



Griffith City Council
Tharbogang Quarry
Noise and Vibration Monitoring Plan

February 2013

Table of contents

1.	Introduction	1
1.1	Overview	1
1.2	Scope of work	1
1.3	Limitations	1
1.4	Assumptions	2
2.	Existing Environment	3
2.1	Existing Site and Sensitive Receivers	3
3.	Approval Requirements	5
3.1	Site Noise and Vibration	5
3.2	Road Traffic Noise	6
4.	Management Measures and Monitoring Protocol	7
4.1	Identification of Noise Sources	7
4.2	Noise and Vibration Controls and Mitigation Measures	7
5.	Noise and Vibration Monitoring Program	8
5.1	Noise Monitoring and Reporting Process	8
5.2	Monitoring Locations	8
5.3	Noise Monitoring Devices	10
5.4	Noise Monitoring Procedure	10
5.5	Data Recording and Reporting	11
5.6	Vibration Monitoring	11
5.7	Community Consultation	12
5.8	Management of Complaints (Complaints Management Protocol)	12
5.9	Response to Noise Criteria Exceedance	12
5.10	Responsibilities and Accountabilities	13
6.	Conclusion	14

Table index

Table 2-1	Residential Receiver Details	3
Table 3-1	NSW Road Traffic Noise Criteria	6
Table 5-1	Noise and Vibration Monitoring Locations	8
Table 5-2	Noise Monitoring Responsibilities	13

Figure index

Figure 1	Site Boundary and Sensitive Receiver Locations (Source: Griffith City Council Blast Management Plan)	4
Figure 2	Proposed Noise and Vibration Monitoring Locations	9

Appendices

Appendix A – Example of noise monitoring field sheet

1. Introduction

1.1 Overview

Griffith City Council (Council) currently operates a Landfill and Quarry in Tharbogang, NSW. The Department of Planning (DoP) have issued Conditions of Approval (CoA) for the site that requires a noise and vibration monitoring program to be prepared and implemented.

This report outlines the applicable noise and vibration criteria for the site and details the monitoring requirements and methodology.

1.2 Scope of work

The scope of work involved in preparing the Noise and Vibration Monitoring Program consisted of:

- An analysis of Landfill and Quarry activities on site to form an understanding of site operations and the primary activities that generate noise and vibration, including blasting overpressure and ground vibration
- A review of surrounding noise and vibration sensitive receiver locations
- Identification of the site specific noise and vibration criteria.
- Selection of appropriate noise and vibration monitoring locations for normal site operations, blast events and road traffic noise to/from the site
- Identification of the appropriate noise and vibration monitoring equipment and monitoring methodology, including
 - Type of monitoring equipment required
 - Monitoring equipment setup
 - Measurement intervals
 - Monitoring frequency
- Preparation of noise and vibration monitoring field sheets to use during monitoring
- Preparation of a process in which compliance with the noise and vibration criteria can be assessed as well as ways to identify areas of improvement and evaluate the monitoring program

1.3 Limitations

This report: has been prepared by GHD for Griffith City Council and may only be used and relied on by Griffith City Council for the purpose agreed between GHD and the Griffith City Council as set out in section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than Griffith City Council arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Griffith City Council, which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

1.4 Assumptions

The CoA for the site require the Noise and Vibration Monitoring Program to include traffic noise monitoring at the private residence along Hillside Drive and to provide details on how the resident would be provided with the opportunity to have amelioration works done on their property should the monitoring demonstrate that the relevant traffic noise criteria is being exceeded.

GHD are aware that the property referred to in the CoA on Hillside Drive is not currently occupied. The dwelling is known to be derelict and not suitable for residential purposes. Therefore, noise and vibration monitoring at this location would not be required at this stage.

Should this dwelling be occupied in the future, it is recommended that the noise and vibration monitoring program be updated based on current site operations at that time.

A Blast Management Plan (Griffith City Council) has been developed for the Landfill and Quarry site as per the requirements of the CoA for the site. Information relating to management and monitoring of noise and vibration of blast events can be found in the Blast Management Plan. Blast monitoring procedures have not been discussed in this document.

2. Existing Environment

2.1 Existing Site and Sensitive Receivers

The Landfill and Quarry site is located at Tharbogang, NSW, approximately 9.5 km northwest of Griffith. The existing operations are positioned in the central part of the site, while the remainder of the site remains undeveloped and is vegetated with sparse cover of trees and grasses.

It is understood that there are plans to expand the Landfill and Quarry operations, which would be to the south and east of current operations, within the site boundary.

The nearest residential receivers to the site have been identified below in Table 2-1 and Figure 1.

Table 2-1 Residential Receiver Details

Property Identification Number	Property Address	Approximate distance from site operations ¹ (m)
1	Farm 1765 Slopes Rd	1020
2	Farm 1743 Slopes Rd	1300
3	Farm 1760 Slopes Rd	1150
4	Farm 1757 Slopes Rd	850
5	250 Slopes Rd	830
6 ²	Corner of Slopes Rd and Hillside Drive	1100

1. Separation distances from sensitive receptors to site operations will increase as Quarry and Landfill stages progress to the south and east of current operations.

2. Note, Property ID 6 is identified as a potential sensitive receiver due to increase in traffic noise associated with Hillside Drive. This dwelling is not currently occupied and is considered unfit for occupancy in its current state.



Figure 1 Site Boundary and Sensitive Receiver Locations (Source: Griffith City Council Blast Management Plan)

3. Approval Requirements

3.1 Site Noise and Vibration

The DoP CoA specifies the following noise and vibration assessment criteria for the site:

NOISE AND VIBRATION

Noise Impact Assessment Criteria

28. The Proponent shall ensure that the noise generated by the project does not exceed the noise impact assessment criteria in Table 1.

Table 1: Operational noise impact assessment criteria dB(A)

Location and Locality	Day <i>L_{Aeq} (15 min)</i>	Evening <i>L_{Aeq} (15 min)</i>	Night <i>L_{Aeq} (15 min)</i>
All Surrounding Sensitive Receivers	35	35	35

Notes:

- Noise generated by the project is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy.
- The noise limits do not apply if the Proponent has an agreement with the landowner to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

Operating Hours

29. The Proponent shall comply with the operating hours in Table 2.

Table 2: Operating hours

Activity	Day	Time
Quarrying Operations	Monday – Friday	7.00am to 5.00pm
	Saturday	8.00am to 1.00pm
	Sunday and Public Holidays	None
Landfilling Operations	Daily	8.00am to 5.00pm

Notes:

- Maintenance activities may be conducted outside weekday hours in Table 2 provided that the activities are not audible at any privately-owned residence, or until 6pm on Saturdays.
- This condition does not apply to delivery of material if that delivery is required by police or other authorities for safety reasons, and/or the operation or personnel or equipment are endangered. In such circumstances, notification is to be provided to DECCW (now OEH) and the affected residents as soon as possible, or within a reasonable period in the case of emergency.

Airblast Overpressure Limits

30. The Proponent shall ensure that the airblast overpressure level from blasting at the project does not exceed the criteria in Table 3.

Table 3: Airblast overpressure impact assessment criteria

Receiver	Airblast overpressure level (dB(Lin Peak))	Allowable exceedance
All Surrounding Sensitive Receivers	115	5% of the total number of blasts in any 12 month period
	120	0%

Ground Vibration Impact Assessment Criteria

31. The Proponent shall ensure that the ground vibration level from blasting at the project does not exceed the levels in Table 4.

Table 4: Ground vibration impact assessment criteria

Receiver	Peak particle velocity (mm/s)	Allowable exceedance
All Surrounding Sensitive Receivers	5	5% of the total number of blasts in any 12 month period
	10	0%

3.2 Road Traffic Noise

The CoA specifies monitoring of road traffic noise on Hillside Drive, however no guidance on the applicable road traffic noise criteria is provided. Therefore, current NSW guidelines have been adopted.

The NSW *Road Noise Policy* (OEH, 2011) sets out noise assessment criteria for residences on local roads affected by additional traffic from land use developments. The applicable criteria are outlined in Table 3-1.

Table 3-1 NSW Road Traffic Noise Criteria

Road Category	Type of project/land use	Assessment Criteria dB(A)	
		Day (7 am – 10 pm)	Night (10 pm – 7 am)
Local Roads	Existing residences affected by additional traffic on existing local roads generated by land used developments	55 dB(A) L _{Aeq,1 hour} (external)	50 dB(A) L _{Aeq,1 hour} (external)

Road traffic noise is to be measured and assessed at 1 metre from the most exposed façade of the affected dwelling, at a height of 1.5 metres above ground.

4. Management Measures and Monitoring Protocol

4.1 Identification of Noise Sources

Noise sources in the area surrounding the site may potentially include the following:

- Traffic noise from the Kidman Way Highway
- Traffic noise from Sloped Road and Hillside Drive
- Traffic noise from the existing Quarry and Landfill activities
- Operational noise from the existing Quarry, including crushing, stockpiling, drilling, blasting, transporting (when in operation)
- Operational noise from the existing Landfill activity
- Rail noise from the existing railway line connecting Tharbogang
- Natural noise from wind, insects and animals

4.2 Noise and Vibration Controls and Mitigation Measures

There are various noise and vibration mitigation and management measures which may be suitable for the operation of the Landfill and Quarry facility. In-principle mitigation and management measures are provided below:

- All site activities should be confined to within the hours specified in the CoA.
- All engine covers should be kept closed while equipment is operating.
- As far as possible, material dropping heights into or out of trucks should be minimised.
- All combustion engine plant should be checked to ensure they produce minimal noise with particular attention to residential grade exhaust silencers.
- Vehicles should be kept properly serviced and fitted with appropriate mufflers. The use of exhaust brakes should be eliminated, where practicable.
- Where practical, machines should be operated at low speed or power and should be switched off when not being used rather than left idling for prolonged periods.
- Machines found to produce excessive noise compared to industry best practice should be removed from the site or stood down until repairs or modifications can be made.
- Operators of mobile plant should minimise the usage or reverse alarms.
- Where feasible, face engine exhausts and noise emitting components away from nearest residences.
- Any haul roads should be kept smooth and free of potholes and bumps.
- Inform truck drivers of designated vehicle routes, parking locations and delivery hours.

Table E1 of the Project Approval¹ also requires that where quarry plant noise is found to exceed the intrusive noise goal of 35 dB(A) $L_{Aeq(15\text{ min})}$ at affected residences, plant or equipment will be moved or modified to ensure compliance with this criteria. This may require mobile plant to operate behind natural earth mounds of other shielding objects.

¹ NSW Government Department of Planning, Application No. 06_0334, July 2010.

5. Noise and Vibration Monitoring Program

5.1 Noise Monitoring and Reporting Process

The process detailed below will be followed to enable assessment of compliance with the noise criteria. Monitoring of vibration from normal Landfill and Quarry operations would not typically be required given the large separation distance to sensitive receivers, unless a complaint is received.

- Undertake attended noise monitoring on an annual basis at identified sensitive receivers over a one-day period during Landfill and Quarry operations.
- Record field observations, noting the audibility of noise from the site at the monitoring locations and identifying other sources of noise, such as insects, local traffic, agriculture equipment, etc.
- Analyse noise monitoring data and compare the measured noise levels against the noise criteria, estimating the contribution of site noise.
- Provide an annual noise monitoring report detailing the findings of the monitoring.
- If results indicate an exceedance of the noise criteria, identify and implement mitigation measures on site.

The following sections detail the procedures for noise monitoring, data collection and reporting.

A review of the monitoring results will be undertaken following completion of the first annual monitoring report. The requirement for further noise monitoring will be determined based on findings of the first annual report and through discussions with the DoP.

5.2 Monitoring Locations

Attended noise monitoring will be conducted at five locations surrounding the site, as identified in Table 5-1 and Figure 2. The aim of these monitoring locations is to quantify noise impacts from the operation of the Landfill and Quarry facility at sensitive receiver locations described in Section 2.1 for comparison against the noise impact criteria outlined in Section 3.1.

Table 5-1 Noise and Vibration Monitoring Locations

Noise monitoring location	Description ²
L1	Adjacent to the property ID 1 for potential noise impact
L2	Adjacent to the property ID 2 for potential noise impact
L3	Adjacent to the property ID 3 for potential noise impact
L4	Adjacent to the property ID 4 for potential noise impact
L5	Adjacent to the property ID 5 for potential noise impact

Attended vibration monitoring is not required as per the CoA, however will be undertaken subject to any vibration related complaints.

² This shall be read in conjunction with Table 2-1 on this document.

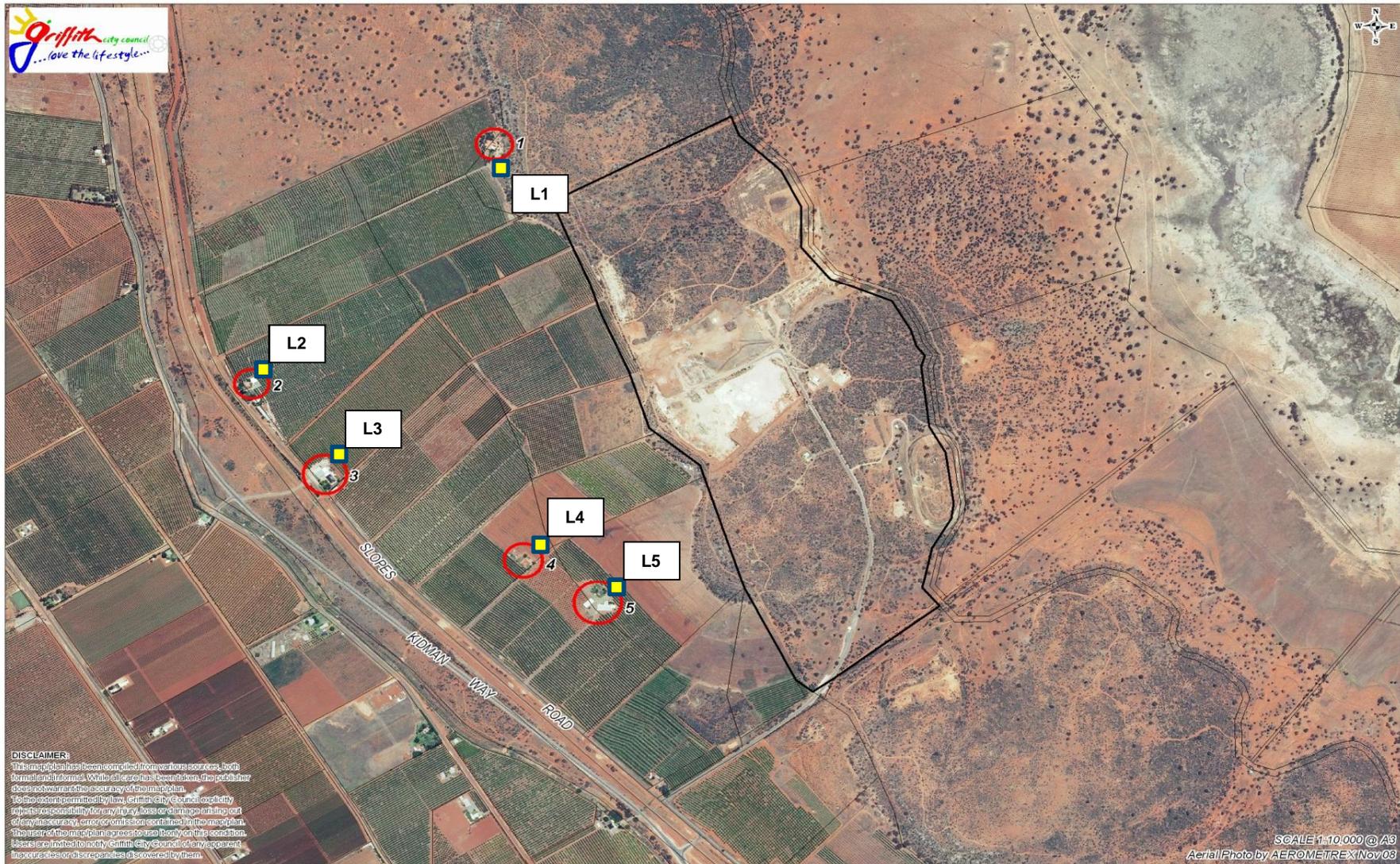


Figure 2 Proposed Noise and Vibration Monitoring Locations

5.3 Noise Monitoring Devices

Noise monitoring will be undertaken using a sound level meter (SLM) capable of recording continuous A-weighted noise levels. The Sound Level Meter (SLM) used shall be Type 1 or Type 2, and conform to the requirements of Australian Standard AS 1259: *Acoustics – Sound Level Meters* and AS IEC 61672.1-2004 *Electroacoustics – Sound level meters - Specifications*.

All instrumentation should be NATA calibrated on an annual basis and calibration should be checked before and after each measurement, with a maximum deviation of ± 0.5 dB.

5.4 Noise Monitoring Procedure

Attended noise monitoring/measurement shall be undertaken in accordance with Australian Standard AS 1055.1:1997 – *Acoustics – Description and measurement of environmental noise: Part 1: General procedures*. Noise monitoring should be conducted by a suitably qualified person with experience in compliance noise monitoring.

The following procedure shall be met in undertaking annual attended noise measurements:

- Attended noise monitoring/measurement shall be conducted during operations of the site that are expected to represent the highest potential for noise impacts. Both quarrying and landfilling operations should occur during monitoring, except if either will not be occurring in the 12 month period.
- Noise monitoring should be conducted at the five locations as identified in Section 5.1 as per the NSW *Industrial Noise Policy*. The monitoring locations would typically be at the property boundary in the direction of the site, or, where the property boundary is greater than 30 metres from the dwelling, then at 30 metres from the dwelling. The measurement height (microphone height) shall be 1.2 m to 1.5 m above the ground.
- There should be a minimum of 3 x 15-minute measurements carried out during one daytime period at each of the monitoring locations, with noise descriptor set to record the following:
 - Time average A-weighted sound pressure level $L_{Aeq,T}$ (as per Clause 3.5 of AS 1055.1:1997), which represents noise level measured at an appropriate free-field location close to the façade of the relevant residence.
- Observations of any apparent tonal, low frequency or impulsive noise will be made during the measurements and the appropriate correction factors will be applied to measured noise levels as per the NSW *Industrial Noise Policy*, where applicable.
- Noise monitoring is to be conducted on an annual basis, as per the CoA. Monitoring would usually be conducted throughout a period of one day.
- Traffic noise measurements shall be conducted at private resident on Hillside Drive³ (refer to property ID6 in Table 2-1) in accordance with AS 3671:1989 – *Acoustics – Road Traffic Noise Intrusion – Building Siting and Construction* and AS 2702-1984 – *Acoustics – Methods for the Measurement of Road Traffic Noise*. Manual traffic count data on Hillside Drive should accompany these measurements. As per Section 3.2, one-hour measurements should be recorded at one metre from the façade of the dwelling. One $L_{Aeq,1-hour}$ should be recorded and compared to the road traffic noise criterion.
 - When required (i.e. if the dwelling on Hillside Drive becomes occupied), traffic noise monitoring should occur on an annual basis, along with the site noise monitoring.

³ It is noted that this private resident is currently derelict and vacant. Hence, traffic noise monitoring would only need to be undertaken should the dwelling become occupied.

- Meteorological conditions shall be noted for noise monitoring purposes, as per indicated in Clause 6.3 of AS 1055.1:1997. In accordance with the NSW *Industrial Noise Policy (2000)* noise monitoring should not be conducted (or data should be excluded) when average wind speeds (over 15-minute periods or shorter) at microphone height are greater than 5 m/s, or when rainfall occurs.
- Notes should be taken on the types of noise sources present during monitoring through site observation (especially likely noise sources from the operation of Quarry and/or Landfill). Where possible, noise levels from individual sources on site should be quantified, with the aim of determining the noise contribution from the site alone to the overall measured noise level.
- Field calibration shall be undertaken immediately pre and post measurement using Sound Calibrator to the satisfaction Clause 5.6 of AS 1055.1: 1997.
- Where adjustment to the measured noise levels is necessary due to certain nature of noise (e.g. tonality, low-frequency, impulsive and intermittent), it shall be conducted in accordance with Section 4 of the NSW *Industrial noise Policy (2000)*.
- Record measurement details in accordance with Clause 7 of AS 1055.1: 1997, which include:
 - Type of instrumentation, make, model and serial numbers, date of most recent calibration, measurement procedure including results of reference level checking or portable calibrator checks and any calculation employed.
 - Description of the time aspect of the measurements, i.e. the reference and measurement time intervals, including details of any sampling used, and the methods of processing data.
 - Positions of measurements, and any adjustment made for presence or absence of nearby reflecting surfaces. This shall include a plan identifying structures, noise source locations and measurement positions.
 - Results of noise monitoring, including site observations and estimated site contribution.

A sample of field (monitoring) sheets has been provided in Appendix A.

5.5 Data Recording and Reporting

Following completion of the noise monitoring, the data should be reviewed by the site environmental representative and entered into an internal database. Unless otherwise required, an annual noise monitoring report should be prepared detailing the methodology and results of the monitoring and comparison against the noise criteria. The noise monitoring report would be incorporated into the Annual Environmental Monitoring Report for the site.

5.6 Vibration Monitoring

Table E1 of the Project Approval requires that monitoring of vibration and airblast overpressure be undertaken for the first three blasts undertaken on site, along with annual blast monitoring. Vibration monitoring during blast events is covered in the Blast Management Plan for the site.

As discussed in Section 5.1, given the distance to sensitive receivers, vibration impacts from Landfill and Quarry activities are unlikely. Vibration monitoring for site operations would only be undertaken following receipt of a complaint relating to vibration impacts from site operations (excluding blasting).

5.7 Community Consultation

Consultation and cooperation between Council and surrounding residents would assist in minimising uncertainty, misconceptions and adverse reactions to noise and vibration. The following community relation measures are recommended:

- Establish contact with residents with the greatest potential to be affected by operational noise and communicate the operational program on a regular basis, based on agreement between both parties, particularly when noisy or vibration generating activities are planned. Communication with the local community would be maintained as a general basis.
- Provide a community liaison phone number and permanent site contact so that noise complaints can be received and addressed in a timely manner.

5.8 Management of Complaints (Complaints Management Protocol)

Noise and vibration impact may potentially occur in spite of implementation of noise and vibration mitigation measures. In ensuring that all complaints have been addressed in optimum manner, the following complaint management protocol is recommended.

- Record each complaint received, including date and time of complaint, type of complaint, details of individual who made the complaint. These shall be recorded in a Complaints Register.
- Upon receipt of a noise complaint, additional monitoring on top of annual monitoring would be undertaken and reported as soon as possible. If exceedances are detected, the situation would be reviewed in order to identify means to attempt to reduce the impact to acceptable levels.
- Appoint Responsible Authority (e.g. Operations Manager) in addressing the complaints in suitable manner. The responsible person shall ensure implementation of any mitigation measures necessary to address the complaint.
- Once the mitigation measures have been implemented, the associated Complaint Register shall be signed-off by the Responsible Authority.
- When necessary, a copy of the Complaints Register may be provided to NSW OEH or DoP.

5.9 Response to Noise Criteria Exceedance

In following any exceedance to the noise or vibration criteria, the following protocol is recommended:

- Ensure that no error has been made within the recorded monitoring data (contact with the responsible consultant may be required).
- Prepare a corrective action plan, which includes a re-monitoring at the monitoring site where noise compliance criteria exceedance occurred. Should the reassessment result show compliance, then it will be considered a sufficient response.
- During and post implementation of the corrective action plan, the Responsible Authority appointed in Section 5.10 will provide regular consultation with the affected residents or landowners for feedback.

- In the event that exceedance of noise compliance criteria continues to occur, a separate negotiation that results in an agreement between the affected residents/landowners and Council shall be made for compensatory measures.
- A report of any exceedance shall be submitted to NSW OEH or DoP.

5.10 Responsibilities and Accountabilities

All personnel are responsible for implementing the appropriate mitigation measures to minimise and/or control the generation of noise and vibration on site according to the standards described in this monitoring plan. The staff responsible for the noise and vibration monitoring program are outlined in Table 5-2.

Table 5-2 Noise Monitoring Responsibilities

Role	Areas of responsibility in relation to noise and vibration monitoring
General Manager	<ul style="list-style-type: none"> • Ensuring all legal requirements and reporting are met.
Waste Operations Manager	<ul style="list-style-type: none"> • Reporting on all matters of Environmental monitoring. • Overseeing monitoring program training. • Overseeing monitoring program.
Landfill / Quarry Operators	<ul style="list-style-type: none"> • Comply with all reasonable instructions given by the Operations Manager and any other senior manager of the Council. • Advise Operations Manager of any potential noise and vibration generating activities to be conducted on-site and ensuring immediate actions taken to reduce potential impact.
Suitably Qualified Technician	<ul style="list-style-type: none"> • Routine annual noise monitoring at the identified sensitive receptors in Section 2.1. • Process measured monitoring data to the satisfaction of the relevant standards and/or guidelines. • Filling out field sheets • All other monitoring items as required.

6. Conclusion

This noise and vibration monitoring plan has been prepared for Council in relation to the existing Landfill and Quarry in Tharbogang, NSW. The noise and vibration monitoring plan includes the identification of potential sensitive receivers, applicable noise and vibration guidelines and criteria, general mitigation measures, monitoring requirements, and monitoring methodology.

GHD recommends the Tharbogang Landfill and Quarry Noise Monitoring Program be carried out on an annual basis. Should noise or vibration complaint occur, additional noise monitoring or vibration monitoring shall be conducted as detailed in this program.

Following analysis of results, noise and vibration mitigation measures will be established and implemented as required under the Conditions of Approval.

Appendices

Appendix A – Example of noise monitoring field sheet

GHD

Suite 3, Level 1, 161-169 Baylis Street
Wagga Wagga NSW 2650

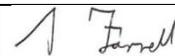
T: 61 2 6923 7400 F: 61 2 6971 9565 E: wgamail@ghd.com.au

© GHD 2013

This document is and shall remain the property of GHD. The document may only be used for the purpose for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form whatsoever is prohibited.

G:\23\14688\WP\74018.docx

Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	S Gunawan T Gribble	V Chavand		S Farrell		30/11/12
1	T Gribble			S Farrell		14/2/2013

www.ghd.com

