



Tarcoola Quarries

Annual Environmental Management Report (AEMR) 2017

April 2018

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- Appendix A - Laboratory reports - dust deposition data
- Appendix B – Monthly extraction reports
- Appendix C – Noise compliance assessment

1. Introduction

1.1 Overview of the site

The Tarcoola quarry (the quarry) is located in the Wagga Wagga Local Government Area, approximately 3.5 km east of the Wagga Wagga CBD (refer Figure 1-1), and is operated by Tarcoola (Wagga Wagga) Pty Ltd. The Murrumbidgee River forms part of the northern boundary of the site and road access to the quarry is via Gillard Road and the Sturt Highway.

A number of residences are located on the periphery of the quarry (mainly to the south) (refer Figure 1-2). One residence (Residence 3) is located on the quarry property.

The quarry has been operating at the current location for 24 years producing a range of aggregates, as well as washed and fill sand. Production has increased in accordance with approved production limits to meet increasing demand for building and construction materials. In 2017 approximately 107,043 tonnes of material was extracted.

A significant underground resource has been identified on the site and it is anticipated that the quarry will operate for a further 20-25 years, depending upon demand for sand and gravel products.

All quarry products and material are transported by truck to local and regional areas.

1.2 Purpose of this report

The purpose of this Annual Environmental Management Report (AEMR) is to provide a summary of the environmental performance, statutory compliance and community relationships associated with the quarry operation during the period 1 January 2017 and 31 December 2017. This is the second AEMR prepared for the quarry.

The AEMR is generally consistent with the format described in the *Environmental Guidelines for Industry – The Annual Environmental Management Report* (NSW DPI, 2006) and has been prepared in accordance with the requirements of Condition 42 of the Development Consent (DA13/0307) issued by the Wagga Wagga City Council (WWCC) which requires that the AEMR:

- Identify the standards and performance measures that apply to the development
- Describe the works carried out in the last 12 months
- Describe the works that will be carried out in the next 12 months
- Include a summary of the complaints received during the past year, and compare this to the complaints received in the previous year
- Include a summary of the monitoring results for the development during the past year
- Include an analysis of these monitoring results against the relevant:
 - Impact assessment criteria/limits
 - Monitoring results from previous years, and
 - Predictions in the EIS
- Identify any trends in the monitoring results over the life of the development
- Identify any non-compliance during the previous year
- Describe what actions were, or are being, taken to ensure compliance

The Development Consent includes the General Terms of Approval (GTA) issued by the NSW Environment Protection Authority (EPA). The GTA were subsequently incorporated into an

Environment Protection Licence (EPL #20543) issued to Tarcoola (Wagga Wagga) Pty Ltd and last revised 2 March 2015.

1.2.1 AEMR distribution

Copies of the AEMR will be submitted to WWCC, and will also be available on the Tarcoola (Wagga Wagga) Pty Ltd (Tarcoola turf) website: <http://tarcoolaturf.com.au/quarry/>

1.3 Scope and limitations

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

GHD otherwise disclaims responsibility to any person other than Tarcoola Quarries 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 Tarcoola Quarries and others who provided information to GHD, 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.

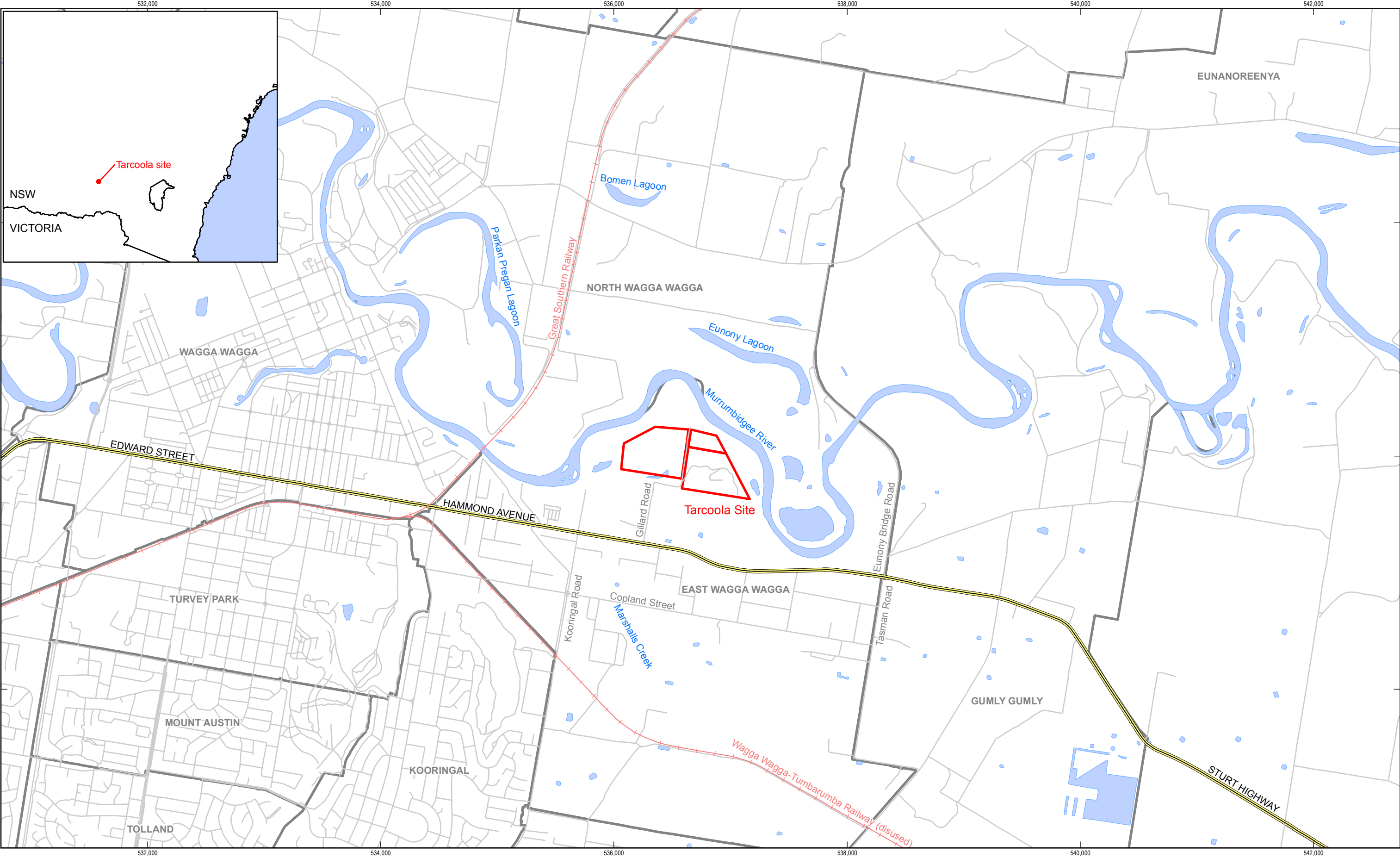
The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

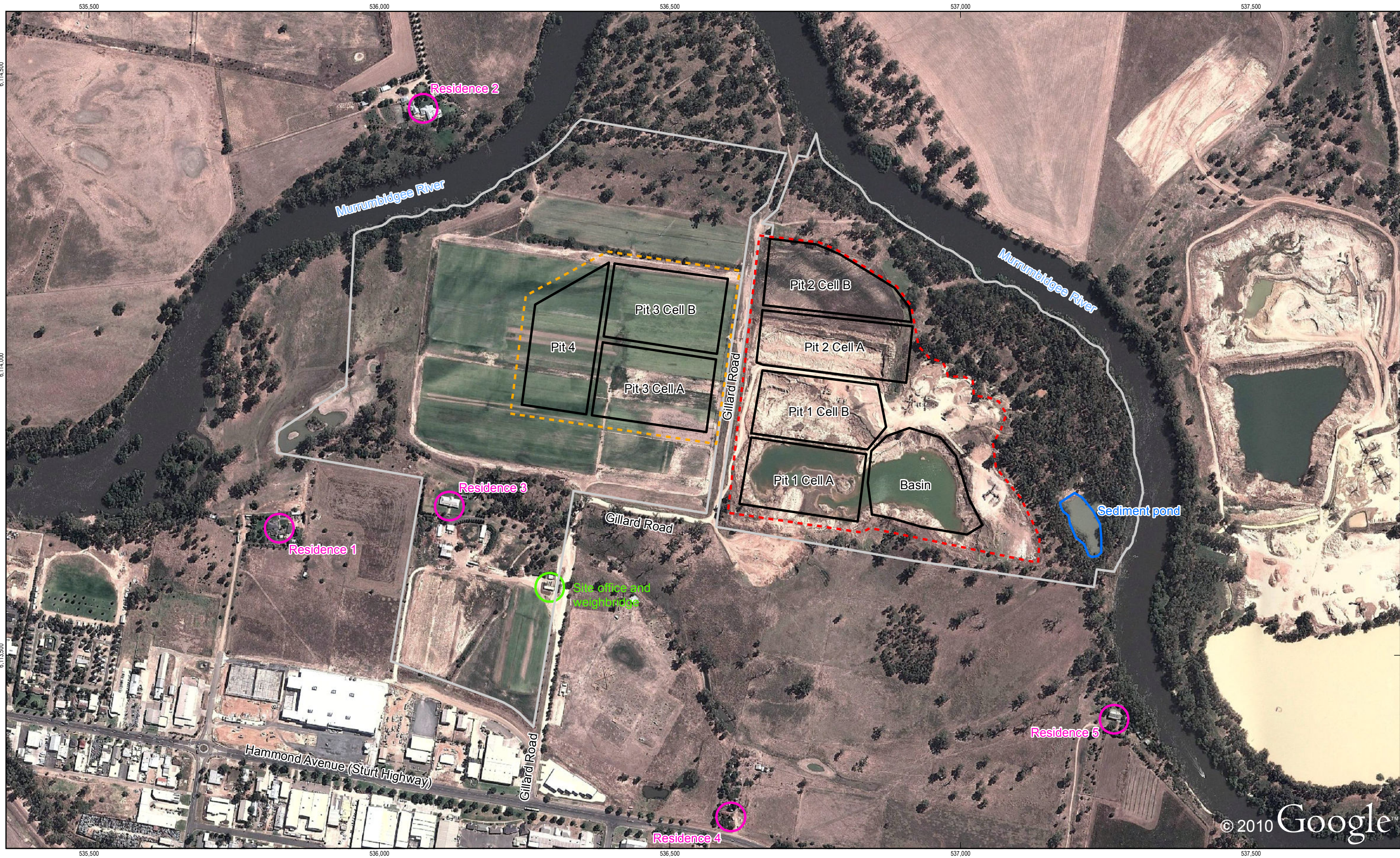
Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

1.4 Quarry contact

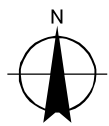
Contact Person	Position Title	Contact Details
Mr Ken Tyson	Quarry owner/manager	Mob: 0417 482 162 Tel: (02) 6921 5403 Email: admin@tarcoolaturf.com.au





Paper size A3
0 50 100 200
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



LEGEND

- Stage 1 boundary
- Stage 2 boundary
- Proposed pit layout
- Sediment pond
- Site office and weighbridge
- Residence
- Property boundary



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Tarcoola Quarries
AEMR

Key site features

Job Number	23-14626
Revision	0
Date	04 Nov 2013

Figure 1-2

G:\23\14626\GIS\Maps\EIS_maps\23-14626_EIS_Fig1-2_20131101.mxd

© 2013. Whilst every care has been taken to prepare this map, GHD, NSW Government and Google make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

Data source: Google: Google Earth aerial imagery - extracted May 2013; NSW Government: Property boundary - 2012. Created by:rtrobinson

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1.1 Regulatory framework

Tarcoola operates in accordance with the compliance requirements of a number of statutory instruments, including development consent (DA292/88), an Environment Protection Licence (EPL 20543) issued by the NSW EPA, and water licences issued by the NSW Department of Primary Industry – Water (NSW DPI Water). Further detail on the development consent, EPL and water licences is provided in the following sections.

1.1.1 Development Approval

The original Development Consent (DA292/88) for the quarry was issued on 23 March 1989. A request for an extension to the quarry was submitted in mid-2013. The quarry was granted Development Consent (DA13/0307) under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) by WWCC on 1 December 2014.

During the 2017 reporting period a Modification Application was lodged with WWCC to alter the approved use and maintenance regime of Gillard Road (refer section 2.5).

In February 2018 WWCC issued amended Development Consent (DA13/0307.01).

1.1.2 Environmental Protection Licence

The quarry operation is subject to compliance requirements associated with a NSW EPA Environmental Protection Licence (EPL 20543) issued under s55 of the *Protection of the Environment Operations Act 1997*. The EPL is issued for the scheduled activity of 'land-based extractive activity' for 100,000 – 500,000 tonnes of extracted, processed or stored material per annum.

1.1.3 Water Access Licences

Tarcoola maintains a number of water access licences (WAL) granted by NSW DPI Water, under the *Water Management Act 2000*. The licences are for the extraction of water from the Murrumbidgee River for use in sand and gravel processing, and also for dewatering of groundwater from the excavations. The water access licences applicable to the quarry operations are listed in Table 1.1. Details of water extraction are provided in section 3.8.

Table 1.1: Tarcoola water access licences

Licence ID	Allocation	Source	Purpose
40AL401316 (WA: 40CA403274)	50 ML	Murrumbidgee Regulated River Water Source	Supply for gravel crushing plant and quarry operations
40AL412769 (WA:40WA412770)	249 ML	Wagga Wagga Alluvial Groundwater Sources	Dewatering groundwater from excavations

1.1.4 Regulatory compliance

The key (operational) compliance requirements associated with the Development Consent and EPL are summarised in Table 1.2 and Table 1.3. Reference is provided to the relevant section of this AEMR, which provides further detail on the environmental management, performance and compliance of the quarry.

Table 1.2: Key compliance requirements – Development Consent

Compliance condition	General compliance requirement (DA13/0307)	Refer AEMR Section
16	Extraction limit 150,000 tonnes / annum. Surveyed evidence of extraction limit	2.1.1
19	Monthly extraction reports	Appendix B
21	Development to be undertaken in accordance with approved plan / staging	2.1.3
27	All chemicals/fuels to be stored 500 mm above the 1:100 ARI level	2.3
28	Loading / unloading to take place within the site	2.1.5
31	Records of extraction quantities and traffic	2.1.5
33	Landscape plan – implemented and maintained	5
34	Access to reserve 71325 to be maintained	4.2
35	Extraction depth limit	2.1
36	No blasting	2.1
37	No receipt or processing of waste or other materials	2.2
38	Noise emissions shall comply with Industrial Noise Policy	3.5
39	No process water to be discharged to Murrumbidgee River, lagoons, drainage lines	3.6
42	Annual Environmental Management Report	This document
43	Notification of exceedances	3.4
44	Independent Environmental Audit	6.4
46	Rehabilitation works	5
47	Air quality monitoring consistent with condition M2.3 (of consent document or M2 of EPL)	3.3
48	Hours of operation	2.1.2

Table 1.3: Key compliance requirements – Environment Protection Licence

Compliance Condition	Compliance requirement (EPL 20543)	Refer AEMR Section
P1.1, O3, M2,	Air quality monitoring, limits and reporting requirements	3.3
P1.2, L3, M6, E1	Noise monitoring, limits, management plan and reporting requirements	3.5
L2	Waste	2.2
O4,	Emergency response	3.9,
O5	Refuelling of plant and equipment	2.3
L4	Hours operation	2.1.2
M4, M5	Complaints	4.1
R1	Reporting	3.1, 3.4

2. Summary of 2017 operations

2.1 Quarry operation

2.1.1 Production

The quarry extraction operations are conducted through a number of stages:

1. Topsoil and overburden removal and stockpiling
2. Free dig extraction of material and stockpiling
3. Screening, crushing, washing and stockpiling of processed material
4. Loading of material for transport (via weighbridge) offsite to clients.

Overburden is progressively stripped in layers and hauled to dedicated areas for levee construction where required. The remaining material is either stockpiled, or used to progressively rehabilitate areas.

Two quarry pits of up to five hectares in area are available for extraction at any time throughout the operations to allow access to either shallow or deeper sand and gravel resources.

In 2017, extraction operations were conducted from Pit 2 cells A and B. Extraction from Pit 1 cells A and B has ceased and rehabilitation activities have commenced, including flattening back batter slopes with overburden.

Extraction of materials has not occurred below 160 m AHD. No blasting has been undertaken.

The amount of material extracted for the period of *January 2017 to November 2017* was 107,043 tonnes. A breakdown of extracted materials by product is presented in Table 2.1.

Table 2.1: Material extracted during 2017

Material	Quantity (tonnes)
Aggregate	31873.25
Fill sand	22609.97
Washed sand	48380.99
Loam	428.16
Other material	3679.6
Total	107043.29
Overburden (relocated on site)	71.32

2.1.2 Hours of operation

The quarry operating hours are:

- 7 am to 6 pm Monday to Friday
- 8 am to 6 pm Saturday

With processing and crushing only occurring between:

- 8 am to 4 pm Monday to Friday
- 8 am to 12 noon Saturday

There were no exceedances of these operating times during the reporting period.

2.1.3 Land disturbance and rehabilitation

Land preparation prior to extraction of material requires planning and implementation of controls associated with dust management, erosion and sediment control, preserving cultural heritage and the stripping and stockpiling of topsoil and overburden.

As a requirement of the development consent, the quarry has developed a Landscape Plan and Progressive Rehabilitation Plan that provides the framework to ensure the land development activities are undertaken in an environmentally appropriate manner (GHD, 2016a and GHD, 2016b).

A total of 12.85 ha is currently disturbed within the operational boundary including the processing area. Approximately 3 ha is undergoing rehabilitation (refer Table 2.2).

Table 2.2: Areas of disturbance and rehabilitation during 2017

Quarry Areas	Proposed Area (ha)	Disturbed (ha)	Rehabilitated (ha)
Stage 1, Pit 1, Cell A	2.32	2.32	1.0
Stage 1, Pit 1, Cell B	2.38	2.38	0.5
Stage 1, Pit 2, Cell A	2.33	2.33	-
Stage 1, Pit 2, Cell B	1.88	0.5	-
Stage 2, Pit 3, Cell A	2.50	Not disturbed	N/A
Stage 2, Pit 3, Cell B	2.53	Not disturbed	N/A
Stage 2, Pit 4	2.48	Not disturbed	N/A
Sediment Basin	2.34	2.34	0.8
Processing	2.98	2.98	0.7
Total		12.85	3.0

2.1.4 Construction

Only minor construction activities were undertaken during 2017, including;

- Installation of a bunded hardstand refuelling area, with additional fuel storage
- Installation of a staff lunch room.

2.1.5 Material processing

Extracted material from the pit is processed through the following facilities:

- Crushing and screening – 5 mm to 20 mm aggregates
- Washing

The processing is undertaken within a laydown area within Stage 1, north of the sediment basin. The material is also stockpiled and loaded for transport off-site at this location.

Once the trucks are loaded they exit the quarry over the weighbridge where the following information is captured:

- Weight (tare and gross)
- Date and time
- Number of truck movements.

2.1.6 Stockpile management

Topsoil and overburden is separately stripped and is used to construct a bund around the periphery of the pit to provide a 10 year ARI level flood protection to the operations. Any excess material will be used in the rehabilitation of the pits being decommissioned in the sequence of operations.

Temporary stockpiles are located away from areas with potential for frequent inundation, while more permanent stockpiles are aligned to flood flows and temporarily stabilised with vegetation.

2.2 Waste management

No waste or other materials have been received or processed at the quarry site during the reporting period.

2.3 Dangerous goods and hazardous material management

Fuel is delivered to site in a fuel tanker. Refuelling of equipment and machinery is undertaken in the designated and bunded refuelling area located near the processing plant.

Spill kits are maintained onsite to ensure any minor spills can be contained and removed.

2.4 Environmental management summary 2017

In 2017, Tarcoola undertook the following environmental monitoring and reporting:

- Air quality (dust) monitoring at 4 residences (refer section 3.3)
- Noise monitoring and compliance assessment at 4 residences (refer section 3.5)
- Dangerous goods and hazardous material management
- Environment Protection Licence #20543 (Annual Return) reporting to the EPA.

The EPL (Condition M6.1) requires noise monitoring to be undertaken on a biennial basis. Noise monitoring at specified residential properties (refer Figure 1-2) was previously undertaken in 2016. Noise monitoring is scheduled for 2018.

2.5 Modification of Development Consent (DA13/0307)

An application to modify the current development consent was lodged with WWCC. The proposed modification was to alter the approved use and maintenance regime of Gillard Road. In February 2018 WWCC issued amended Development Consent (DA13/0307.01), which removes the requirement to Seal Gillard Road and replace with a road maintenance agreement including emulsion treatment.

3. Environmental management, monitoring and performance

3.1 Environmental management plans and programs

Tarcoola have an Environmental Management Strategy (EMS) (GHD, 2016a) which incorporates a range of management plans, including:

- Landscape plan
- Dust management plan and monitoring program
- Transport management plan
- Noise management plan and monitoring program
- Flood management plan and evacuation plan
- Pollution Incident Response Management Plan (PIRMP)
- Stormwater and erosion and sediment control plan
- Soil and water management plan
- Environmental monitoring program

The environmental monitoring program was developed to summarise the quarry's monitoring and reporting requirements and frequency for easy reference.

As this is only the second year of monitoring since the commencement of the quarry extension there is limited information available for comparative analysis or identification of trends.

An Annual Return was submitted to EPA in April 2017 for the period 2 March 2016 to 1 May 2017. The remainder of the reporting period (May 2017 to December 2017) will be covered by the 2018 Annual Return.

3.2 Meteorological summary 2017

A review of the Bureau of Meteorology weather data for 2017 was undertaken noting the monthly rainfall and average predominant wind direction (refer Table 3.1). Weather conditions may affect aspects such as dust, water management and erosion and sediment control. Wind speed and direction will influence dust deposition and the distance in which noise from operation travels.

Table 3.1: Weather observations for Jan – Dec 2017 – Wagga Wagga

Month	Monthly Rainfall (mm)	Predominant wind direction
January	13.8	W – NW
February	18.0	W – SW
March	44.8	W – SW
April	32.4	W – SW
May	20.2	W – SW
June	2.2	W – SW
July	52.6	W – SW
August	50.4	W – SW
September	8.4	W – SW
October	65.4	W – SW
November	37.0	W – SW
December	101.8	W – SW
Total	447	

Source: Bureau of Meteorology (BOM) Wagga Wagga AMO site (072150).

The recorded annual 2017 rainfall (447 mm) is less than the average annual rainfall (572 mm) and median rainfall (575 mm) (<http://www.bom.gov.au/nsw/wagga/climate.shtml>).

3.3 Air quality management

3.3.1 Air quality conditions, standards and performance measures

Operating conditions

The Development Consent Conditions and EPL specify the following conditions:

O2 – Dust

- *O2.1 - Activities occurring at the premises must be carried out in a manner that will minimise emissions of dust from the premises*
- *O2.2 - Trucks entering and leaving the premises that are carrying loads must be covered at all times, except during loading and unloading*
- *O2.3 - All mitigation measures identified in the Environmental Impact Statement for the control of dust must be fully implemented at all times*

Monitoring requirements

The EPL (Condition M2.2) requires quarterly air quality (dust) monitoring in accordance with Table 3.2.

Table 3.2: Air monitoring requirements

Pollutant	Unit of measure	Frequency	Sampling Method
Dust deposition Total suspended particles	g/m ² /month	Quarterly	Australian Standard AS 3580.10.1

Performance criteria

Air quality impact assessment criteria for deposited dust are documented in Table 7.1 of *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (EPA, 2016).

To ensure that the required dust deposition outcomes are achieved, dust emissions from the Tarcoola quarry must meet the criteria in Table 3.3 at all sensitive receivers.

Table 3.3: Assessment criteria for deposited dust

Pollutant	Averaging Period	Criteria
Deposited dust (insoluble solids)	Annual	2 g/m ² /month*

* Maximum increment (increase). Maximum cumulative impact of 4 g/m²/month.

The above criteria are provided as cumulative (incremental plus background) concentration levels.

3.3.2 Monitoring procedures and parameters

The quarry air quality monitoring program is set out in Tarcoola Dust Management and Monitoring Plan (DMMP) (GHD, 2015) (a sub plan within the Tarcoola Environmental Management Strategy (GHD, 2016a)).

The DMMP provides details on performance requirements, the existing quarry environment and sensitive receivers, management practices, monitoring and reporting.

Air quality (dust) monitoring commenced in June 2016, and has continued throughout 2017.

Monitoring is undertaken at 4 private residences (R1, R2, R4 and R5) adjoining the quarry (refer Figure 1-2). Residence R3 is owned by the quarry and is not categorised as a sensitive receivers from a monitoring / reporting perspective.

Monitoring involves the use of dust deposition gauges on stands which have been sampled and analysed in accordance with *AS/NZS 3580.1.1:2016 Methods for sampling and analysis of ambient air – Determination of particulate matter – Deposited matter – Gravimetric method*.

In 2017 dust deposition gauges were sampled on a monthly and then quarterly basis. Monthly monitoring has been re-instated for 2018.

Incremental impact has been calculated / determined by subtracting the gauge with the lowest recorded value (assumed to be the background level) from the values of the remaining gauges.

3.3.3 Air quality monitoring results

Table 3.4 presents the exposure period and sampling days for each sampling event. The measured deposited dust levels for each month as well as the yearly average is presented at each monitoring location in Table 3.5 and Table 3.6.

The guidance criteria has an annual averaging period, which allows for short term or minor exceedances on a month by month basis.

The deposited dust criterion is for insoluble solids, however analysis also includes soluble solids, combustible matter and ash for comparative purposes (refer Appendix A).

Table 3.4: Exposure periods 2017 sampling events

Month	Exposure period	Days
January	23/12/2016 – 23/01/2017	31
February	23/01/2017 – 23/02/2017	31
March	23/02/2017 – 24/03/2017	29
April	24/03/2017 – 21/04/2017	29
May	21/04/2017 – 23/05/2017	32
June	23/05/2017 – 20/06/2017	28
July	20/06/2017 – 20/07/2017	24
August	-	-
September	-	-
October	20/07/2017 – 25/10/2017	35
November	-	-
December	-	-

‘-’ denotes no data obtained during this period.

*Note : Tarcoola Quarries have recommenced a monthly dust monitoring regime from January 2018.

Table 3.5: Summary of dust deposition results for 2017

Location	Parameter	Unit	Month											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Residence 1	Insoluble solids	g/m ²	1.6	1.2	1.6	1.1	14.6	0.1	1.0	-	-	5.2	-	-
	Total matter	g/m ²	2.7	1.2	1.6	1.1	15.3	0.4	1.7	-	-	5.8	-	-
Residence 2	Insoluble solids	g/m ²	1.5	2.4	4.4	1.7	0.7	3.4	0.4	-	-	0.2	-	-
	Total matter	g/m ²	2.6	3.6	6	2.8	0.7	3.7	1.1	-	-	0.8	-	-
Residence 4	Insoluble solids	g/m ²	1.1	1.0	0.1	2.9	3.3	0.1	2.2	-	-	0.1	-	-
	Total matter	g/m ²	1.1	2.2	1.7	4.0	4.0	0.4	2.9	-	-	0.7	-	-
Residence 5	Insoluble solids	g/m ²	0.2	0.1	0.1	6.5	0.7	0.3	0.7	-	-	0.6	-	-
	Total matter	g/m ²	1.3	1.3	1.7	7.6	1.4	0.3	0.7	-	-	0.6	-	-

* Results presented are insoluble solids as defined in AS350.10.1 – 1991 (AM019). Laboratory analytical reports which include all sampled parameters are presented in Appendix A.

* Dust monitoring was carried out on a monthly basis from January to July 2017, and on a quarterly basis from August 2017. This resulted in the last quarterly dust sampling event for the 2017 calendar year taking place in October.

**Results in the table above include outlier events that may include significant short term sources of dust from sources other than the quarry.

Table 3.6: Annual average of deposited dust results from 2017

Parameter	Units	Residence 1	Residence 2	Residence 4	Residence 5
Derived Increment	g/m ²	1.7 (3.3)	1.8	1.4	1.2
Total	g/m ²	2.1 (3.7)	2.7	2.1	1.9

*Site increment was derived by subtracting the monthly background level from the lowest reading of the 4 gauges as defined in the DMMP (GHD, 2015).

**Results from the month of May 2017 have been excluded from the average at Residence 1. Results in this location for May 2017 were over seven times higher than the yearly average and are not considered representative. The result including the anomalous May 2017 figure is presented in ().

Results from the previous year (2016) are provided in Table 3.7 in order to identify any longer term trends. When more years of valid data become available, trends can be identified and datasets graphed. Results show that dust levels at Residence 1 have decreased considerably, possibly due to changes in dust generating activities in the vicinity of the sampling site.

Table 3.7: Annual average of deposited dust results from 2016

Parameter	Units	Residence 1	Residence 2	Residence 4	Residence 5
Derived Increment	g/m ²	4.8	1.2	1.5	1.6
Total	g/m ²	5.7	1.7	2.6	2.0

3.3.4 Air quality results interpretation

The annual average incremental deposited dust levels at all sites was below 2 g/m²/month. The total levels, including the background, were below 4 g/m²/month. Both the incremental and total deposited dust levels comply with the NSW EPA guidance for amenity dust. The guidance criteria has an annual averaging period, which allows for short term or minor exceedances on a month by month basis.

Results in Table 3.5 show some monthly exceedances of the criteria which may have been influenced by a combination of site activities, offsite influences, monthly wind patterns and rainfall.

3.3.5 Comparison with EIS prediction

Section 9, Volume 1 of the EIS (GHD, 2013a) assessed the expected impacts of the quarry expansion on air quality (PM₁₀, TSP and dust deposition). The EPL only requires monitoring and reporting on dust deposition (insoluble solids).

No site specific dust deposition information was available for the EIS. A conservative background deposition level of 2.0 g/m²/month was adopted. The relevant assessment criteria for dust deposition was determined to be 4.0 g/m²/month (the EPA criterion is a maximum cumulative concentration based on background air quality concentrations plus the site criterion).

Dispersion modelling undertaken for the project resulted in the cumulative impacts for the identified sensitive receivers ranging between 2.1 (R5) and 2.76 (R3) g/m²/month (refer Table 3.8).

The measured results (annual average) Table 3.8 are generally consistent with EIS predictions and comply with the relevant criteria.

Table 3.8: Predicted and measured total dust impacts (g/m²/month) at sensitive receivers

Receiver	Averaging period	Predicted Cumulative impact	2017 measured average total deposited dust	Criteria
Residence 1	Annual	2.2	2.1	4
Residence 2	Annual	2.1	2.7	4
Residence 3	Annual	2.8	N/A	4
Residence 4	Annual	2.1	2.1	4
Residence 5	Annual	2.1	1.9	4

3.4 Exceedances and notifications

There were a number of exceedances of the monthly level (an increment of 2 g/m² or the total of 4 g/m²) during the monthly period 1 January 2017 to 31 December 2017. These are as follows:

- Monthly dust limit (4 g/m²/month) for insoluble solids at Site 1 (May 2017) (anomalous data)
- Monthly dust limit (4 g/m²/month) for insoluble solids at Site 1 (October 2017)
- Monthly dust limit (4 g/m²/month) for insoluble solids at Site 2 (March 2017)
- Monthly dust limit (4 g/m²/month) for insoluble solids at Site 5 (April 2017).

The annual average for all sites remained below 4 g/m²/month throughout the year.

The annual average criteria has not been exceeded at any site for 2017.

No notifications were made to WWCC or the EPA.

3.5 Noise Monitoring

3.5.1 Noise conditions, standards and performance measures

The Conditions of Consent and EPL specify the following conditions in relation to noise:

DA Condition 15A

Prior to carrying out any development, the proponent shall engage a suitably qualified acoustic practitioner to measure daytime background L_{A90} levels at each of residences R1, R2, R4 and R5. The background readings shall be taken with no activities occurring at the quarry, including no product deliveries. The daytime L_{Aeq, 15 minute} shall be limited to 5 dB(A) above the measured background or condition L6.1, whichever is the lower.

DA Condition L6 and EPL L3 noise limits

- L6.1 - Noise from the premises must not exceed the sound pressure level (noise) limits presented in the Table below. Note the limits represent the sound pressure level (noise) contribution, at the nominated receiver locations in the table.

Table 3.9: EPL L3 Noise Limits (dB(A))

Noise Assessment Location	Measurement frequency	Day (L _{Aeq} (15 minute))
Residence 1	Continuous	43
Residence 2	Continuous	42
Residence 3	Continuous	43
Residence 4	Continuous	43
Residence 5	Continuous	43

DA Condition M2.2 (from EPA General Terms of Approval)

- An annual noise audit of plant and activities should be implemented to ensure best available economically achievable technologies are used.

3.5.2 Monitoring procedures and parameters

A Noise Management Plan has been developed for the quarry (a sub plan within GHD, 2016a). This plan documents the noise monitoring program for the site, lists the operational and traffic noise management practices to be implemented at the site, and potential responses and corrective actions in the event of a noise complaint.

3.5.3 Noise monitoring results

The EPL requires biennial noise monitoring, however DA Condition M2.2 requires an annual audit of plant noise and activities. Noise monitoring was undertaken in 2016 and 2017. A report summarising the 2017 noise monitoring activities (16 March 2017) and compliance is presented in Appendix C.

3.5.4 Noise results interpretation

A noise audit of the operational plant and equipment was undertaken on 16 March 2017 to determine the source noise levels. The measured equipment noise levels were all found to be lower than the sound power levels of the plant and equipment used in the EIS. A summary of the results can be found in Table 3-2 of the report located in Appendix C.

Compliance noise monitoring was also undertaken on 16 March 2017, using four SVAN 977 sound level meters. A summary of the measured background L_{A90(day)}, ambient noise levels L_{Aeq(day)} at each receiver location is provided in Table 3.10 below. The worst-case measured 15 minute period has also been provided.

Table 3.10 Measured noise levels, dB(A)

ID	Address	Background level L _{A90(day)}	Ambient level L _{Aeq(day)}	Worst case L _{Aeq(15 minute)}
R1	45 Koorringal Road	40	46	53
R2	80 Hinkler Street	43	49	50
R4	213 – 215 Hammond Avenue	47	53	56
R5	273 Hammond Avenue	41	50	59

The primary noise contribution at all measured locations was due to other noise sources. The quarry contribution to the ambient noise level has been modelled to determine whether operation of the quarry complies with the noise limits provided in L6.1 of the EPL, and results can be found below in Table 3.11. Modelling was completed using SoundPLAN Version 7.4 and utilised the worst case data.

Table 3.11 Quarry noise level contribution, dB(A)

ID	Address	Noise limit	Quarry Contribution L _{Aeq} (15 minute)
R1	45 Koorringal Road	43	31
R2	80 Hinkler Street	42	35
R4	213 – 215 Hammond Avenue	43	35
R5	273 Hammond Avenue	43	37

The predicted quarry noise level contribution to the ambient noise environment at all noise monitoring locations were compliant with the noise limits specified by the EPL.

Predicted quarry noise levels (based on a revised footprint and a 2.5 m high noise mound) were presented in section 3 of the EIS Supplementary Report (GHD, 2013b) and are presented in Table 3.12.

Table 3.12: Predicted and measured quarry noise levels (L_{Aeq}(15 min) dB(A)

Receiver	Predicted noise level	Modelled contribution based on site measurement	Noise Criteria
Residence 1	39	31	43
Residence 2	42	35	42
Residence 3	48	- *	- *
Residence 4	41	35	43
Residence 5	37	37	43

*R3 is the house of the quarry owner

3.5.5 Comparison of monitoring results against EIS predictions

Plant and equipment noise levels were measured to determine source noise levels and were found to be below the levels specified within the EIS. The measured noise levels were used to calculate the quarry noise contribution at each noise monitoring location provided in the EPL.

Noise level contributions from the quarry at the four identified sensitive receiver locations were compliant with the limits specified in the EPL. The dominant noise sources at each residence were due to a combination of road traffic and wildlife noise.

3.6 Surface water management and monitoring

The Consent Conditions and EPL do not require routine monitoring or reporting on surface water quality.

Surface water runoff is managed on site through erosion and sediment controls and a sediment basin.

No process water is discharged to the Murrumbidgee River.

3.7 Erosion and sediment management

Sediment trapped behind any sediment fences must be regularly cleaned out and stockpiled in an appropriate area. Special consideration and controls will be made to areas where there is a potential for sediment to migrate off the site for example at the base of any notable erosion.

Permanent stockpiles are aligned to flood flow and temporarily stabilised with vegetation to prevent erosion.

3.8 Water extraction

Water Access Licence allocation details are provided in section 1.1.3.

Groundwater may be extracted for dewatering purposes in accordance with the requirements of water licence 40AL412769 (WA:40WA412770).

A water meter was installed in 2016 to measure the amount of groundwater extracted during operations. Tarcoola has an allocation of 249 ML per year.

Between 1 July 2016 and 30 June 2017, 117 ML was extracted.

Between 1 July 2017 and 30 January 2018 136 ML was extracted.

Surface Water may be extracted from the Murrumbidgee Regulated River Water Source for the supply of gravel crushing plant and quarry operations, in accordance with licence 40AL401316. Tarcoola has an allocation of 50 ML per year.

Between 1 July 2017 and 10 April 2018, 17 ML was extracted.

3.9 Incident management and response

A Pollution Incident Response Management Plan (PIRMP) was developed for the quarry during 2017.

4. Community relations

4.1 Environmental complaints

Tarcoola maintains a 24-hour telephone complaints line which is advertised on their website. Any complaints received are documented in a register where the following information is noted:

- Complainant name and contact details
- Nature of the complaint
- Date of the complaint
- Specifics of the complaint
- Outcome of the investigation of the complaint
- Actions implement to resolve the complaint
- Details of reporting if required.

No public complaints were received during the reporting period (refer Table 4.1).

Table 4.1: Complaints history and nature of complaint

Year	Air	Water	Noise	Other	Total
2017	0	0	0	0	0
2016	0	0	0	0	0

4.2 Public access to Reserve 71325

Unobstructed public access to Reserve 71325 has been maintained during the reporting period.

5. Rehabilitation activities

A progressive rehabilitation plan has been developed for the quarry (GHD, 2016b).

Rehabilitation of Pit 1, cells A and B has commenced with batters being flattened back with the aid of overburden material.

No other rehabilitation activities were undertaken during the reporting period.

Landscaping activities have included targeted weed spraying.

6. Activities proposed for 2018

6.1 Extraction

Extraction activities are proposed to continue in Pit 2 cells A and B during 2018.

6.2 Rehabilitation

Progressive rehabilitation of Pit 1 cells A, B and the sediment basin is proposed to be undertaken in 2018.

6.3 Noise monitoring

An annual noise audit of plant and activities (Condition M2.2, DA 13/0307) will be undertaken in 2018.

6.4 Independent environmental audit

Consent Condition 44 requires that an independent environmental audit is undertaken within 3 years of the date of development consent (by 28 January 2018) and every 5 years thereafter.

The audit is scheduled for late April / May 2018.

6.5 Testing of PIRMP

The PIRMP will be reviewed and tested to confirm that it is up to date and remains relevant to site operations and activities.

7. References

AS/NZS 3580.1.1:2016 *Methods for sampling and analysis of ambient air – Determination of particulate matter – Deposited matter – Gravimetric method.*

EPA (2016) *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*, NSW Environment Protection Authority, November 2016 (revision).

Development Application (2014), DA 13/0307, Date of Determination 1/12/2014. City of Wagga Wagga

Environment Protection Licence (2015), EPL #20543, EPA

GHD (2013a) *Tarcoola Turf and Quarries Extension of Tarcoola Quarry Environmental Impact Statement* Volume 1 and 2, June 2013. GHD doc reference 23/14626/WP/69413

GHD (2013b) *Tarcoola Turf and Quarries Extension of Tarcoola Quarry Environmental Impact Statement – Supplementary Report*, November 2013. GHD doc reference 23/14626/WP/195151

GHD (2016a) *Tarcoola Quarries Environmental Management Strategy*. September 2016. GHD doc reference 23/156471/WP/75167

GHD, (2016b), Rehabilitation plan

NSW DPI (2006) *Environmental Guidelines for Industry – The Annual Environmental Management Report*. NSW DPI – Mineral Resources v3 January 2006

Appendices

Appendix A - Laboratory reports - dust deposition data

GHD

Monday, January 30, 2017

Suite 3, Level 1 161-169 Baylis Street

Wagga Wagga NSW 2650

Attention: Nathan Szymanski



NATA Accredited Laboratory
Number: 9597

Accredited for compliance with
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LABORATORY ANALYSIS REPORT

Report Number: 1701-0112

Page 1 of 2

For all enquiries related to this report please quote document number: 1701-0112

Facility:	Order #	
Sample Type	Collected By	Date Received
Air Particulates	A Williams	23-January-2017

EAL ID	Client ID. Date/Time sample taken	Test	Result (units)	Method Reference	Limit of Reporting
17Jan-0355	Tarcoola Turf Site 1 23.12.16 to 23.01.17	Deposited Matter - Ash	1.4 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	1.3 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	2.7 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Soluble Solids	3.6 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	6.3 g/m2/month	AS 3580.10.1:2003	0.2
17Jan-0356	Tarcoola Turf Site 2 23.12.16 to 23.01.17	Deposited Matter - Ash	2.3 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	0.3 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	2.6 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Soluble Solids	0.5 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	3.1 g/m2/month	AS 3580.10.1:2003	0.2
17Jan-0357	Tarcoola Turf Site 4 23.12.16 to 23.01.17	Deposited Matter - Ash	0.7 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	0.4 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	1.1 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Soluble Solids	0.9 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	2.0 g/m2/month	AS 3580.10.1:2003	0.2
17Jan-0358	Tarcoola Turf Site 5 23.12.16 to 23.01.17	Deposited Matter - Ash	0.7 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	0.6 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	1.3 g/m2/month	AS 3580.10.1:2003	0.2

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Monday, January 30, 2017

Suite 3, Level 1 161-169 Baylis Street

Wagga Wagga NSW 2650

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LABORATORY ANALYSIS REPORT

Report Number: 1701-0112

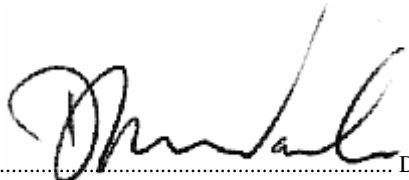
Page 2 of 2

For all enquiries related to this report please quote document number: 1701-0112

<u>Facility:</u>		<u>Order #</u>			
<u>Sample Type</u>		<u>Collected By</u>		<u>Date Received</u>	
Air Particulates		A Williams		23-January-2017	
<u>EAL ID</u>	<u>Client ID.</u> Date/Time sample taken	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
17Jan-0358	Tarcoola Turf Site 5 23.12.16 to 23.01.17				
		Deposited Matter - Soluble Solids	1.2 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	2.5 g/m2/month	AS 3580.10.1:2003	0.2

Note:

* NATA Accreditation does not cover the performance of this service.

Signed..... David Wade, Laboratory Manager.

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Tuesday, February 28, 2017

Suite 3, Level 1 161-169 Baylis Street

Wagga Wagga NSW 2650

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LABORATORY ANALYSIS REPORT

Report Number: 1702-0125

Page 1 of 2

For all enquiries related to this report please quote document number: 1702-0125

Facility:	Order #	
Sample Type	Collected By	Date Received
Air Particulates	A Williams	23-February-2017

EAL ID	Client ID. Date/Time sample taken	Test	Result (units)	Method Reference	Limit of Reporting
17Feb-0470	Tarcoola Site 1 23.01.17 to 23.02.17	Deposited Matter - Ash	0.9 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	0.3 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	1.2 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Soluble Solids	0.7 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	1.8 g/m2/month	AS 3580.10.1:2003	0.2
17Feb-0471	Tarcoola Site 2 23.01.17 to 23.02.17	Deposited Matter - Ash	3.0 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	0.6 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	3.6 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Soluble Solids	0.9 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	4.5 g/m2/month	AS 3580.10.1:2003	0.2
17Feb-0472	Tarcoola Site 4 23.01.17 to 23.02.17	Deposited Matter - Ash	1.8 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	0.4 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	2.2 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Soluble Solids	0.8 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	3.0 g/m2/month	AS 3580.10.1:2003	0.2
17Feb-0473	Tarcoola Site 5 23.01.17 to 23.02.17	Deposited Matter - Ash	0.9 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	0.3 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	1.3 g/m2/month	AS 3580.10.1:2003	0.2

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Tuesday, February 28, 2017

Suite 3, Level 1 161-169 Baylis Street

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LABORATORY ANALYSIS REPORT

Report Number: 1702-0125

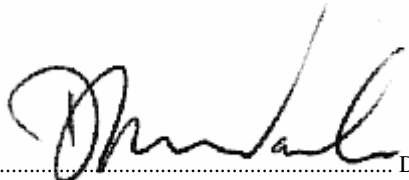
Page 2 of 2

For all enquiries related to this report please quote document number: 1702-0125

<u>Facility:</u>		<u>Order #</u>		<u>Date Received</u>	
<u>Sample Type</u>		<u>Collected By</u>			
Air Particulates		A Williams		23-February-2017	
<u>EAL ID</u>	<u>Client ID.</u> Date/Time sample taken	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
17Feb-0473	Tarcoola Site 5 23.01.17 to 23.02.17				
		Deposited Matter - Soluble Solids	1.0 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	2.2 g/m2/month	AS 3580.10.1:2003	0.2

Note:

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Signed  David Wade, Laboratory Manager.

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Wednesday, March 29, 2017

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LABORATORY ANALYSIS REPORT

Report Number: 1703-0144

Page 1 of 2

For all enquiries related to this report please quote document number: 1703-0144

Facility:	Order #	
Sample Type	Collected By	Date Received
Water	A Williams	24-March-2017

EAL ID	Client ID. Date/Time sample taken	Test	Result (units)	Method Reference	Limit of Reporting
17Mar-0454	Tarcoola Site 1 23.02.17 to 24.03.17	Deposited Matter - Ash	1.4 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	<0.2 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	1.6 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Soluble Solids	0.4 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	2.0 g/m2/month	AS 3580.10.1:2003	0.2
17Mar-0455	Tarcoola Site 2 23.02.17 to 24.03.17	Deposited Matter - Ash	5.4 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	0.6 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	6.0 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Soluble Solids	5.8 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	11.8 g/m2/month	AS 3580.10.1:2003	0.2
17Mar-0456	Tarcoola Site 4 23.02.17 to 24.03.17	Deposited Matter - Ash	1.5 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	<0.2 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	1.7 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Soluble Solids	0.4 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	2.1 g/m2/month	AS 3580.10.1:2003	0.2
17Mar-0457	Tarcoola Site 5 23.02.17 to 24.03.17	Deposited Matter - Ash	1.3 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	0.4 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	1.7 g/m2/month	AS 3580.10.1:2003	0.2

GHD

Wednesday, March 29, 2017

Suite 3, Level 1 161-169 Baylis Street

Wagga Wagga NSW 2650

Attention: Nathan Szymanski

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LABORATORY ANALYSIS REPORT

Report Number: 1703-0144

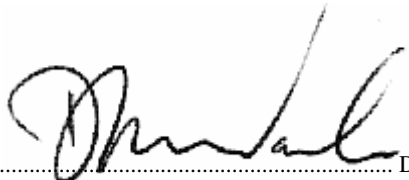
Page 2 of 2

For all enquiries related to this report please quote document number: 1703-0144

<u>Facility:</u>		<u>Order #</u>			
<u>Sample Type</u>		<u>Collected By</u>		<u>Date Received</u>	
Water		A Williams		24-March-2017	
<u>EAL ID</u>	<u>Client ID.</u> Date/Time sample taken	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
17Mar-0457	Tarcoola Site 5 23.02.17 to 24.03.17				
		Deposited Matter - Soluble Solids	0.8 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	2.5 g/m2/month	AS 3580.10.1:2003	0.2

Note:

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Signed  David Wade, Laboratory Manager.

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Thursday, April 27, 2017

Suite 3, Level 1 161-169 Baylis Street

Wagga Wagga NSW 2650

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NATA Accredited Laboratory
Number: 9597

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ISO/IEC 17025 - Testing

LABORATORY ANALYSIS REPORT

Report Number: 1704-0086

Page 1 of 2

For all enquiries related to this report please quote document number: 1704-0086

Facility:	Order #	
Sample Type	Collected By	Date Received
Air Particulates	A. Williams	21-April-2017

EAL ID	Client ID. Date/Time sample taken	Test	Result (units)	Method Reference	Limit of Reporting
17Apr-0252	Tarcoola Site 1 23.03.17 - 21.04.17	Deposited Matter - Ash	1.0 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	<0.2 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	1.1 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Soluble Solids	0.6 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	1.7 g/m2/month	AS 3580.10.1:2003	0.2
17Apr-0253	Tarcoola Site 2 23.03.17 - 21.04.17	Deposited Matter - Ash	2.5 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	0.3 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	2.8 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Soluble Solids	0.6 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	3.4 g/m2/month	AS 3580.10.1:2003	0.2
17Apr-0254	Tarcoola Site 4 23.03.17 - 21.04.17	Deposited Matter - Ash	1.8 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	2.2 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	4.0 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Soluble Solids	5.5 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	9.5 g/m2/month	AS 3580.10.1:2003	0.2
17Apr-0255	Tarcoola Site 5 23.03.17 - 21.04.17	Deposited Matter - Ash	6.3 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	1.3 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	7.6 g/m2/month	AS 3580.10.1:2003	0.2

GHD

Thursday, April 27, 2017

Suite 3, Level 1 161-169 Baylis Street

Wagga Wagga NSW 2650

Attention: Nathan Szymanski

NATA Accredited Laboratory
Number: 9597Accredited for compliance with
ISO/IEC 17025 - Testing

LABORATORY ANALYSIS REPORT

Report Number: 1704-0086

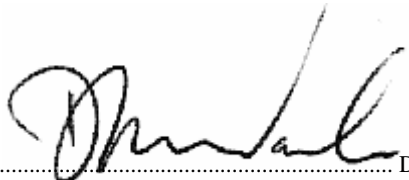
Page 2 of 2

For all enquiries related to this report please quote document number: 1704-0086

<u>Facility:</u>		<u>Order #</u>			
<u>Sample Type</u>		<u>Collected By</u>		<u>Date Received</u>	
Air Particulates		A. Williams		21-April-2017	
<u>EAL ID</u>	<u>Client ID.</u> Date/Time sample taken	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
17Apr-0255	Tarcoola Site 5 23.03.17 - 21.04.17	Deposited Matter - Soluble Solids	1.0 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	8.5 g/m2/month	AS 3580.10.1:2003	0.2

Note:

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Signed  David Wade, Laboratory Manager.

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Thursday, June 1, 2017

Suite 3, Level 1 161-169 Baylis Street

Wagga Wagga NSW 2650

Attention: Nathan Szymanski



NATA Accredited Laboratory
Number: 9597

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LABORATORY ANALYSIS REPORT

Report Number: 1705-0109

Page 1 of 2

For all enquiries related to this report please quote document number: 1705-0109

Facility:	Order #	
Sample Type	Collected By	Date Received
Air Particulates	Client	23-May-2017

EAL ID	Client ID. Date/Time sample taken	Test	Result (units)	Method Reference	Limit of Reporting
17May-0383	Tarcoola Site 1 21.04.17 to 23.05.17	Deposited Matter - Ash	2.0 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	13.3 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	15.3 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Soluble Solids	2.3 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	17.6 g/m2/month	AS 3580.10.1:2003	0.2
17May-0384	Tarcoola Site 2 21.04.17 to 23.05.17	Deposited Matter - Ash	0.6 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	<0.2 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	0.7 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Soluble Solids	<0.2 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	0.8 g/m2/month	AS 3580.10.1:2003	0.2
17May-0385	Tarcoola Site 4 21.04.17 to 23.05.17	Deposited Matter - Ash	1.2 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	2.8 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	4.0 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Soluble Solids	<0.2 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	4.1 g/m2/month	AS 3580.10.1:2003	0.2
17May-0386	Tarcoola Site 5 21.04.17 to 23.05.17	Deposited Matter - Ash	1.1 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	0.3 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	1.4 g/m2/month	AS 3580.10.1:2003	0.2

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Thursday, June 1, 2017

Suite 3, Level 1 161-169 Baylis Street

Wagga Wagga NSW 2650

Attention: Nathan Szymanski

NATA Accredited Laboratory
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LABORATORY ANALYSIS REPORT

Report Number: 1705-0109

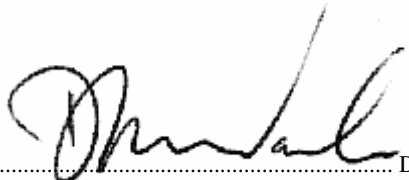
Page 2 of 2

For all enquiries related to this report please quote document number: 1705-0109

<u>Facility:</u>		<u>Order #</u>			
<u>Sample Type</u>		<u>Collected By</u>		<u>Date Received</u>	
Air Particulates		Client		23-May-2017	
<u>EAL ID</u>	<u>Client ID.</u> Date/Time sample taken	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
17May-0386	Tarcoola Site 5 21.04.17 to 23.05.17	Deposited Matter - Soluble Solids	<0.2 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	1.4 g/m2/month	AS 3580.10.1:2003	0.2

Note:

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Signed  David Wade, Laboratory Manager.

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Monday, June 26, 2017

Suite 3, Level 1 161-169 Baylis Street

Wagga Wagga NSW 2650

Attention: Nathan Szymanski



NATA Accredited Laboratory
Number: 9597

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LABORATORY ANALYSIS REPORT

Report Number: 1706-0061

Page 1 of 2

For all enquiries related to this report please quote document number: 1706-0061

Facility:	Order #	
Sample Type	Collected By	Date Received
Air Particulates	Belinda Fourie	20-June-2017

EAL ID	Client ID. Date/Time sample taken	Test	Result (units)	Method Reference	Limit of Reporting
17Jun-0144	Tarcoola 1 23.05.17 to 20.06.17	Deposited Matter - Ash	0.3 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	<0.2 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	0.4 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Soluble Solids	0.4 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	0.8 g/m2/month	AS 3580.10.1:2003	0.2
17Jun-0145	Tarcoola 2 23.05.17 to 20.06.17	Deposited Matter - Ash	3.0 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	0.8 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	3.7 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Soluble Solids	0.5 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	4.2 g/m2/month	AS 3580.10.1:2003	0.2
17Jun-0146	Tarcoola 4 23.05.17 to 20.06.17	Deposited Matter - Ash	0.3 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	<0.2 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	0.4 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Soluble Solids	<0.2 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	0.4 g/m2/month	AS 3580.10.1:2003	0.2
17Jun-0147	Tarcoola 5 23.05.17 to 20.06.17	Deposited Matter - Ash	0.2 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	<0.2 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	0.3 g/m2/month	AS 3580.10.1:2003	0.2

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Monday, June 26, 2017

Suite 3, Level 1 161-169 Baylis Street

Wagga Wagga NSW 2650

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LABORATORY ANALYSIS REPORT

Report Number: 1706-0061

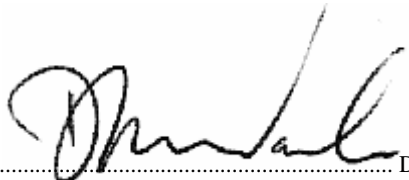
Page 2 of 2

For all enquiries related to this report please quote document number: 1706-0061

<u>Facility:</u>		<u>Order #</u>			
<u>Sample Type</u>		<u>Collected By</u>		<u>Date Received</u>	
Air Particulates		Belinda Fourie		20-June-2017	
<u>EAL ID</u>	<u>Client ID.</u> Date/Time sample taken	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
17Jun-0147	Tarcoola 5 23.05.17 to 20.06.17				
		Deposited Matter - Soluble Solids	0.8 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	1.1 g/m2/month	AS 3580.10.1:2003	0.2

Note:

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Signed..... David Wade, Laboratory Manager.

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Friday, July 28, 2017

Suite 3, Level 1 161-169 Baylis Street

Wagga Wagga NSW 2650

Attention: Nathan Szymanski



NATA Accredited Laboratory
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LABORATORY ANALYSIS REPORT

Report Number: 1707-0073

Page 1 of 2

For all enquiries related to this report please quote document number: 1707-0073

Facility:	Order #	
Sample Type	Collected By	Date Received
Air Particulates	A. Williams	20-July-2017

EAL ID	Client ID. Date/Time sample taken	Test	Result (units)	Method Reference	Limit of Reporting
17Jul-0208	Tarcoola #1 20.06.17 - 20.07.17	Deposited Matter - Ash	0.8 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	1.0 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	1.7 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Soluble Solids	1.4 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	3.2 g/m2/month	AS 3580.10.1:2003	0.2
17Jul-0209	Tarcoola #2 20.06.17 - 20.07.17	Deposited Matter - Ash	0.8 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	0.3 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	1.1 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Soluble Solids	0.3 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	1.4 g/m2/month	AS 3580.10.1:2003	0.2
17Jul-0210	Tarcoola #4 20.06.17 - 20.07.17	Deposited Matter - Ash	1.7 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	1.2 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	2.9 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Soluble Solids	2.7 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	5.6 g/m2/month	AS 3580.10.1:2003	0.2
17Jul-0211	Tarcoola #5 20.06.17 - 20.07.17	Deposited Matter - Ash	0.5 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	0.2 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	0.7 g/m2/month	AS 3580.10.1:2003	0.2

GHD

Friday, July 28, 2017

Suite 3, Level 1 161-169 Baylis Street

Wagga Wagga NSW 2650

Attention: Nathan Szymanski

NATA Accredited Laboratory
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LABORATORY ANALYSIS REPORT

Report Number: 1707-0073

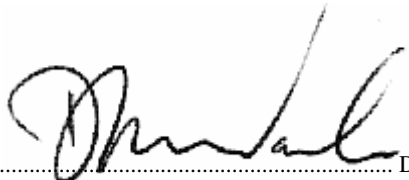
Page 2 of 2

For all enquiries related to this report please quote document number: 1707-0073

<u>Facility:</u>		<u>Order #</u>			
<u>Sample Type</u>		<u>Collected By</u>		<u>Date Received</u>	
Air Particulates		A. Williams		20-July-2017	
<u>EAL ID</u>	<u>Client ID.</u> Date/Time sample taken	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
17Jul-0211	Tarcoola #5 20.06.17 - 20.07.17				
		Deposited Matter - Soluble Solids	<0.2 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	0.8 g/m2/month	AS 3580.10.1:2003	0.2

Note:

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Signed  David Wade, Laboratory Manager.

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Wednesday, March 7, 2018

Suite 3, Level 1 161-169 Baylis Street

Wagga Wagga NSW 2650

Attention: Nathan Szymanski



NATA Accredited Laboratory
Number: 9597

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REPLACEMENT LABORATORY ANALYSIS REPORT

This Report Replaces Report Sent on

Report Number: 1710-0121

Page 1 of 2

For all enquiries related to this report please quote document number: 1710-0121

Facility:	Order #	
Sample Type	Collected By	Date Received
Air Particulates	A Williams	25-October-2017

EAL ID	Client ID. Date/Time sample taken	Test	Result (units)	Method Reference	Limit of Reporting
17Oct-0341	Tarcoola Turf #1 20.07.17 to 25.10.17				
		Deposited Matter - Ash	2.9 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	3.0 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	5.8 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Soluble Solids	18.1 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	23.9 g/m2/month	AS 3580.10.1:2003	0.2
17Oct-0342	Tarcoola Turf #2 20.07.17 to 25.10.17				
		Deposited Matter - Ash	0.6 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	<0.2 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	0.8 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Soluble Solids	0.4 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	1.2 g/m2/month	AS 3580.10.1:2003	0.2
17Oct-0343	Tarcoola Turf #4 20.07.17 to 25.10.17				
		Deposited Matter - Ash	0.6 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	<0.2 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	0.7 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Soluble Solids	3.3 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	4.0 g/m2/month	AS 3580.10.1:2003	0.2
17Oct-0344	Tarcoola Turf #5 20.07.17 to 25.10.17				
		Deposited Matter - Ash	0.4 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Combustible Matter	<0.2 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Insoluble Solids	0.6 g/m2/month	AS 3580.10.1:2003	0.2

GHD

Wednesday, March 7, 2018

Suite 3, Level 1 161-169 Baylis Street

Wagga Wagga NSW 2650

Attention: Nathan Szymanski

NATA Accredited Laboratory
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REPLACEMENT LABORATORY ANALYSIS REPORT

This Report Replaces Report Sent on

Report Number: 1710-0121

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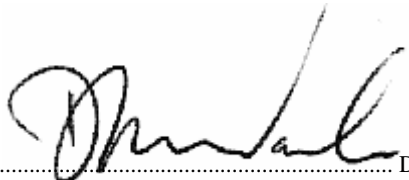
For all enquiries related to this report please quote document number: 1710-0121

<u>Facility:</u>	<u>Order #</u>	<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>
Air Particulates	A Williams			25-October-2017

<u>EAL ID</u>	<u>Client ID.</u> Date/Time sample taken	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
17Oct-0344	Tarcoola Turf #5 20.07.17 to 25.10.17	Deposited Matter - Soluble Solids	0.4 g/m2/month	AS 3580.10.1:2003	0.2
		Deposited Matter - Total Matter	1.0 g/m2/month	AS 3580.10.1:2003	0.2

Note:

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Signed..... David Wade, Laboratory Manager.

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Appendix B – Monthly extraction reports

Tarcoola Quarries
Hammond Avenue
WAGGA WAGGA NSW 2650

Extraction Report [Item Multi-Period]

July 2017 To March 2018

(All Amounts in Tonnes)

Item Name	July	August	September	October	November	December	January	February	March	Total
10/14mm AG	1435.45	1503.32	1563.7	1332.1	2262.47	1009.06	1145.5	1648.04	1714.4	13615.05
20mm AG	865.92	1022.42	955.54	973.7	1147.27	747.6	752.15	1188.54	1126.48	8791.62
7mm AG	239.26	181.34	130.66	218.2	100.72	367.46	255.56	356.53	225.03	2094.86
Concrete Mix	0	12.3	0	0	0	0	0	0	0	12.3
Delivery	0	0	0	0	0	0	0	0	0	20.68
FILL SAND	1465.22	1867.66	2169.52	1221.62	1570.42	1233.18	1636.22	2155.54	2028.77	15348.25
GRIT 7mm	178.66	348.24	304.06	258.38	291.34	253.82	232.62	147.76	211.7	2226.58
OVERBURDEN	0	0	0	0	0	0	1065.04	2803.2	3868.24	7736.48
Oversized AG	3.3	0	30.02	0	0	33.28	21.04	1.04	87.7	176.38
Recycled concrete	0	25.1	0	0	0	0	0	0	0	25.1
Washed Sand	3445.68	3845.85	3834.13	4172.78	4913.02	2943.98	2957.23	5094.35	4157.95	35565.99
Screened Loam	28.96	92.74	10.46	36.26	18.46	0	0	0	20.63	207.56
Total (Month):	7665.46	8898.95	9009.09	8213.04	10303.7	6608.38	8065.36	13395.15	13461.59	85620.85

Taroola Quarries
Hammond Avenue
WAGGA WAGGA NSW 2650

Extraction Report [Multi-Period]

July 2016 To June 2017

(All Amounts in Tonnes)

	14MM AG	20MM AG	7MM AG	CONCM	FILL SAND	GRIT 7MM	O/BURDEN	OVERSIZE AG	W/SAND	SCR LOAM	UNSCR LOAM	TOTAL
JULY 2016	1334.74	952.04	137.70		1705.37	209.64	11.76	165.30	4554.18			9,070.73
AUGUST	1567.92	1023.34	138.20	12.74	2170.50	294.66		53.04	5801.55			11,061.95
SEPTEMBER	1436.97	889.94	262.04		1706.44	514.32		63.72	4700.56			9,573.99
OCTOBER	1443.80	1014.00	294.60		893.78	612.48		1.24	4591.43	2.68	24.64	8,878.65
NOVEMBER	1637.38	970.24	249.42		3791.52	228.08			6392.66		11.74	13,261.04
DECEMBER	1325.56	922.96	206.94		1803.56	400.60		3.48	3471.99	76.53	67.36	8,278.88
JANUARY 2017	1115.10	632.49	45.14	38.06	1621.80	348.83	63.18		2468.78	23.48		6,376.86
FEBRUARY	1629.96	995.18	258.52		2070.52	203.60		48.30	5908.46	27.18		11,141.72
MARCH	1650.04	1058.58	158.92		2318.76	397.14		3.08	4583.92	27.86		10,198.30
APRIL	1107.64	585.66	70.14		2216.46	205.01	8.14	4.30	3075.52	86.60		7,369.47
MAY	1782.78	1234.14	235.04	1.50	2429.18	569.66		13.88	3977.38	61.90		10,305.46
JUNE 2017	1778.12	1055.10	189.48		2425.63	243.90		65.86	5190.48	14.26		10,962.83
Totals =	17810.01	11333.67	2246.04	52.30	25153.52	4227.92	83.08	422.20	54736.91	320.49	103.74	116,489.88

Appendix C – Noise compliance assessment



Tarcoola Quarry

Tarcoola Quarry Annual Compliance Noise compliance monitoring

March 2017

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1. Introduction

1.1 Overview

GHD was engaged by Tarcoola (Wagga Wagga) Pty Ltd to undertake biennial compliance noise monitoring to satisfy the environmental protection licence (EPL), number 20543, issued by the Environmental Protection Authority (EPA).

Compliance noise monitoring was undertaken at the four receiver locations identified in the EPL and source noise levels were measured at Tarcoola quarry.

This compliance noise assessment provides a summary of the levels measured at the residential locations and at the quarry.

1.2 Scope

The scope for the compliance noise assessment follows:

- Undertake a noise audit of the operational equipment to determine the source noise levels
- Conduct compliance noise monitoring at four residential receivers
- Comparison of the measured noise levels with the criteria specified in the EPL
- Preparation of a report summarising the findings.

1.3 Limitations

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

GHD otherwise disclaims responsibility to any person other than Tarcoola Quarry 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.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

2. EPL conditions

The noise limits provided under Condition L3 of the EPL are:

- L3.1 Noise generated at the premises that is measured at each noise monitoring point established under this licence must not exceed the noise levels specified in Column 4 of the table below for that point during the corresponding time periods specified in Column 1 when measured using the corresponding measurement parameters listed in Column 2.*

Point 1, 3, 4, 5			
Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	L _{Aeq} (15 minute)	Continuous	43

Point 2			
Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	L _{Aeq} (15 minute)	Continuous	42

- L3.2 The noise limits set out in L3.1 apply under meteorological conditions of:*
 - Wind speeds up to 3 metres/second at 10 metres above ground level; or*
 - Temperature inversion conditions of up to 3°C/100m and wind speeds up to 2 metres/second at 10 metres above ground.*
- L3.3 To determine compliance:*
 - with the L_{Aeq}(15 minute) noise limits in the Noise Limits table, the noise measurement equipment must be located:*
 - i) approximately on the property boundary, where any dwelling is situated 30 metres or less from the property boundary closest to the premises; or*
 - ii) within 30 metres of a dwelling façade, but not closer than 3m, where any dwelling on the property is situated more than 30 metres from the property boundary closest to the premises; or, where applicable*
 - iii) within approximately 50 metres of the boundary of a National Park or a Nature Reserve.*
 - with the L_{A1}(1 minute) noise limits in the Noise Limits table, the noise measurement equipment must be located within 1 metre of a dwelling façade.*
 - with the noise limits in the Noise Limits table, the noise measurement equipment must be located:*
 - i) at the most affected point at a location where there is no dwelling at the location; or*
 - ii) at the most affected point within an area at a location prescribed by part (a) or part(b) of this condition.*

The monitoring conditions provided under Condition M6 of the EPL are:

- *M6.1* To assess compliance with the noise limits specified within this licence, the licensee must undertake operator attended noise monitoring at each specified noise monitoring point in accordance with the table below.

Point 1, 2,4, 5			
Assessment period	Minimum frequency in a reporting period	Minimum duration within assessment period	Minimum number of assessment period
Day	Special Frequency 1	24 hours	1 operation day

- *M6.2 A noise compliance assessment shall be undertaken within three months of commencement of operations at the premises. The assessment shall be prepared by a suitably qualified and experienced acoustical practitioner and shall assess compliance with the noise limits presented in L3.1.*

3. Noise monitoring


3.1 Plant and equipment noise measurements

3.1.1 Noise monitoring equipment

Attended noise measurements were undertaken using a Brüel & Kjær Type 2250-L sound level meter. The sound level meter was programmed to accumulate environmental noise data continuously over the measurement period. A summary of the equipment details is provided in Table 3-1.

A calibration on the noise monitoring equipment was performed prior to sampling using a sound level calibrator with a sound pressure level of 94 dB(A) at 1 kHz. At completion of the measurements, the meter's calibration was re-checked to ensure the sensitivity of the noise monitoring equipment had not varied. The sound level meter was found to be within the acceptable tolerance of ± 0.5 dB(A).

Table 3-1 Equipment details

Location	Equipment details	Equipment settings	Equipment photo
Inside Tarcoola Quarry site	Brüel & Kjær Type 2250-L SN: 2731849	1 minute, Fast, A-weighting Pre-cal: 93.7 Post-cal: 93.7	



3.1.2 Plant and equipment measurements

A noise audit of the operational plant and equipment was undertaken to determine the source noise levels. A minimum of one minute per measurement and four measurements per equipment were conducted in accordance with *AS1217.1 – 1985 Acoustics – Determination of sound power levels of noise sources: Part 7 – survey method*.

The measurements were taken at a fixed distance from each side of the equipment. A summary of the measured equipment levels are summarised in Table 3-2.

The measured equipment noise levels were found to be lower than the sound power levels of the plant and equipment used in the *Tarcoola Quarries Environmental Impact Statement* (EIS) (GHD, 2012).

Table 3-2 Measured plant and equipment noise levels, dB(A)

Equipment	Measured distance, m	Sound pressure level L_{Aeq} dB(A)	Sound power level L_{WA} dB(A)	EIS sound power level, dB(A)	Equipment photo
Dump truck CAT 730	5.0	86	108	115	
Excavator CAT 320D	4.3	78	99	112	

Equipment	Measured distance, m	Sound pressure level L_{Aeq} dB(A)	Sound power level L_{WA} dB(A)	EIS sound power level, dB(A)	Equipment photo
Loader CAT 966G	3.7	85	104	115	
Screeners 1 Terex Supertrak 683	4.5	83	104	111	

Equipment	Measured distance, m	Sound pressure level L_{Aeq} dB(A)	Sound power level L_{WA} dB(A)	EIS sound power level, dB(A)	Equipment photo
<p>Screener 2</p> <p>Terek Supertrak 683</p>	3.6	87	106	111	
<p>Screener 3</p> <p>Ezystak R8048TS</p>	3.3	86	104	111	

3.2 Compliance noise monitoring

3.2.1 Noise monitoring equipment

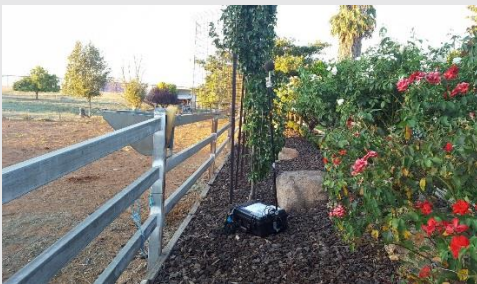


Compliance noise measurements were undertaken using four SVAN 977 sound level meters on 16 March 2017. Each sound level meter was programmed to accumulate environmental noise data continuously over sampling periods of 15 minutes. The noise logger was placed at the most affected point on or within the residential property boundary within 30 metres of the residence in accordance with Condition L3.3 of the EPL. Noise levels were measured over one operational day between 7 am to 6 pm.


A calibration on the noise monitoring equipment was performed prior to deployment using a sound level calibrator with a sound pressure level of 94 dB(A) at 1 kHz. At completion of the measurements, the meter's calibration was re-checked to ensure the sensitivity of the noise monitoring equipment had not varied. The sound level meter was found to be within the acceptable tolerance of ± 0.5 dB(A).

Wind speeds were negligible on the day of monitoring.

A summary of the noise monitoring equipment is provided in Table 3-3. A site map of the quarry and measurement locations is provided in Figure 1.

Table 3-3 Compliance noise monitoring equipment details

ID	Address	Equipment details	Equipment settings	Equipment photo
R1	45 Koorungal Road Lot 3 DP 542294	SVAN 977 SN: 36873	15 minute, Fast, A-weighting Pre-cal: 94.7 Post-cal: 95.0	
R2	80 Hinkler Street Lot 2 DP 634593	SVAN 977 SN: 45733	15 minute, Fast, A-weighting Pre-cal: 93.5 Post-cal: 93.7	
R4	213 – 215 Hammond Avenue Lot 1 DP 996350	SVAN 977 SN: 36872	15 minute, Fast, A-weighting Pre-cal: 93.6 Post-cal: 94.1	

ID	Address	Equipment details	Equipment settings	Equipment photo
R5	273 Hammond Avenue Lot 22 DP 869161	SVAN 977 SN: 45743	15 minute, Fast, A- weighting Pre-cal: 94.3 Post-cal: 94.5	

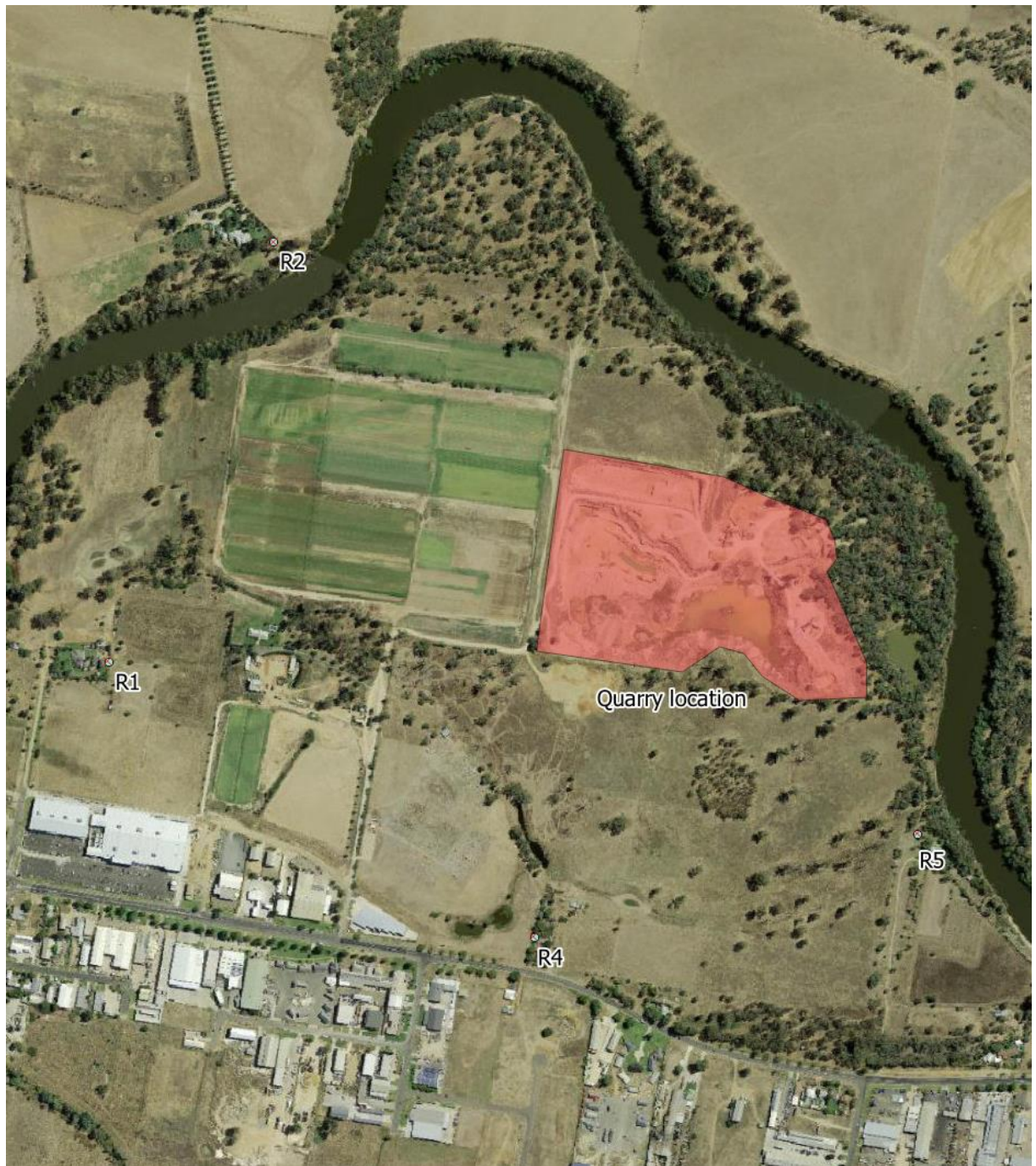


Figure 1 Site location map and noise monitoring locations

3.3 Measured noise levels

A summary of the measured background $L_{A90(\text{day})}$, ambient noise levels $L_{Aeq(\text{day})}$ at each receiver location is provided in Table 3-4. The worst-case measured 15 minute period has also been provided.

The primary noise contribution at all measurement locations was due to other noise sources. The quarry contribution to the ambient noise level has been modelled in Section 3.4 to determine whether operation of the quarry complies with the noise limits provided in Condition L6.1 of the EPL.

Quarry noise was audible at all measurement locations however the noise was noted to have negligible effect on the observed noise level. A summary of the observations at each measurement location follows.

Receiver 1: 45 Koorungal Road

The dominant noise source at R1 was road traffic noise travelling along Sturt Highway, located about 390 metres to the south. Additional contributions to the ambient noise level included bird noise, insect noise and domestic animal noise from dogs, horses and chickens.

Quarry noise audible at this location included reversing beepers, material loading and truck horns.

Receiver 2: 80 Hinkler Street

The dominant noise sources at R2 were bird and insect noise. Quarry noise audible at this location included reversing beepers, material loading and truck horns.

Receiver 4: 213-215 Hammond Avenue

The dominant noise source at R4 was road traffic noise along Sturt Highway located about 50 metres to the south. Operational noise audible from the quarry included material loading onto trucks and reversing beepers.

Receiver 5: 273 Hammond Avenue

The dominant noise sources at R5 were bird and insect noise. Material loading and reversing beepers were audible at this location. A distant hum from Sturt Highway was observed at this location. Noise levels from another quarry located north of this location was more apparent than noise from Tarcoola quarry.

Table 3-4 Measured noise levels, dB(A)

ID	Address	Background level $L_{A90(\text{day})}$	Ambient level $L_{Aeq(\text{day})}$	Worst case $L_{Aeq(15 \text{ minute})}$
R1	45 Koorungal Road	40	46	53
R2	80 Hinkler Street	43	49	50
R4	213 – 215 Hammond Avenue	47	53	56
R5	273 Hammond Avenue	41	50	59

3.4 Modelled quarry contribution

Due to extraneous noise in the measurement data, the noise level contribution from the quarry during the worst-case 15 minute period was modelled using SoundPLAN Version 7.4.

SoundPLAN is a computer program for the calculation, assessment and prognosis of noise exposure. Environmental noise propagation was calculated according to *ISO 9613-2 'Acoustics – Attenuation of sound during propagation outdoors'*.

The following noise modelling assumptions were made:

- Surrounding land was modelled as a mix between soft and hard ground with a ground coefficient of 0.75. Water was modelled with a ground absorption coefficient of 0.
- Atmospheric absorption was based on an average temperature of 10°C and an average humidity of 70%
- Atmospheric propagation conditions were modelled with noise enhancing conditions wind conditions for noise propagation (downwind conditions)
- Source noise levels were calculated using the measurements taken on the day of monitoring
- All equipment were assumed to be operational at maximum capacity during the 15-minute assessment period.

The predicted noise level contribution from the quarry are provided in Table 3-5.

Table 3-5 Quarry noise level contribution, dB(A)

ID	Address	Noise limit	Quarry Contribution L _{Aeq} (15 minute)
R1	45 Koorringal Road	43	31
R2	80 Hinkler Street	42	35
R4	213 – 215 Hammond Avenue	43	35
R5	273 Hammond Avenue	43	37

The predicted quarry noise level contribution to the ambient noise environment at all noise monitoring locations were compliant with the noise limits specified by the EPL.

4. Conclusion

Compliance noise monitoring was undertaken by GHD for Tarcoola (Wagga Wagga) Pty Ltd to satisfy the EPL conditions.

Plant and equipment noise levels were measured to determine source noise levels and were found to be below the levels specified within the EIS. The measured noise levels were used to calculate the quarry noise contribution at each noise monitoring location provided in the EPL.

Noise level contributions from the quarry at the four identified sensitive receiver locations were compliant with the limits specified in the EPL. The dominant noise sources at each residence were due to a combination of road traffic and wildlife noise.

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