	Ongoing	Compliance with Dust Management Plan	EA Section 7.8.2
<ul style="list-style-type: none"> Conduct odour modelling in the event of a complaint / incident 	Council	Ongoing	<i>Approved Methods for the Sampling and analysis of Air Pollutants NSW 2007</i>	EA Section 7.8.2
<ul style="list-style-type: none"> Water sprayers will be used on the crusher whenever it is operating 	Council	Ongoing	Compliance with Dust Management Plan	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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"> Capture and flare landfill gases and monitor emissions Once data is available, a greenhouse gas target will be set and incorporated into the landfill operational environmental management plan 	Landfill Operations Manager	Ongoing	POEO (Clean Air) Regulations 2002 - schedule 2 EPA Environmental Guidelines: Solid Waste Landfills 1996	EA Section 7.9.2
<ul style="list-style-type: none"> Construct and operate waste transfer station to reduce waste to landfill 	Council	Within 2 years of project commencement	Handbook for the Design and Operation of Rural and Regional Transfer Stations 2006	EA Figure 6.11
<ul style="list-style-type: none"> Cover active tip face daily with green waste to improve bioreaction process 	Council	Ongoing	Environmental Guidelines: Solid Waste Landfills	EA Section 7.9.2

NOISE AND VIBRATION

<ul style="list-style-type: none"> Implement procedures for investigating complaints 	Council	Ongoing	Number of complaints registered and finalised	EA Section 7.17
<ul style="list-style-type: none"> Where quarry plant noise is found to exceed the intrusive goal of 35dB (L_{Aeq, 15 min}) at affected residences, the plant will be moved or modified to ensure the noise impact from plant is below 35dB (L_{Aeq, 15 min}). 	Contractor	Ongoing	Number of exceedences	EA Section 7.7.2
<ul style="list-style-type: none"> 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. Blasting will only occur between 9.00am -3pm, Monday to Friday excluding public holidays. 	Contractor	Ongoing	Number of exceedences	
<ul style="list-style-type: none"> Restrict operating hours of the quarry to 8.30am - 5pm 	Contractor	Ongoing		EA Section 6.4.3
<ul style="list-style-type: none"> Notify residents within 2,000m of intention to blast at least 7 days in advance 	Council / Contractor	Ongoing		EA Section 7.8.2

HAZARDS

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

	Manager		<i>flammable and combustible liquids 2004 Dangerous Goods Regulations 2005</i>	
<ul style="list-style-type: none"> Develop and implement fire management procedures in consultation with the Griffith Fire Control Centre, and submit to emergency services Develop emergency response and contingency procedures as part of the operational plans 	Landfill Operational Manager	Construction		EA Table 7.13
<ul style="list-style-type: none"> Store chemicals and explosives offsite 	Landfill Operational Manager	Ongoing	<i>Explosives Act 2003 and Regulations 2005</i>	EA Table 7.13
<ul style="list-style-type: none"> Public education and additional inspection for prohibited wastes and burning materials 	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"> Reduce tip face and cover daily to reduce risk of ignition from lightening strikes Spread green waste in thin layers to minimise risk of self-combustion Street sweeper waste to be stockpiled with green waste Manage and monitor waste prior to disposal in the landfill cell and implement other measures outlined in Table 7.13 of the EA Create vertical and horizontal layers in inert cell with clay to isolate volume of waste prone to a fire event 	Landfill operational manager	Ongoing		EA Table 7.13
<ul style="list-style-type: none"> Limit access to quarry face and exposed edges Conduct safe work methods statements for potentially hazardous tasks Ensure appropriate supervision for personnel for all tasks Conduct site inductions and periodic refresher training for all employees , contractors and transport contractors 	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"> Construct waste transfer station 	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"> Re-direct recyclables for processing 	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"> Record the waste stream and amount received, recovered and recycled, and disposed of in landfill 	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"> Implement procedures for investigating complaints 	Council	Prior to commencement of works	Number of complaints registered and finalised	EA Section 7.17
<ul style="list-style-type: none"> 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 	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"> Compile Transport Management Plan 	Council	Prior to commencement of works	Approval of plan by RTA.	
<ul style="list-style-type: none"> 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 	Council	In accordance with the RTA approved Transport Management Plan	Approval of plan by RTA.	
<ul style="list-style-type: none"> The operator to maintain a log book of extraction quantities, waste deliveries and traffic movements. 	Council	Ongoing		
HERITAGE				
<ul style="list-style-type: none"> Implement procedures to investigate and protect culturally significant material if discovered during construction and operation 	Site Manager	Prior to commencement of works	<i>Guidelines for Aboriginal Heritage Impact Assessment in the Exploration & Mining Industries</i>	EA Section 7.12.2 and Appendix D of this Response to Submissions
<ul style="list-style-type: none"> The two surveyor scarred trees will be preserved and protected and a 20 m radius development exclusion zone will be maintained around each tree 	Council	Prior to commencement of works		Appendix D of this Response to Submissions
<ul style="list-style-type: none"> 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. 	Council	Prior to commencement of works		Appendix D of this Response to Submissions

VISUAL AMENITY

<ul style="list-style-type: none"> Erect 2.5m perimeter fence to prevent windblown rubbish leaving the site Ensure rubbish pickup along the fence line and more generally is undertaken regularly 	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"> The landfill will be rehabilitated and revegetated to replicate areas of open grassy woodland. 	Council	Ongoing		EA Section 6.4.4
<ul style="list-style-type: none"> 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. The benches and floor of the quarries will be revegetated with suitable native species 	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"> Ensure strategic landscaping is incorporated into new residential developments within line of sight and in close proximity to the development 	Planning division Council	Ongoing	<i>Griffith Land and Environment Plan</i>	EA Section 7.13.2

SOCIOECONOMIC

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

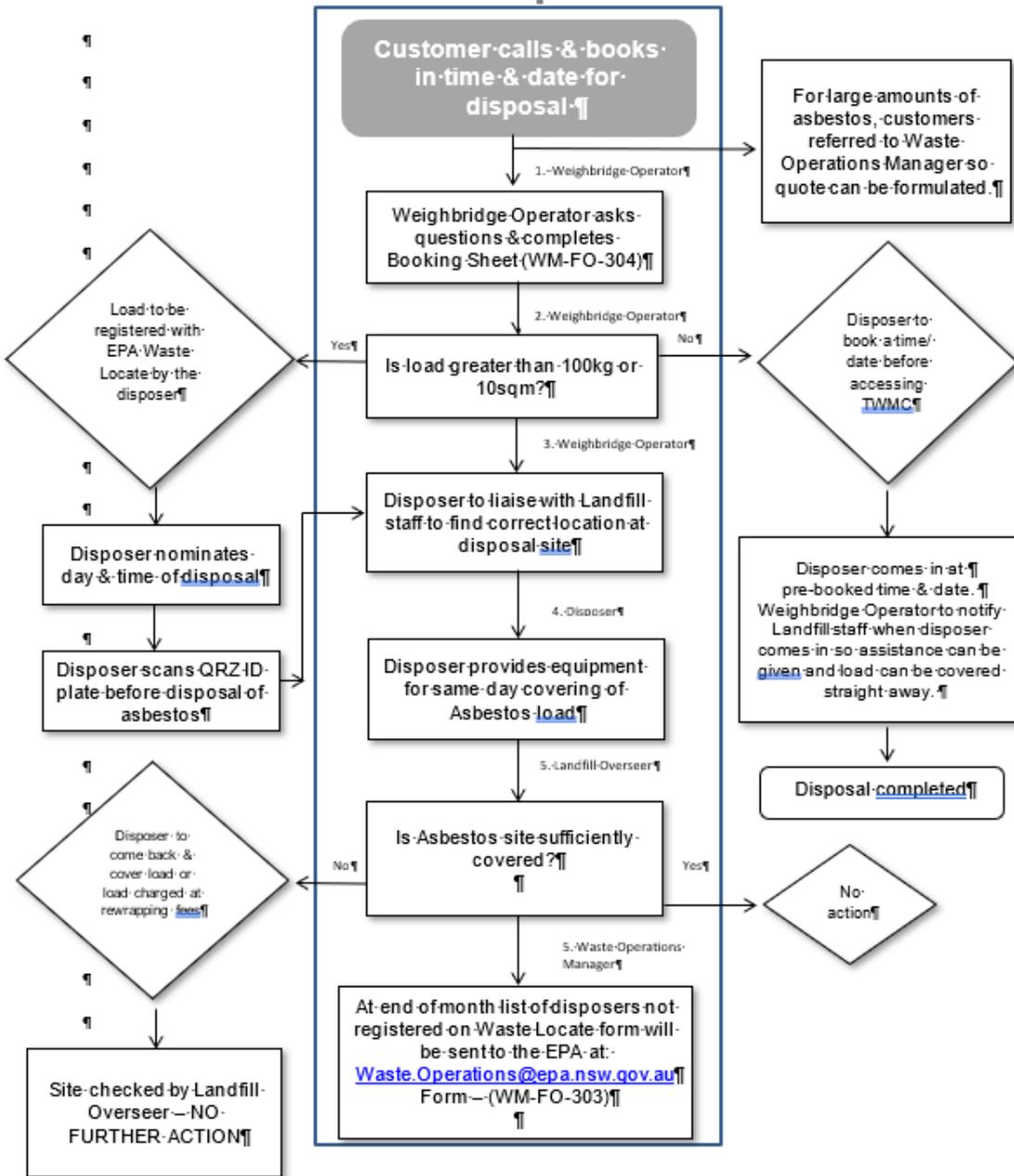
- If a load is deliver to Tharbogang Waste Management Centre and is not declared as asbestos by the customer, then the load will not be accepted until it is wrapped correctly as required above.
- If asbestos is dumped at the Tharbogang internal active tipping site and the offending customer is identified, 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.



WM-PR-013
(WM-PR-013) Asbestos Procedure
 Version 5 -- Owner: Waste Operations Manager
 Created: 7/10/16 -- Modified: 7/8/18 -- Approved: 11/12/16



Approved By: Waste Operations Manager	Group/System: Waste Operations	Document ID: (WM-PR-013)	Version: 5
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