

APPENDIX 4

Air and Noise Assessment



Air Noise Environment
Environmental Monitoring and Assessment

Air and Noise Assessment - Increased Throughput, Liquid Waste Facility, Glendenning

Duggan & Hede

Date of Issue: 8 April 2019

Prepared by:
Air Noise Environment

ABN: 13 081 834 513





Air

- Ambient Monitoring
- Auditing
- Computational Modelling
- Control Solutions
- Emission Inventories
- Expert Evidence
- Dust Assessment and Management
- Occupational Monitoring and Assessment
- Odour Monitoring and Assessment
- Research and Policy Studies
- Source Emission Monitoring



Noise

- Acoustic Design and Certification
- Computational Acoustic / Noise Modelling
- Entertainment Noise Modelling and Control
- Acoustic / Noise Control Solutions
- Acoustic Expert Evidence
- Liquor Licence Assessments
- Acoustic / Noise Monitoring
- Occupational Noise Monitoring and Control
- Acoustic / Noise Research and Policy studies
- Road Traffic and Transport Noise Studies
- Vibration Monitoring and Assessment
- Acoustic Calibrations



Environment

- Environmental Audits,
- Environmental Impact Statements,
- Environmental Management Plans and Systems,
- Environmental Policy and Compliance,
- Greenhouse Gas Emissions Inventories and Testing,
- National Pollutant Inventory, and
- National Greenhouse and Energy Reports.

This document has been prepared and issued by Air Noise Environment Pty Ltd in accordance with our Quality Assurance procedures. Authorship, copyright details and legal provisions relating to this document are provided on the following page. Should you have any queries regarding the contents of this document, please contact your nearest Air Noise Environment office:

Brisbane Office

A: Unit 3, 4 Tombo Street,
Capalaba, QLD 4157
T: +61 7 3245 7808
E: qld@ane.com.au

Sydney Office

A: Level 6, 69 Reservoir Street
Surry Hills, NSW 2010
T: +61 2 8217 0706
E: nsw@ane.com.au





DOCUMENT CONTROL SHEET

Document Details

Project Reference: 4022.4-Stage1-report02.odt

Document Title: Air and Noise Assessment - Increased Throughput, Liquid Waste Facility, Glendenning

Client: Duggan & Hede

Document Reference: /Network/Projects/4022.4/Reporting/4022.4-Stage1-report02.odt

Revision History

Version:	Issue Date:	Author:	Description:	Approved by:
00	4/4/19	Samuel Wong	Internal Draft	-
01	5/4/19	Samuel Wong	Draft for Client	Gary Hall
02	8/4/19	Samuel Wong	Final for Client	Gary Hall
Revision:	Issue Date:	Author:	Details of Revision:	
01.1				
01.2				
02.1				
02.2				

Copyright:

Air Noise Environment retains ownership of the copyright to all reports, drawings, designs, plans, figures and other work produced by Air Noise Environment Pty Ltd during the course of fulfilling a commission. The client named on the cover of this document shall have a licence to use such documents and materials for the purpose of the subject commission provided they are reproduced in full or, alternatively, in part with due acknowledgement to Air Noise Environment. Third parties must not reproduce this document, in part or in full, without obtaining the prior permission of Air Noise Environment Pty Ltd.

Disclaimer:

This document has been prepared with all due care and attention by professional environmental practitioners according to accepted practices and techniques. This document is issued in confidence and is relevant only to the issues pertinent to the subject matter contained herein. Air Noise Environment Pty Ltd holds no responsibility for misapplication or misinterpretation by third parties of the contents of this document. If the revision history does not state that a Final version of the document has been issued, then it remains a draft. Draft versions of this document should not be relied upon for any purpose by the client, regulatory agencies or other interested parties.

Where site inspections, testing or fieldwork have taken place, the report is based on the information made available by the client or their nominees during the visit, visual observations and any subsequent discussions with regulatory authorities. It is further assumed that normal activities were being undertaken at the site on the day of the site visit(s).

The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to Air Noise Environment Pty Ltd for the purposes of this project is both complete and accurate.





Table of Contents

1	Introduction	6
1.1	Scope of Study	6
1.2	Tasks Undertaken	6
1.3	This Report	7
2	Noise Assessment	8
2.1	Overview	8
2.2	Noise Criteria	8
2.2.1	Overview	8
2.2.2	Noise Policy for Industry	9
2.2.3	Road Traffic Criteria	12
2.3	Noise Modelling	12
2.3.1	Calculation Methodology	12
2.3.2	Meteorology	12
2.3.3	Topography	12
2.3.4	Sensitive Receptors	12
2.3.5	Noise Source Data	13
2.3.6	Noise Source Locations	14
2.4	Predicted Results - Operational	15
2.5	Predicted Results - Road Traffic	16
3	Air Quality Assessment	18
3.1	Overview	18
3.2	Air Quality Criteria	18
3.3	Modelling Methodology	19
3.4	Air Emissions Data	20
3.4.1	Overview	20
3.4.2	Sampling Methodology	20
3.4.3	Sampling Results	22
3.4.4	Modelled Emission Data	23
3.5	Modelled Receptors	24
3.6	Modelling Results	25
4	Conclusion	28
	Appendix A - Acoustic Glossary	29
	Appendix B - Air Quality Glossary	31
	Appendix C - Sampling Reports	33





Index of Tables

Table 2.1: Derived Intrusiveness $L_{Aeq,15-minute}$ Noise Criteria	9
Table 2.2: NPI Recommended Amenity Noise Levels	10
Table 2.3: Derived Amenity Criteria for Assessment	10
Table 2.4: NPI Project Trigger Noise Levels	11
Table 2.5: Sleep Disturbance Noise Levels	11
Table 2.6: Modelled Noise Source Data	14
Table 2.7: Predicted L_{Aeq} Noise Levels – Residential Receptors	16
Table 2.8: Predicted Noise Levels – Industrial Receptors	16
Table 2.9: Predicted Traffic Noise Levels	17
Table 3.1: NSW EPA Odour Criteria	18
Table 3.2: NSW VOC Ambient Air Quality Criteria (ug/m^3)	19
Table 3.3: Summary of Air Modelling Inputs	20
Table 3.4: Emissions Tests	21
Table 3.5: Summary Of Emission Monitoring Methods	21
Table 3.6: Odour Sampling Results	22
Table 3.7: VOC Sampling Results (Waste Oil)	23
Table 3.8: Modelled Odour Emission Data	23
Table 3.9: Modelled VOC Emission Data (Waste Oil Venting)	24
Table 3.10: Predicted Odour and VOC Results – Residential Receptors	26
Table 3.11: Predicted VOC Results – Site Boundary	26

Index of Figures

Figure 2.1: Modelled Discrete Receptors	13
Figure 2.2: Modelled Noise Source Locations and Industrial Receptors	15
Figure 3.1: Discrete Receptor Locations	25
Figure 3.2: Predicted Ground Level Odour Concentrations	27





1 Introduction

1.1 Scope of Study

Duggan and Hede Pty Ltd commissioned Air Noise Environment Pty Ltd on behalf of JJ Richards & Sons to undertake an air and noise assessment for the existing liquid waste facility at 14 Rayben Street, Glendenning.

The purpose of the study is to assess the potential for air and noise impacts associated with a proposal to increase the waste oil throughput. The increased waste oil throughput has a potential to increase odour and noise emissions from the site. Currently, the site is approved to process 42000 kL of organic waste and 10000 kL of waste oil per year. The proposal is to increase the waste oil throughput to 20000 kL, however, no changes to organic waste throughput is proposed. Notwithstanding the above, it is additionally noted that the proposed increase in throughputs will not result in any additional plant or equipment on site.

The assessment has been undertaken in accordance with the following guidelines:

- NSW Noise Policy for Industry (2017);
- NSW Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (2017);
- Assessment and Management of Odour from Stationary Sources in NSW (November 2006); and
- Generic Guidance and Optimum Model Settings for the Calpuff Modeling System for Inclusion into the 'Approved Methods for the Modeling and Assessments of Air Pollutants in NSW, Australia'.

1.2 Tasks Undertaken

Air Noise Environment previously completed the original air and noise assessment for the development application, and a post-commissioning odour audit, which were submitted to the NSW EPA. The assessments were detailed in the following reports:

- Air and Noise Assessment – Proposed Liquid Waste Transfer Station, Glendenning, 12 February 2016, Report No. 4022.1report02.pdf; and
- Odour Audit – JJ Richards Glendenning, 27 September 2018, Report No. 4022.3AuditReport02.pdf.

This assessment has utilised the following information and data from previous work completed for the site:

- Background noise monitoring data from the original 2016 DA report to derive noise criteria in accordance with the NSW Noise Policy for Industry (2017);
- Meteorological modelling from the original 2016 DA report;
- Odour emissions sampling of organic waste and waste oil processing/handling activities



undertaken as part of the 2018 post-commissioning odour audit.

In addition to the above data, additional noise monitoring and air sampling was conducted on the site to provide an input to this assessment. Additional tasks include:

- Attended source noise monitoring of on-site activities for revised noise modelling;
- VOC emissions sampling from waste oil activities for revised air dispersion modelling.

Computational modelling has been undertaken for assessing potential air and noise impacts.

1.3 This Report

This report presents a description of the proposal, assessment methodology, results and conclusions of the revised assessment. An acoustic and air quality glossary is presented in Appendix A and B to assist the reader.





2 Noise Assessment

2.1 Overview

The proposed increase in waste oil throughput has a potential to result in additional waste oil truck movements on site and on the surrounding road network. Furthermore, there is a potential for the $L_{Aeq,period}$ noise levels to increase from the site as a result of more trucks entering the site and unloading activity occurring more frequently. Worst-case $L_{Aeq,15-minute}$ intrusiveness noise levels are unlikely to change as a result of the increased waste oil throughput, as no additional loading bays or pump equipment are proposed.

No changes to organic waste throughputs are proposed, therefore, noise emissions from the organics building will remain unchanged.

It is noted that the DA assessment report assumed continuous noise emissions from the site (i.e. waste oil loading/unloading continuously 24/7). This was a conservative approach to the assessment which demonstrated compliance with the relevant noise criteria. However, the DA assessment was completed based on noise emissions data from similar JJ Richards & Sons liquid waste facilities (as the Glendenning site was yet to be constructed). This additional assessment considers on-site attended noise monitoring data to represent actual noise emissions from the site. Furthermore, the assessment has been completed in accordance with the recently released Noise Policy for Industry (2017).

Continuous 24/7 noise emissions from the site have been assumed. The proposed increased waste oil throughput will not increase the existing hours of operation, and even with the increased waste oil throughput, loading/unloading noise is not expected to occur continuously throughout the day. Therefore, the 24/7 assumption is a highly conservative approach to assessing noise impacts.

The following sections provide details on the methodology, results and recommendations of the noise assessment.

2.2 Noise Criteria

2.2.1 Overview

The acoustic assessment has been completed in accordance with the procedure identified in the NSW Noise Policy for Industry (2017). The policy sets two separate noise criteria to meet environmental noise objectives: one to account for intrusive noise (intrusiveness noise level) and the other to protect the amenity of particular land uses (amenity noise level). The lower of the intrusiveness noise level and amenity noise level is defined as the project noise trigger level. The project noise trigger level provides a basis for assessing a proposal or site.





The derivation of the project noise trigger levels in accordance with the NSW EPA policies are presented below. Road traffic noise impacts have been undertaken against criteria defined in the NSW Road Noise Policy (2011), which is also discussed below.

2.2.2 Noise Policy for Industry

2.2.2.1 Intrusiveness Noise Level

According to the NPI, intrusive noise refers to noise that exceeds background noise levels (as defined by the Rating Background Level) by more than 5 dB. The intrusiveness criteria for the assessment has been summarised in Table 2.1. The Rating Background Levels have been derived from background noise monitoring completed as part of the 2016 development application assessment.

Table 2.1: Derived Intrusiveness $L_{Aeq,15\text{-minute}}$ Noise Criteria

Period	Rating Background Level dB(A)	Intrusiveness Noise Criteria $L_{Aeq,15\text{-minute}}$
Day	43	48
Evening	38	43
Night	31	36

2.2.2.2 Amenity Noise Level

To limit continuing increases in noise levels, the maximum ambient noise level within an area from industrial noise sources should remain below the recommended amenity noise levels defined in Table 2.2 of the NPI where feasible and reasonable. The recommended amenity noise levels differ according to the type of receiver and acoustic amenity of the area. For example, higher recommended noise levels apply to residential houses located in an urban area compared to a rural area.

The project amenity noise level for a new industrial development is equivalent to the recommended noise level (as defined in Table 2.2 of the NPI) minus 5 dB(A). It is noted that where the existing acoustic environment is defined by traffic noise, the NPI requires that the project amenity noise level is defined by the $L_{Aeq,period(traffic)}$ minus 15 dB(A).

The nearest sensitive receivers to the site are residential houses located to the north. Table 2.2 presents amenity noise level for residential receivers in Rural, Suburban and Urban amenity areas.





Table 2.2: NPI Recommended Amenity Noise Levels

Type of Receiver	Noise Amenity Area	Time of Day	Recommended L_{Aeq} Noise Level dB(A)
Residence	Rural	Day	50
		Evening	45
		Night	40
Residence	Suburban	Day	55
		Evening	45
		Night	40
Residence	Urban	Day	60
		Evening	50
		Night	45
Industrial	All	When In Use	70

In accordance with Table 2.3 of the NPI, the RBL values are used to determine which noise amenity area is applicable to the nearest sensitive receptors. Based on the day, evening and night RBL values of 43 dB(A), 38 dB(A) and 31 dB(A), respectively, the relevant noise amenity area of the nearest residential houses is Suburban. Table 2.3 summarises the project amenity noise levels

Table 2.3: Derived Amenity Criteria for Assessment

Period	Acceptable Noise Level dB(A)	Modification to ANL dB(A) as per NPI	Amenity Noise Criteria $L_{Aeq,period}$	Amenity Noise Criteria ^a $L_{Aeq,15-min}$
Residential Houses				
Day	55	- 5	50	53
Evening	45	- 5	40	43
Night	40	- 5	35	38
Industrial				
When In Use	70	- 5	65	68





Period	Acceptable Noise Level dB(A)	Modification to ANL dB(A) as per NPI	Amenity Noise Criteria $L_{Aeq,period}$	Amenity Noise Criteria ^a $L_{Aeq,15-min}$
a In accordance with the NPI, the $L_{Aeq,15-min}$ criteria can be derived from the $L_{Aeq,period}$ amenity criteria using a + 3 dB correction				

2.2.2.3 Project Trigger Noise Levels

As required by the NSW NPI, the lower of the intrusive and amenity criteria is to be adopted for an assessment. The relevant criteria for the assessment are summarised in Table 2.4.

Table 2.4: NPI Project Trigger Noise Levels

Period	Limiting Criteria Type	Noise Criteria
Residential		
Day	Intrusiveness	48 $L_{Aeq,15-minute}$
Evening	Amenity/Intrusiveness	43 $L_{Aeq,15-minute}$
Night	Intrusiveness	36 $L_{Aeq,15-minute}$
Industrial		
When in Use	Amenity	68 $L_{Aeq,15-minute}$

The noise criteria applies at the most-affected point (i.e. highest noise level) on or within the residential property boundary. If the actual property boundary is more than 30 metres from the house, then the criteria applies at the most-affected point within 30 m of the house.

2.2.2.4 Sleep Disturbance Noise Criteria

In addition, reference has been made to the following criteria for sleep disturbance:

Table 2.5: Sleep Disturbance Noise Levels

NPI Maximum Noise Level Criteria	Adopted Criteria
$L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater	$L_{Aeq,15min}$ 40 dB(A) (which is greater than RBL 31 dB(A) + 5)
L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,	L_{AFmax} 52 dB(A) (which is greater than RBL 31 dB(A) + 15)

It is noted that the $L_{Aeq,15-min}$ sleep disturbance criteria is less stringent than the $L_{Aeq,15-minute}$ project





trigger noise level. Therefore, only the $L_{A\text{Max}}$ 52 dB(A) has been applied for assessing sleep disturbance. It is not expected that the proposed waste oil throughput increase will require trucks to arrive at night-time (10 pm to 7 am). However, as a conservative approach to assessing potential noise impacts, this has been considered.

2.2.3 Road Traffic Criteria

The proposed increased capacity is expected to increase truck movements to the site and along the surrounding road network. Noise criteria applicable to traffic generating developments are specified in the *NSW Road Noise Policy (2011)*. The NSW RNP states that 'for existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding 'no build option'. The relevant noise parameter for assessing changes to noise levels is the $L_{Aeq,15\text{-hour}}$ (7 am to 10 pm) and $L_{Aeq,9\text{-hour}}$ (10 pm to 7 am).

2.3 Noise Modelling

2.3.1 Calculation Methodology

For the purposes of predicting impacts associated with noise emissions from proposed development on nearby sensitive receptors, noise modelling of the sources was completed using the proprietary software Cadna (Computer Aided Noise Abatement Model) developed by DataKustik. Cadna incorporates the influence of meteorology, terrain, ground type and air absorption in addition to source characteristics to predict noise impacts at receptor locations.

The model is utilised to assess the potential noise emissions from the site under a range of operating scenarios and meteorological conditions. The noise modelling also allows investigation of possible noise management solutions, in the event that non-compliance with the assessment criterion is predicted. The following sections discuss the inputs, assumptions and results of the noise modelling.

2.3.2 Meteorology

As a conservative approach, worst-case meteorology for non-arid areas (more than 500 mm annual rainfall) as defined in the NSW INP has been considered in the modelling (downwind conditions, 3 m/s wind speed and F Class Stability).

2.3.3 Topography

Terrain height data was based on data from the Shuttle Radar Imaging Mission (SRTM), and obtained from the United States Geological Survey (USGS) web site. Consideration has also been given to intervening industrial buildings shielding the site from the nearest sensitive receptors.

2.3.4 Sensitive Receptors

Discrete receptors have been modelled at the nearest sensitive receptors to the north and east (Receptor Group 1 and 2, respectively). Receptors have also been modelled along the boundary of





the nearby industrial premises. Figure 2.1 presents the modelled residential receptors. Figure 2.2 presents the modelled industrial receptors.



Figure 2.1: Modelled Discrete Receptors

2.3.5 Noise Source Data

Table 2.6 presents the modelled noise source data for the on-site noise sources and activity. Noise source data of fixed plant (e.g. pumps, unloading activity, fans) is based on attended noise measurements undertaken at the existing facility on 21 March 2019.

Truck movement data has been provided by Duggan & Hede. The forecast truck movement data for waste oil trucks (inwards and outwards) is 12.4 per day (two times the existing movements of 6.2 per day). During a worst-case hour, it is assumed that 2 per hour arrive on site. The modelling has also considered an $L_{A_{Max}}$ scenario for truck movement.

The data presented in Table 2.6 represent L_{Aeq} noise levels.



Table 2.6: Modelled Noise Source Data

Noise Source	Frequency Spectra (SWL, A-weighted)									Total	
	31.5	63	125	250	500	1k	2k	4k	8k	A	Lin
<i>Proposed Organics Building</i>											
Rooftop Vent 1 ^a	71	76	83	74	70	68	70	66	60	82	88
Rooftop Vent 2 ^a	71	76	83	74	70	68	70	66	60	82	88
Rooftop Vent 3 ^a	71	76	83	74	70	68	70	66	60	82	88
Rooftop Vent 4 ^a	71	76	83	74	70	68	70	66	60	82	88
Rooftop Vent 5 ^a	71	76	83	74	70	68	70	66	60	82	88
Rooftop Vent 6 ^a	71	76	83	74	70	68	70	66	60	82	88
Rooftop Vent 7 ^a	71	76	83	74	70	68	70	66	60	82	88
Rooftop Vent 8 ^a	71	76	83	74	70	68	70	66	60	82	88
Unloading Pump 1 ^a	69	68	76	77	83	74	66	82	62	89	92
Unloading Pump 2 ^a	66	74	77	71	81	74	69	84	62	89	91
Odour Control Unit Fan	71	74	78	68	63	65	69	69	65	80	85
Truck Movement (L _{Amax} Passby, 2 per hour)	63	78	82	91	86	90	97	99	97	103	109
<i>Used Oil Storage Area</i>											
Unloading Pump ^a	83	80	68	71	70	67	63	66	61	78	89
Truck Movement (L _{Amax} Passby, 2 per hour)	63	78	82	91	86	90	97	99	97	103	109
<i>L_{Amax} Scenario</i>											
Reversing Beeper (L _{Amax}) ^b	-	-	-	-	-	113	-	-	-	113	113
Truck Movement (L _{Amax} Passby)	63	78	82	91	86	90	97	99	97	103	109

^a A plus 5 dB correction for tonality has been applied separately in the CadnaA noise model based on an analysis of 1/3 octave band measurement data for each source and the methodology defined in the NPI (2017).

^b A plus 3 dB correction for tonality or impulsiveness has been included

2.3.6 Noise Source Locations

Figure 2.2 presents modelled noise source locations.



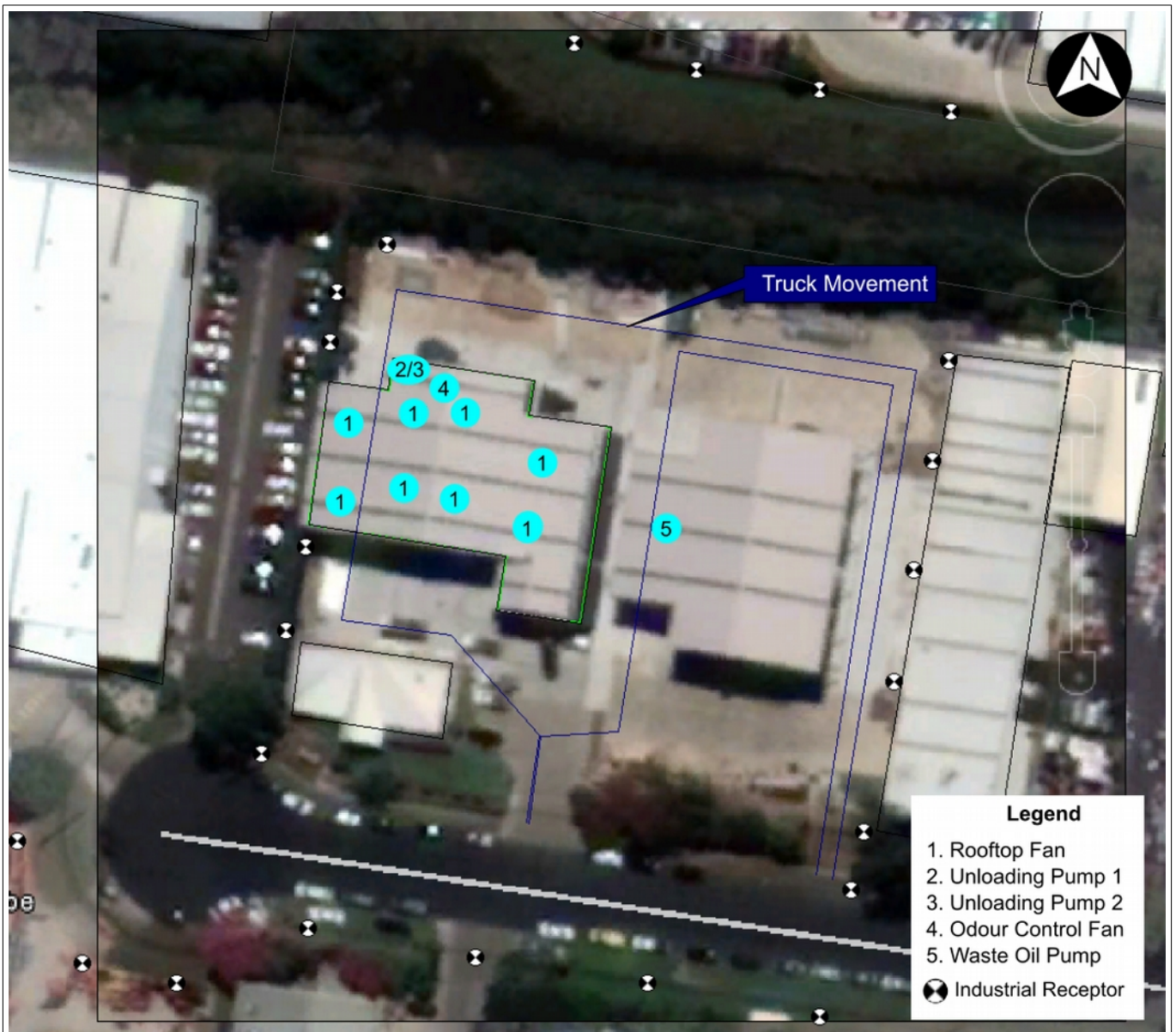


Figure 2.2: Modelled Noise Source Locations and Industrial Receptors

2.4 Predicted Results - Operational

Tables 2.7 and 2.8 presents predicted noise levels at the nearest residential and industrial receptors.





Table 2.7: Predicted L_{Aeq} Noise Levels – Residential Receptors

Receptor Group	Predicted L_{Aeq} Noise Levels dB(A)	Predicted L_{Amax} Noise Levels dB(A)
1	35	39
2	28	28
RG1 Criteria	Day/Evening/Night (48/43/36)	52 dB(A)

Table 2.8: Predicted Noise Levels – Industrial Receptors

Industrial Receptor	Predicted $L_{Aeq,period}$ Noise Level dB(A)
Boundary of Industrial Property to the West	59
Boundary of Industrial Property to the North	51
Boundary of Industrial Property to the East	56
Boundary of Industrial Property to the South	52
Industrial Criteria	68

The results of the noise modelling indicate compliance with all relevant noise criteria and at all modelled receptors. It is noted that the model is conservative by assuming worst-case meteorological conditions and all sources operating simultaneously (24/7). As noted previously, the proposed increased waste oil throughput will not increase the existing hours of operation, and even with the increased waste oil throughput, loading/unloading noise is not expected to occur continuously throughout the day. Therefore, the 24/7 assumption is a highly conservative approach to assessing noise impacts.

Overall, based on the results of the modelling, noise impacts associated with the proposed changes to the site are considered to be minimal.

2.5 Predicted Results – Road Traffic

Noise predictions have been undertaken to determine the dB increase in traffic noise levels along the main truck route (M7 to Knox Road to Powers St). The following assumptions and data have been referenced in calculating the above noise levels:

- Traffic data for Knox Road (South of Cross Street) from NSW RMS Traffic Volume Counter website:
 - 2018 hourly data;
 - 6.28% heavy vehicles.





- Total truck movements per day from the site of 44.5 (including organics, waste oil and truck parking bays) as provided by Duggan & Hede;
- To predict a worst-case increase in $L_{Aeq,15\text{-hour}}$ noise levels (7 am to 10 pm), it is assumed that all 44.5 trucks arrive/depart from the site between 7 am to 10 pm. Likewise, to predict a worst-case increase in $L_{Aeq,9\text{-hour}}$ noise levels (10 pm to 7 am), it is assumed that all 44.5 trucks arrive/depart from the site between 10 pm to 7 am.

The Calculation of Road Traffic Noise Model (CoRTN) methodology has been adopted to estimate road source noise levels with and without the liquid waste facility in operation. Using this information, the predicted dB change in traffic can be calculated.

Table 2.9 presents the predicted traffic noise levels and dB increase. Based on the results, it is anticipated that increases to road traffic noise levels will be well within the 2 dB allowable increase. The assessment is conservative by assuming trucks will also arrive during the night period, but as noted previously, for the proposed waste oil throughput increase, no changes to operating hours are proposed.

Table 2.9: Predicted Traffic Noise Levels

Noise Parameter	Road Source Noise Level L_{Aeq}		Predicted dB Increase
	Existing	With Development Traffic (including increased waste oil trucks)	
$L_{Aeq,15\text{-hour}}$ (7 am – 10 pm)	77.9	78.0	0.1
$L_{Aeq,9\text{-hour}}$ (10 pm – 7 am)	72.6	72.9	0.3
Criteria			2 dB





3 Air Quality Assessment

3.1 Overview

The following section presents details of the air dispersion modelling to assess potential air quality impacts from the proposed increased waste oil throughput.

It is noted that the DA assessment report already assumed continuous emissions from the site (i.e. waste oil loading/unloading continuously 24/7). This was a conservative approach to the assessment which demonstrated compliance with the relevant ambient air quality criteria. However, the DA assessment was completed based on air emissions data from similar JJ Richards & Sons liquid waste facilities (as the Glendenning site was yet to be constructed). This additional assessment considers on-site odour and VOC sampling data.

Continuous 24/7 emissions from the site have been assumed as a conservative approach. The proposed increased waste oil throughput will not increase the existing hours of operation, and even with the increased throughput, it is unlikely that emissions will occur continuously during the day.

3.2 Air Quality Criteria

The odour assessment has been completed in accordance with the odour criteria presented in the document “Assessment and management of odour from stationary sources in NSW”, published by the NSW OEH in November 2006.

The document comprises two parts - a technical framework (which defines the criteria) and technical notes (that discuss assessment methodologies). In the policy document, the OEH note that odour assessment criteria need to be designed to take into account the range of sensitivities to odours within the community, and to provide additional protection for individuals with a heightened response to odours. Therefore, the odour assessment criteria allows for population size, cumulative impacts, anticipated odour levels during adverse meteorological conditions and community expectations of amenity. Table 3.1 presents odour criteria for various population sizes, as specified by the OEH.

Table 3.1: NSW EPA Odour Criteria

Population of Affected Community	Odour Assessment Criteria (OU)
Rural single residence ($\leq$)	7.0
~ 10	6.0
~ 30	5.0
~ 125	4.0





Population of Affected Community	Odour Assessment Criteria (OU)
~ 500	3.0
Urban area ($\geq$ a 2000) and/or schools and hospitals	2.0

Alternatively, the NSW EPA identifies that the following equation may be applied:

$$\text{Odour assessment criterion (OU)} = (\log_{10}(\text{population}) - 4.5)/-0.6$$

The nearest sensitive receptors are residential zones in urban areas, therefore, the 2.0 OU applies for this receptor group.

For comparison to the assessment criteria, impacts in odour units are reported as peak concentrations (i.e. approximately one second average) and as the 99th percentile of predicted concentrations based on a Level 3 odour assessment methodology.

In addition to odour, an assessment of volatile organic compounds has also been undertaken. Table 3.2 presents ambient air quality criteria relevant to these compounds. In accordance with the NSW EPA requirements, the relevant statistical parameter for comparison against the criteria is the 99.9th percentile value.

Table 3.2: NSW VOC Ambient Air Quality Criteria (ug/m³)

Compound	Criteria	Averaging Time
Toluene	360	1-hour
Benzene	29	1-hour
Ethylbenzene	8,000	1-hour
Xylene	190	1-hour
Cumene	21	1-hour
Trimethylbenzene	2,200	1-hour

3.3 Modelling Methodology

The modelling has adopted the same methodologies as those considered in the DA assessment report, including the type of dispersion model (CALPUFF modelling system) and derived meteorological data using CALMET.

The methodology is summarised below in Table 3.3 for ease of reference. Updated emissions data based on on-site sampling has been utilised in the revised modelling as discussed in the following





section.

Table 3.3: Summary of Air Modelling Inputs

Modelling Component	Details
Meteorological Year	2012
Meteorological Model	TAPM prognostic data utilised in CALMET under No Observation mode, as recommended ¹
Model Domain	20 km x 20 km Grid spacing of 0.2 km
Vertical Layers in CALMET	20 m, 50 m, 75 m, 150 m, 200 m, 500 m, 750 m, 1,000 m, 1,500 m, 2,000 m, 3,000 m
Dispersion Model	CALPUFF
Terrain Data	Shuttle Radar Imaging Missions (SRTM) data from the United States Geological Survey (USGS).
Land Use Data	United States Geological Survey (USGS)

3.4 Air Emissions Data

3.4.1 Overview

Air emissions sampling of odour and VOCs was undertaken on 28 August 2018 and 21 March 2019. NATA technical reports are provided in Appendix C. The following section presents a summary of the sampling methodologies and results.

3.4.2 Sampling Methodology

Emissions testing was completed on Tuesday 28 August 2018 and Thursday 21 March 2019. The purpose of the testing was to determine odour and VOC emission concentrations and rates for key emission points. Table 3.4 presents a summary of the tests completed on the day of the sampling. Table 3.5 presents the sampling methods adopted.

1 TRC Environmental Corporation (March 2011) 'Generic Guidance and Optimum Model Settings for the CALPUFF Modelling System for Inclusion into the 'Approved Methods for the Modelling and Assessments of Air Pollutants in NSW, Australia' prepared on behalf of the NSW Office of Environment and Heritage.



Table 3.4: Emissions Tests

Test	Type	Sampling Location	No. of Samples	Comments
1	Odour	Odour at inlet and outlet of carbon filter unit.	4 (inlet and outlet in duplicates)	Sampling conducted during filling of process tanks to represent worst-case emissions.
2	Odour	Beneath one of the rooftop fans	2 (Duplicates)	Sampling undertaken beneath one of the rooftop extraction fans. The fan was located nearest to the OCU (compared to other fans) and odour at this fan is assumed to be a worst-case.
3-4	Odour	Truck vent during filling of truck from two different waste oil tanks	4 (2 different tanks in duplicates)	Access to the rooftop vent could not be gained. Therefore, sampling was undertaken at a truck vent, during filling of waste from the storage tanks.
5	VOCs	VOCs at inlet and outlet of carbon filter unit	Total of 12 samples 2 locations (inlet/outlet) x 3 waste sources x 2 (duplicates)	3 different waste sources were considered to determine any VOC composition variation.
6	VOCs	Truck vent during filling of truck from two different waste oil tanks	2 (1 tank in duplicates)	Access to the rooftop vent could not be gained. Therefore, sampling was undertaken at a truck vent, during filling of waste from the storage tanks.

Table 3.5: Summary Of Emission Monitoring Methods

Measurement Parameter	Location	Method Equivalency	NATA Accredited
Sampling Positions	Scrubber Inlet	AS4323.1-1995 Method 1: selection of sampling positions	Yes
Velocity, Flowrate and Temperature	Scrubber Inlet	AS 4323.2-1995 "Stationary Source Emissions Method 2: Determination of Total Particulate Matter - Isokinetic Manual Sampling - Gravimetric Method" TM-2 USEPA (2000) Method 2	Yes





Measurement Parameter	Location	Method Equivalency	NATA Accredited
Velocity	Mineral Oil Tanker Vents	Flow rate provided by tanker pump filling meter.	No
Moisture Content	Scrubber Inlet	USEPA Method 4 Determination of Moisture Content in Stack Gases	Yes
Speciated Organic Compounds	Scrubber Inlet, Scrubber Outlet, Waste oil tanker vent	NIOSH Method 1500 Sampling onto carbon tubes with analysis by Gas Chromatograph	Yes
Odour	Scrubber Inlet, Scrubber Outlet, Oil Tanker, Roof Vent	AS/NZS 4323.3:2001 Stationary Source Emissions - Determination of Odour Concentration by Dynamic Olfactometry NSW (OM-7)	Yes

3.4.3 Sampling Results

Tables 3.6 and 3.7 presents a summary of the odour and VOC sampling results. The VOC sampling did not identify any VOCs in the organic waste (all results were below the detection limit). VOCs were detected in the waste oil only.

Table 3.6: Odour Sampling Results

Test	Sampling Location	Odour Concentration (OU)	Odour Emission Rate (OUV/s)
1	OCU Inlet	2670	1027.2
1	OCU Outlet	73	27.9
2	Rooftop Exhaust Fan	51.5	82.4 ^a
3-4	Waste Oil Filling	7095	99.2
5	Waste Oil Filling	7215	102.0

^a Based on maximum flow rate of rooftop fan (RCV500-6D) of 1.6 m³/s





Table 3.7: VOC Sampling Results (Waste Oil)

Odour Source	Adopted VOC Concentration in DA Assessment (g/Nm ³) ^a	Measured VOC Concentration (g/Nm ³) March 2019 Testing
Benzene	46.3	18.8
Toluene	335.8	268.0
Ethylbenzene	20.8	12.8
Xylene	100.4	46.3
Cumene	3.6	3.6
Trimethylbenzene	15.8	12.6

^a Based on data from a JJ Richards & Sons used oil facility in Wacol, Brisbane

3.4.4 Modelled Emission Data

Tables 3.8 and 3.9 presents the modelled odour and VOC emissions data considered in the modelling and based on the testing described in the previous section. It is noted that Test 1 for the OCU on site is not relevant to the modelling. Test 1 relates to odour emissions from the OCU which are vented directly inside the organic waste building. Odour emissions are then released via the rooftop vent fans (Test 2).

Table 3.8: Modelled Odour Emission Data

Source	X (km)	Y (km)	Relative Height (m)	Diameter (m)	Exit Velocity (m/s)	Temp (°C)	Odour Emission Rate (OUV/s)
Rooftop Vent 1	301.3492	6263.4589	7.5	0.9 m	1.8	Ambient	82.4
Rooftop Vent 2	301.3591	6263.4612	8.5	0.9 m	2.5	Ambient	82.4
Rooftop Vent 3	301.3660	6263.4604	8.5	0.9 m	2.5	Ambient	82.4
Rooftop Vent 4	301.3762	6263.4535	7.5	0.9 m	2.5	Ambient	82.4
Rooftop Vent 5	301.3746	6263.4439	7.5	0.9 m	2.5	Ambient	82.4
Rooftop Vent 6	301.3643	6263.4487	8.5	0.9 m	2.5	Ambient	82.4
Rooftop Vent 7	301.3571	6263.4499	8.5	0.9 m	2.5	Ambient	82.4





Source	X (km)	Y (km)	Relative Height (m)	Diameter (m)	Exit Velocity (m/s)	Temp (°C)	Odour Emission Rate (OUV/s)
Rooftop Vent 8	301.3476	6263.4483	7.5	0.9 m	2.5	Ambient	82.4
Unloading of oil tanker	301.4063	6263.4436	11.0	0.1 m	2.5	Ambient	102.0

Table 3.9: Modelled VOC Emission Data (Waste Oil Venting)

Odour Source	Modelled VOC Concentration (g/Nm ³) ^a	Modelled Emission Rate (g/s) ^{b,c}
Benzene	46.3	0.00050
Toluene	335.8	0.00364
Ethylbenzene	20.8	0.00023
Xylene	100.4	0.00109
Cumene	3.6	0.00004
Trimethylbenzene	15.8	0.00017

a The higher concentration from the Wacol facility testing and 21 March 2019 testing at the Glendenning site has been adopted

b The same emission parameters identified in Table 3.8 for 'Unloading of oil tanker' have been adopted for VOC emissions modelling

c Based on 650 L/min loading rate

3.5 Modelled Receptors

As per the original assessment, residential receptor groups to the north (R1) and to the east (R2) have been considered. Receptors have also been modelled along the site boundary for the assessment of VOC concentrations. A gridded receptor grid of 50 m x 50 m has been used for the CALPUFF output data to provide a ground level concentration plot.





Figure 3.1: Discrete Receptor Locations

3.6 Modelling Results

Tables 3.10 and 3.11 presents predicted ground level concentrations for the modelled pollutants at residential receptors and the site boundary. Figure 3.2 presents a predicted concentration plot for odour.

The results indicate compliance for all modelled sensitive receptors and modelled compounds. As noted previously, the modelling is highly conservative by assuming continuous organic waste and waste oil loading. The proposed increased waste oil throughput will not increase the existing hours of operation, and even with the increased throughput, it is unlikely that emissions will occur continuously during the day.



Table 3.10: Predicted Odour and VOC Results – Residential Receptors

Compound	Predicted Concentrations		Unit	Averaging Time	Criteria
	Receptor Group 1	Receptor Group 2			
Odour	0.36	0.14	OU	Peak, 99 th Percentile	2.0
Benzene	0.3	0.1	µg/m ³	Max 1-hour	29
Toluene	2.0	0.6	µg/m ³	Max 1-hour	360
Ethylbenzene	0.1	0.0	µg/m ³	Max 1-hour	8,000
Xylene	0.6	0.2	µg/m ³	Max 1-hour	190
Cumene	0.02	0.01	µg/m ³	Max 1-hour	21
Trimethylbenzene	0.1	0.03	µg/m ³	Max 1-hour	2,200

Table 3.11: Predicted VOC Results – Site Boundary

Compound	Highest Predicted Concentrations at Industrial Property (µg/m ³)	Averaging Time	Criteria
Benzene	2.1	Max 1-hour	29
Toluene	14.9	Max 1-hour	360
Ethylbenzene	0.9	Max 1-hour	8,000
Xylene	4.5	Max 1-hour	190
Cumene	0.2	Max 1-hour	21
Trimethylbenzene	0.7	Max 1-hour	2,200



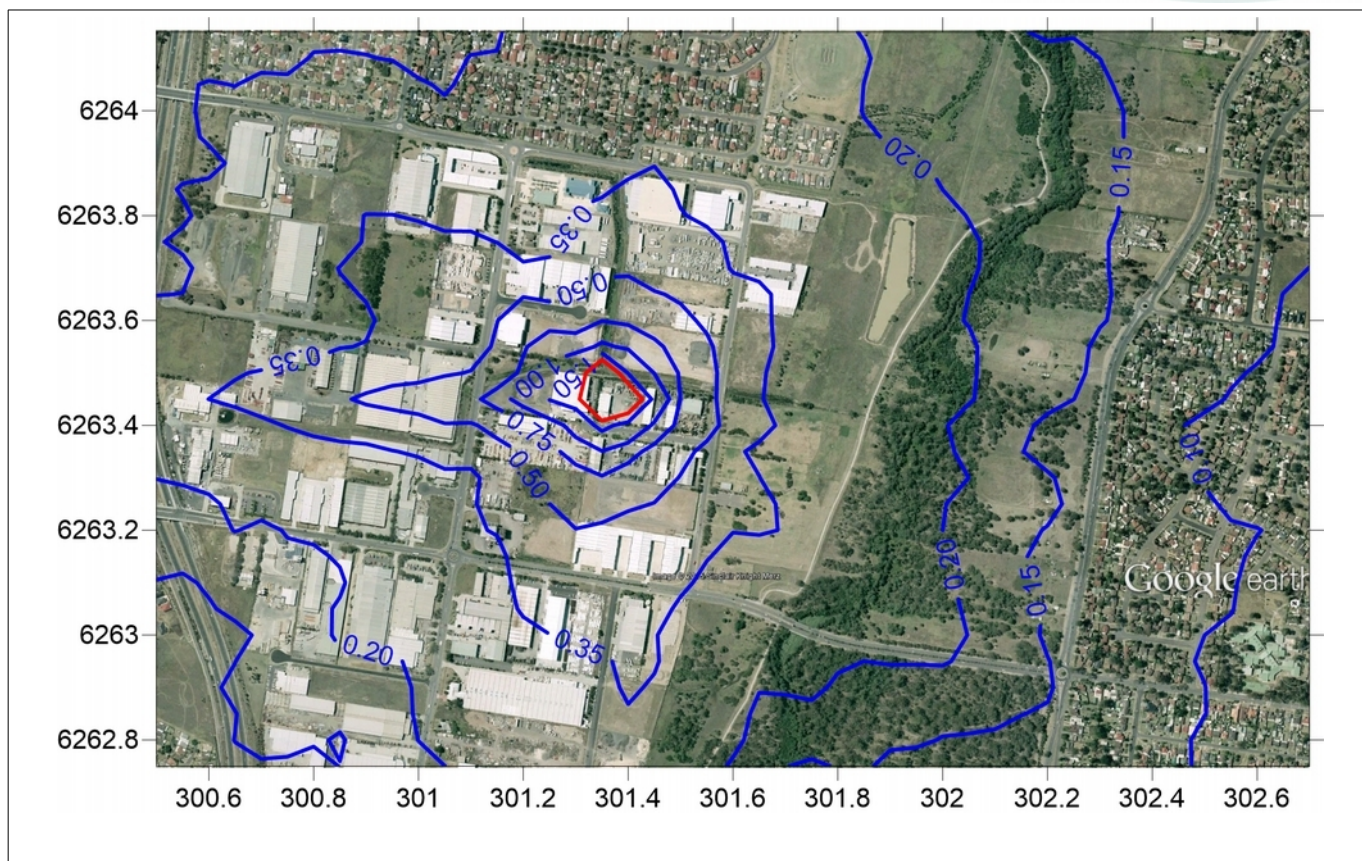
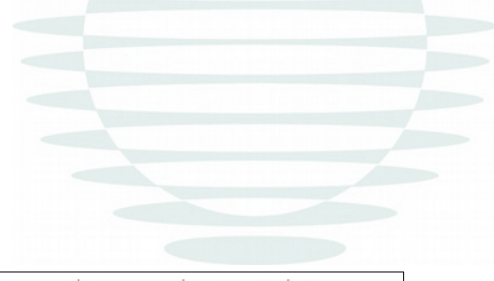


Figure 3.2: Predicted Ground Level Odour Concentrations

Scenario: Worst-Case
Location: Glendenning
Pollutant: Odour

Averaging Time: Peak, 99th Percentile
Units: OU
Criteria: 2.0 OU



4 Conclusion

An air and noise assessment has been undertaken to assess the potential impacts of increasing the waste oil throughput at the JJ Richards & Sons Glendenning facility. Currently, the site is approved to process 42000 kL of organic waste and 10000 kL of waste oil per year. The proposal is to increase the waste oil throughput to 20000 kL, and no changes to organic waste throughput are proposed. Notwithstanding the above, it is additionally noted that the proposed increase in throughputs will not result in any additional plant or equipment on site.

Air and noise modelling has been undertaken to assess potential impacts. The modelling has taken into consideration on-site noise and air (VOCs and odour) sampling data. The results of the modelling indicate compliance with the relevant NSW EPA air and noise criteria. It is noted that continuous 24/7 emissions from the site has been assumed in the modelling as a conservative approach. The proposed increased waste oil throughput will not increase the existing hours of operation, and even with the increased throughput, it is unlikely that emissions will occur continuously during the day. Therefore, the 24/7 assumption is a highly conservative approach to assessing noise impacts.





Appendix A - Acoustic Glossary





APPENDIX A: GLOSSARY OF ACOUSTIC TERMINOLOGY

A-Weighting	A response provided by an electronic circuit which modifies sound in such a way that the resulting level is similar to that perceived by the human ear.
dB (decibel)	This is the scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and the reference pressure (0.00002N/m ²).
dB(A)	This is a measure of the overall noise level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
Facade Noise Level	Refers to a sound pressure level determined at a point close to an acoustically reflective surface (in addition to the ground). Typically a distance of 1 metre is used.
Free Field	Refers to a sound pressure level determined at a point away from reflective surfaces other than the ground with no significant contribution due to sound from other reflective surfaces; generally as measured outside and away from buildings.
Hertz (Hz)	A measure of the frequency of sound. It measures the number of pressure peaks per second passing a point when a pure tone is present.
L_{Aeq} Equivalent Continuous Sound Level	This is the equivalent steady sound level in dB(A) containing the same acoustic energy as the actual fluctuating sound level over the given period. For a steady sound with small fluctuations, its value is close to the average sound pressure level.
$L_{A90,T}$	This is the dB(A) level exceeded 90% of the time, T.
$L_{A10,T}$	This is the dB(A) level exceeded 10% of the time, T.
$L_{A50,T}$	This is the dB(A) level exceeded 50% of the time, T.
L_{WA}	The A-weighted sound power level in dB.





Appendix B - Air Quality Glossary





APPENDIX B: GLOSSARY OF AIR QUALITY TERMINOLOGY

Conversion of ppm to mg/m ³	Where R is the ideal gas constant; T, the temperature in Kelvin (273.16 + T°C); and P, the pressure in mm Hg, the conversion is as follows: $\text{mg m}^{-3} = (P/RT) \times \text{Molecular weight} \times (\text{concentration in ppm})$ $= \frac{P \times \text{Molecular weight} \times (\text{concentration in ppm})}{62.4 \times (273.2 + T^{\circ}\text{C})}$
g/s	Grams per second
mg/m ³	Milligrams (10 ⁻³) per cubic metre.
µg/m ³	Micrograms (10 ⁻⁶) per cubic metre.
ppb	Parts per billion.
ppm	Parts per million.
PM ₁₀ , PM _{2.5} , PM ₁	Fine particulate matter with an equivalent aerodynamic diameter of less than 10, 2.5 or 1 micrometres respectively. Fine particulates are predominantly sourced from combustion processes. Vehicle emissions are a key source in urban environments.
50th percentile	The value exceeded for 50 % of the time.
NO _x	Oxides of nitrogen – a suite of gaseous contaminants that are emitted from road vehicles and other sources. Some of the compounds can react in the atmosphere and, in the presence of other contaminants, convert to different compounds (eg, NO to NO ₂).
VOC	Volatile Organic Compounds. These compounds can be both toxic and odorous.



Appendix C – Sampling Reports





Air Noise Environment
Environmental Monitoring and Assessment

Emissions Monitoring: JJ Richards & Sons, Glendenning

Duggan and Hede

Duggan and Hede
PO Box 496
Clayfield
QLD 4011

Sampling Date: 28 August 2018

Issued: 14 September 2018

Prepared by:
Air Noise Environment

ABN: 13 081 834 513



Accredited for Compliance with ISO/IEC 17025 – Testing





This document is issued in accordance with NATA's accreditation requirements.

NATA Accreditation Number: 15841

Accredited for compliance with ISO/IEC 17025 – Testing

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

Should you have any queries regarding the contents of this document, please contact Air Noise Environment.

Brisbane Office

A: Unit 3, 4 Tombo Street,

Capalaba, QLD 4157

T: +61 1300 851 761

E: qld@ane.com.au





DOCUMENT CONTROL SHEET

Document Details

Project Reference: 4022.3AirEmissionsReport01.odt
 Document Title: Emissions Monitoring: JJ Richards & Sons, Glendenning
 Client: Duggan and Hede
 Document Reference: /Network/Projects/4022.3/Reporting/4022.3AirEmissionsReport01.odt

Version Number

Version:	Issue Date:	Prepared by:	Description:	Approved by:	Signature:
00	14/09/18	Sam Wong	Internal Draft	-	-
01	14/09/18	Sam Wong	Final	Gary Hall	<i>G Hall</i>

Revision History

Revision:	Issue Date:	Approved by:	Signature:	Details of Revision:
01.1				
01.2				

Copyright:

Air Noise Environment retains ownership of the copyright to all reports, drawings, designs, plans, figures and other work produced by Air Noise Environment Pty Ltd during the course of fulfilling a commission. The client named on the cover of this document shall have a licence to use such documents and materials for the purpose of the subject commission provided they are reproduced in full or, alternatively, in part with due acknowledgement to Air Noise Environment. Third parties must not reproduce this document, in part or in full, without obtaining the prior permission of Air Noise Environment Pty Ltd.

Disclaimer:

This document has been prepared with all due care and attention by professional environmental practitioners according to accepted practices and techniques. This document is issued in confidence and is relevant only to the issues pertinent to the subject matter contained herein. Air Noise Environment Pty Ltd holds no responsibility for misapplication or misinterpretation by third parties of the contents of this document. If the revision history does not state that a Final version of the document has been issued, then it remains a draft. Draft versions of this document should not be relied upon for any purpose by the client, regulatory agencies or other interested parties.

Where site inspections, testing or fieldwork have taken place, the report is based on the information made available by the client or their nominees during the visit, visual observations and any subsequent discussions with regulatory authorities. It is further assumed that normal activities were being undertaken at the site on the day of the site visit(s).

The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to Air Noise Environment Pty Ltd for the purposes of this project is both complete and accurate.



Table of Contents

1	Introduction	5
2	Methodology	6
2.1	Emission Testing	6
2.2	Laboratory Analysis	7
2.3	Deviation from Methods	7
3	Results	8
3.1	Introduction	8
3.2	Scrubber Inlet and Outlet	8
3.2.1	Process Conditions	8
3.2.2	Monitoring Results	8
3.3	Mineral Oil Tanks	10
3.3.1	Process Conditions	10
3.3.2	Monitoring Results	10
3.4	Internal Roof Extraction Vent	11
3.4.1	Process Conditions	11
3.4.2	Monitoring Results	11
	Appendix A – Glossary of Terms	12

Index of Tables

Table 1.1: Monitoring Locations and Parameters	5
Table 2.1: Summary Of Emission Monitoring Methods	6
Table 2.2: Table of NATA Accredited Laboratories with NATA Accreditation Number	7
Table 3.1: Flow and Sample Characteristics for the Scrubber	8
Table 3.2: Odour Emissions Monitoring Results for Scrubber	9
Table 3.3: Speciated Organic Compounds Emissions Monitoring Results for Scrubber	9
Table 3.4: Flow and Sample Characteristics for the Scrubber	10
Table 3.5: Odour Emissions Monitoring Results for Mineral Oil Tank vent	10
Table 3.6: Odour Emissions Monitoring Results for Mineral Oil Tank vent	11



1 Introduction

Duggan and Hede commissioned Air Noise Environment Pty Ltd to conduct monitoring of air emissions from the JJ Richards and Sons Glendenning Facility as part of a post commissioning odour audit.

Table 1.1 details the monitoring locations and the monitoring performed at each location. The monitoring was completed on 28 August 2018.

Table 1.1: Monitoring Locations and Parameters

Compound	Release Point			
	Scrubber Inlet	Scrubber Outlet	Mineral Oil Storage	Internal Roof Extraction Vent
Velocity and Flowrate	x	x	x	x
Moisture Content	x	-	-	-
Speciated Organic Compounds	x	x	-	-
Odour	x	x	x	x

The monitoring of air emissions at the Glendenning Facility was completed during normal operating conditions. Any factors that may have affected the monitoring results were not observed by, or brought to the notice of Air Noise Environment (ANE) staff except where noted in this report.



2 Methodology

2.1 Emission Testing

Table 2.1 below lists the Methods used when undertaking emission monitoring at the Glendenning Facility.

All air quality monitoring undertaken by the Company has been undertaken in accordance with the methods identified in Table 2.1 below unless as specified in Section 2.3.

Table 2.1: Summary Of Emission Monitoring Methods

Measurement Parameter	Location	Method Equivalency	NATA Accredited
Sampling Positions	Scrubber Inlet	AS4323.1-1995 Method 1: selection of sampling positions	Yes
Velocity, Flowrate and Temperature	Scrubber Inlet	AS 4323.2-1995 "Stationary Source Emissions Method 2: Determination of Total Particulate Matter - Isokinetic Manual Sampling - Gravimetric Method" TM-2 USEPA (2000) Method 2	Yes
Velocity	Mineral Oil Tanker Vents	Flow rate provided by tanker pump filling meter.	No
Moisture Content	Scrubber Inlet	USEPA Method 4 Determination of Moisture Content in Stack Gases	Yes
Speciated Organic Compounds	Scrubber Inlet, Scrubber Outlet	NIOSH Method 1500 Sampling onto carbon tubes with analysis by Gas Chromatograph	Yes
Odour	Scrubber Inlet, Scrubber Outlet, Oil Taker, Roof Vent	AS/NZS 4323.3:2001 Stationary Source Emissions - Determination of Odour Concentration by Dynamic Olfactometry NSW (OM-7)	Yes



2.2 Laboratory Analysis

Table 2.2 Provides a list of the NATA accredited laboratories that performed the applicable analysis, NATA accreditation number, and report number.

Table 2.2: Table of NATA Accredited Laboratories with NATA Accreditation Number

Measurement Parameter	NATA Accreditation Number	Report Number
Moisture Content (gravimetric)	Alr Noise Environment Pty Ltd - 15841	-
Speciated Organic Compounds	National Measurement Institute - 198	RN1207345
Odour (dynamic olfactometry)	The Odour Unit Pty Ltd - 14974	20180829_057

2.3 Deviation from Methods

None



3 Results

3.1 Introduction

The following sections present a summary of results for each sampling location.

3.2 Scrubber Inlet and Outlet

3.2.1 Process Conditions

Sampling at the scrubber was conducted during normal operations. During the odour and speciated organic compound sampling, trucks were observed offloading waste product into the storage tanks.

3.2.2 Monitoring Results

Velocity, flow rates and moisture content was sampled from the duct leading into the scrubber inlet. As the scrubber system is a closed system, it is assumed that the flow rates from the outlet match the inlet. Results of emissions monitoring for the Scrubber inlet are provided in Table 3.1 and Table 3.2 below for emissions monitoring completed on 28 August 2018.

Table 3.1: Flow and Sample Characteristics for the Scrubber

Parameter	Monitoring Result	Units
Run Start Time (Moisture Test)	9:30	hh:mm
Run Stop Time (Moisture Test)	11:20	hh:mm
Meter Calibration Factor	0.989	-
Pitot Tube Coefficient	0.84	-
Total Meter Volume	0.620	m ³
Average Meter Temperature	20	°C
Average Stack Temperature	12	°C
Barometric Pressure	766.79	mm Hg
Stack Static Pressure	23.8	mm H ₂ O
Average Stack Gas Velocity	5.6	m/s
Average Stack Gas Velocity at Exit (m)	12.6	m/s
Stack Diameter at sampling plane (inlet)	0.3	m
Stack diameter at exit (estimated)	0.2	
Actual Stack Flow Rate	24	m ³ /min
Dry Standard Stack Flow Rate	23	Nm ³ /min



Table 3.2: Odour Emissions Monitoring Results for Scrubber

Compound	Scrubber Inlet	Scrubber Outlet
Odour concentration (average duplicate samples) (OU)	2,670	73
Odour emission rate (average duplicate samples) (OU.m ³ /min)	61,631	1,673
Odour emission rate (average duplicate samples) (OU.m ³ /s)	1,027.2	27.9

Table 3.3: Speciated Organic Compounds Emissions Monitoring Results for Scrubber

Compound	Scrubber Inlet	Scrubber Outlet
Speciated Organic compounds (average duplicate samples) Test 1 (mg/m ³)	<0.2	<0.2
Speciated Organic compounds (average duplicate samples) Test 2 (mg/m ³)	<0.3	<0.3
Speciated Organic compounds (average duplicate samples) Test 3 (mg/m ³)	<0.2	<0.2
Speciated Organic compounds (average duplicate samples) Test 1 (g/s)	<0.00008	<0.00008
Speciated Organic compounds (average duplicate samples) Test 2 (g/s)	<0.0001	<0.0001
Speciated Organic compounds (average duplicate samples) Test 3 (g/s)	<0.00009	<0.00009
No Speciated volatile compounds were detected in the analysis. The following list of compounds was analysed for: Benzene, Toluene, Ethylbenzene, m&p-Xylenes, o-Xylene, Styrene, Isopropylbenzene, n-Propylbenzene, 1,3,5-Trimethylbenzene, tert-Butylbenzene, 1,2,4-Trimethylbenzene, sec-Butylbenzene, 4-Isopropyltoluene, n-Butylbenzene, Dichlorodifluoromethane, Chloromethane, Vinylchloride, Bromomethane, Chloroethane, Trichlorofluoromethane, 1,1-Dichloroethane, Dichloromethane, trans-1,2-Dichloroethene, 1,1-Dichloroethene, 2,2-Dichloropropane, cis-1,2-Dichloroethene, Bromochloromethane, 1,1,1-Trichloroethane, Carbon tetrachloride, 1,1-Dichloropropene, 1,2-Dichloroethane, Trichloroethene, 1,2-Dichloropropane, Dibromomethane, cis-1,3-Dichloropropene, trans-1,3-Dichloropropene, 1,1,2-Trichloroethane, Tetrachloroethene, 1,3-Dichloropropane, 1,2-Dibromoethane, 1,1,1,2-Tetrachloroethane, 1,1,2,2-Tetrachloroethane, 1,2,3-Trichloropropane, 1,2-Dibromo-3-chloropropane, Hexachlorobutadiene, Chlorobenzene, Bromobenzene, 2-Chlorotoluene, 4-Chlorotoluene, 1,3-Dichlorobenzene, 1,4-Dichlorobenzene, 1,2-Dichlorobenzene, 1,2,4-Trichlorobenzene, 1,2,3-Trichlorobenzene, Trihalomethanes, Chloroform, Bromodichloromethane, Dibromochloromethane, Bromoform, Naphthalene		



3.3 Mineral Oil Tanks

3.3.1 Process Conditions

Sampling at the mineral oil vent was not possible due to restricted access to the building roof. Sampling was conducted under worst case scenario conditions from the vent of the Tanker truck during filling of the tanker. Sampling for odour was conducted from the Tanker vent pipe only during filling. The flow rate of air emissions from the tanker was determined from the rate at which waste oil was pumped into the tanker. The oil flow rate was provided by JJ Richards staff from the flow meter on the waste oil transfer pump.

3.3.2 Monitoring Results

Results of odour emissions monitoring for the Mineral oil tanks are provided in Table 3.4 and Table 3.5 below for emissions monitoring completed on 28 August 2018.

Table 3.4: Flow and Sample Characteristics for the Scrubber

Parameter	Monitoring Result	Units
Test 1 start time	10:49	hh:mm
Test 1 flow rate (actual)	0.877	m ³ /min
Test 1 flow rate (wet)	0.839	m ³ /min
Average Stack Temperature	14.8	°C
Test 2 start time	11:24	hh:mm
Test 2 flow rate (actual)	0.886	m ³ /min
Test 2 flow rate (wet)	0.848	m ³ /min
Average Stack Temperature	14.8	°C
Barometric Pressure	766.79	mm Hg
Diameter at sampling plane (vent outlet)	0.1	m

Table 3.5: Odour Emissions Monitoring Results for Mineral Oil Tank vent

Compound	Sample 1	Sample 2
Sample Time	10:49	11:24
Odour concentration (average duplicate samples) (OU)	7,095	7,215
Odour emission rate (average duplicate samples) (OU.m ³ /min)	5,953	6,120
Odour emission rate (average duplicate samples) (OU.m ³ /s)	99.2	102



3.4 Internal Roof Extraction Vent

3.4.1 Process Conditions

Sampling for odour was conducted for a point approximately 10 cm from the internal roof extraction vent. A sample tube was raised to the roof attached to a long pole. The odour samples were collected from inside the building at the extraction fan cowling before release to the external atmosphere.

3.4.2 Monitoring Results

Results of odour emissions monitoring for the extraction vents are provided in and Table 3.6 below for emissions monitoring completed on 28 August 2018.

Table 3.6: Odour Emissions Monitoring Results for Mineral Oil Tank vent

Compound	Sample
Sample time	13:00
Odour concentration (average duplicate samples) (OU)	51.5



Appendix A – Glossary of Terms



APPENDIX A: GLOSSARY OF TERMS

<	The analytes tested for was not detected, the value stated is the reportable limit of detection
µg	Micrograms (10 ⁻⁶ grams)
AS	Australian Standard
dscm	dry standard cubic meters (at 0°C and 1 atmosphere)
g	grams
kg	kilograms
m	metres
m ³	Cubic Metres, actual gas volume in cubic metres as measured.
mg	Milligrams
min	Minute
mg/m ³	Milligrams (10 ⁻³) per cubic metre.
mmH ₂ O	Millimetres of water
Mole	SI Unit defined as an amount of a substance that contains as many elementary entities (e.g. atoms, molecules, ions, electrons) as there are atoms in 12 grams of pure Carbon-12 (¹² C)
N/A	Not Applicable
ng	Nanograms (10 ⁻⁹ grams)
Nm ³	Normalised Cubic Metres - Gas volume in dry cubic metres at standard temperature and pressure (0°C and 101.3 kPa).
ou	Odour Units
°C	Degrees Celsius
µg/m ³	Micrograms (10 ⁻⁶) per cubic metre. Conversions from µg/m ³ to parts per volume concentrations (ie, ppb) are calculated at 25 °C.
ppb / ppm	Parts per billion / million.
PM	Particulate Matter.
PM ₁₀ , PM _{2.5} , PM ₁	Fine particulate matter with an equivalent aerodynamic diameter of less than 10, 2.5 or 1 micrometres respectively. Fine particulates are predominantly sourced from combustion processes. Vehicle emissions are a key source in urban environments.
sec	Second
Sm ³	Standardised Cubic Metres - Gas volume in dry cubic metres at standard temperature and pressure (0°C and 101.3 kPa) and corrected to a standardised value (e.g. 7% O ₂).



APPENDIX A: GLOSSARY OF TERMS

STP	Standard Temperature and Pressure (0°C and 101.3 kPa).
TVOC	Total Volatile Organic Compounds. These compounds can be both toxic and odorous.
USEPA	United States Environmental Protection Agency



Air Noise Environment
Environmental Monitoring and Assessment

Emissions Monitoring: JJ Richards & Sons, Glendenning

Duggan and Hede

Duggan and Hede
PO Box 496
Clayfield
QLD 4011

Sampling Date: 21 March 2019

Issued: 5 April 2019

Prepared by:
Air Noise Environment

ABN: 13 081 834 513



Accredited for Compliance with ISO/IEC 17025 – Testing





This document is issued in accordance with NATA's accreditation requirements.

NATA Accreditation Number: 15841

Accredited for compliance with ISO/IEC 17025 – Testing

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

Should you have any queries regarding the contents of this document, please contact Air Noise Environment.

Brisbane Office

A: Unit 3, 4 Tombo Street,

Capalaba, QLD 4157

T: +61 1300 851 761

E: qld@ane.com.au





DOCUMENT CONTROL SHEET

Document Details

Project Reference: 4022.4VOC Report01.odt
 Document Title: Emissions Monitoring: JJ Richards & Sons, Glendenning
 Client: Duggan and Hede
 Document Reference: /Network/Projects/4022.4/Reporting/4022.4VOC Report01.odt

Version Number

Version:	Issue Date:	Prepared by:	Description:	Approved by:	Signature:
00	04/04/19	Samuel Wong	Internal Draft	-	-
01	05/04/19	Samuel Wong	Final	Gary Hall	

Revision History

Revision:	Issue Date:	Approved by:	Signature:	Details of Revision:
01.1				
01.2				

Copyright:

Air Noise Environment retains ownership of the copyright to all reports, drawings, designs, plans, figures and other work produced by Air Noise Environment Pty Ltd during the course of fulfilling a commission. The client named on the cover of this document shall have a licence to use such documents and materials for the purpose of the subject commission provided they are reproduced in full or, alternatively, in part with due acknowledgement to Air Noise Environment. Third parties must not reproduce this document, in part or in full, without obtaining the prior permission of Air Noise Environment Pty Ltd.

Disclaimer:

This document has been prepared with all due care and attention by professional environmental practitioners according to accepted practices and techniques. This document is issued in confidence and is relevant only to the issues pertinent to the subject matter contained herein. Air Noise Environment Pty Ltd holds no responsibility for misapplication or misinterpretation by third parties of the contents of this document. If the revision history does not state that a Final version of the document has been issued, then it remains a draft. Draft versions of this document should not be relied upon for any purpose by the client, regulatory agencies or other interested parties.

Where site inspections, testing or fieldwork have taken place, the report is based on the information made available by the client or their nominees during the visit, visual observations and any subsequent discussions with regulatory authorities. It is further assumed that normal activities were being undertaken at the site on the day of the site visit(s).

The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to Air Noise Environment Pty Ltd for the purposes of this project is both complete and accurate.



Table of Contents

1	Introduction	5
2	Methodology	6
2.1	Emission Testing	6
2.2	Laboratory Analysis	7
2.3	Deviation from Methods	7
3	Results	8
3.1	Introduction	8
3.2	Mineral Oil Tanks	8
3.2.1	Process Conditions	8
3.2.2	Monitoring Results	8
3.3	Accuracy of Monitoring Results	9
	Appendix A – Glossary of Terms	10

Index of Tables

Table 1.1: Monitoring Locations and Parameters	5
Table 2.1: Summary Of Emission Monitoring Methods	6
Table 2.2: Table of NATA Accredited Laboratories with NATA Accreditation Number	7
Table 3.1: Speciated Organic Compounds Emissions Monitoring Results for Scrubber	8
Table 3.2: Estimated Method Uncertainties (TVOC)	9



1 Introduction

Duggan and Hede commissioned Air Noise Environment Pty Ltd to conduct monitoring of VOC emissions from the JJ Richards and Sons Glendenning Facility during waste oil unloading activities.

Table 1.1 details the monitoring locations and the monitoring performed. The monitoring was completed on 21 March 2019.

Table 1.1: Monitoring Locations and Parameters

Compound	Location
Speciated Organic Compounds	Filling Waste Oil into Trucks Vent

The monitoring of air emissions at the Glendenning Facility was completed during normal operating conditions. Any factors that may have affected the monitoring results were not observed by, or brought to the notice of Air Noise Environment (ANE) staff except where noted in this report.



2 Methodology

2.1 Emission Testing

Table 2.1 below lists the methods used when undertaking emission monitoring at the Glendenning Facility.

All air quality monitoring has been undertaken in accordance with the methods identified in Table 2.1 below unless as specified in Section 2.3.

Table 2.1: Summary Of Emission Monitoring Methods

Measurement Parameter	Location	Method Equivalency	NATA Accredited
Velocity	Mineral Oil Tanker Vents	Flow rate provided by tanker pump filling meter.	No
Speciated Organic Compounds	Mineral Oil Tanker Vents	NIOSH Method 1500 Sampling onto carbon tubes with analysis by Gas Chromatograph	Yes

2.2 Laboratory Analysis

Table 2.2 provides a list of the NATA accredited laboratories that performed the applicable analysis, NATA accreditation number, and report number.

Table 2.2: Table of NATA Accredited Laboratories with NATA Accreditation Number

Measurement Parameter	NATA Accreditation Number	Report Number
Speciated Organic Compounds	National Measurement Institute - 198	RN1227564

2.3 Deviation from Methods

None



3 Results

3.1 Introduction

The following section presents a summary of results for the speciated Volatile Organic sampling.

3.2 Mineral Oil Tanks

3.2.1 Process Conditions

Sampling at the mineral oil vent was not possible due to restricted access to the building roof. Sampling was conducted under worst case scenario conditions from the vent of the Tanker truck during filling of the tanker. Sampling for speciated VOC's was conducted from the Tanker vent only during filling. The flow rate of air emissions from the tanker was determined from the rate at which waste oil was pumped into the tanker. The oil flow rate was provided by JJ Richards staff from the flow meter on the waste oil transfer pump.

3.2.2 Monitoring Results

Results of the VOC emissions monitoring for the Mineral oil tanks are provided in Table 3.1 below for emissions monitoring completed on 21 March 2019.

Table 3.1: Speciated Organic Compounds Emissions Monitoring Results for Scrubber

Compound	Sample 1	Duplicate sample	Average
Sample Time	13:51	13:51	-
Benzene (mg/Nm ³)	25.06	12.53	18.80
Toluene (mg/Nm ³)	344.64	191.44	268.04
Ethylbenzene (mg/Nm ³)	17.23	8.35	12.79
m&p Xylenes (mg/Nm ³)	47.00	22.62	34.81
o-Xylene (mg/Nm ³)	15.51	7.48	11.50
Isopropylbenzene (mg/Nm ³)	1.25	5.92	3.59
N-Propylbenzene (mg/Nm ³)	2.98	1.41	2.19
1,3,5-Trimethylbenzene (mg/Nm ³)	4.54	2.09	3.32
Tert-Butylbenzene (mg/Nm ³)	<0.16	0.17	0.17
1,2,4-Trimethylbenzene (mg/Nm ³)	12.53	6.09	9.31
Total VOC (as n-hexane) (mg/Nm ³)	4,229.68	2,262.44	3,246.06

The following list of Speciated volatile compounds were not detected:

Styrene, tert-Butylbenzene, sec-Butylbenzene, 4-Isopropyltoluene, n-Butylbenzene, Dichlorodifluoromethane, Chloromethane, Vinylchloride, Bromomethane, Chloroethane, Trichlorofluoromethane, 1,1-Dichloroethane, Dichloromethane, trans-1,2-Dichloroethene, 1,1-Dichloroethene, 2,2-Dichloropropane, cis-1,2-Dichloroethene, Bromochloromethane, 1,1,1-Trichloroethane, Carbon tetrachloride, 1,1-Dichloropropene, 1,2-Dichloroethane, Trichloroethene, 1,2-Dichloropropane, Dibromomethane, cis-1,3-Dichloropropene, trans-1,3-Dichloropropene, 1,1,2-Trichloroethane, Tetrachloroethene, 1,3-Dichloropropane, 1,2-Dibromoethane, 1,1,1,2-Tetrachloroethane, 1,1,2,2-Tetrachloroethane, 1,2,3-Trichloropropane, 1,2-Dibromo-3-chloropropane, Hexachlorobutadiene, Chlorobenzene, Bromobenzene, 2-Chlorotoluene, 4-Chlorotoluene, 1,3-Dichlorobenzene, 1,4-Dichlorobenzene, 1,2-Dichlorobenzene, 1,2,4-Trichlorobenzene, 1,2,3-Trichlorobenzene, Trihalomethanes, Chloroform, Bromodichloromethane, Dibromochloromethane, Bromoform, Naphthalene



3.3 Accuracy of Monitoring Results

Table 3.2 presents a summary of the estimated method uncertainties for each of the monitoring parameters.

Table 3.2: Estimated Method Uncertainties (TVOC)

Sample Location	Method	% Uncertainty	Uncertainty	Units
Truck Vent	NIOSH 1500	4.54	209	mg/Nm ³

Uncertainty values cited are calculated at the 95% confidence level, with a coverage factor of 2.



Appendix A – Glossary of Terms



APPENDIX A: GLOSSARY OF TERMS

<	The analytes tested for was not detected, the value stated is the reportable limit of detection
µg	Micrograms (10 ⁻⁶ grams)
AS	Australian Standard
dscm	dry standard cubic meters (at 0°C and 1 atmosphere)
g	grams
kg	kilograms
m	metres
m ³	Cubic Metres, actual gas volume in cubic metres as measured.
mg	Milligrams
min	Minute
mg/m ³	Milligrams (10 ⁻³) per cubic metre.
mmH ₂ O	Millimetres of water
Mole	SI Unit defined as an amount of a substance that contains as many elementary entities (e.g. atoms, molecules, ions, electrons) as there are atoms in 12 grams of pure Carbon-12 (¹² C)
N/A	Not Applicable
ng	Nanograms (10 ⁻⁹ grams)
Nm ³	Normalised Cubic Metres - Gas volume in cubic metres at standard temperature and pressure (0°C and 101.3 kPa).
ou	Odour Units
°C	Degrees Celsius
µg/m ³	Micrograms (10 ⁻⁶) per cubic metre. Conversions from µg/m ³ to parts per volume concentrations (ie, ppb) are calculated at 25 °C.
ppb / ppm	Parts per billion / million.
PM	Particulate Matter.
PM ₁₀ , PM _{2.5} , PM ₁	Fine particulate matter with an equivalent aerodynamic diameter of less than 10, 2.5 or 1 micrometres respectively. Fine particulates are predominantly sourced from combustion processes. Vehicle emissions are a key source in urban environments.
sec	Second
Sm ³	Standardised Cubic Metres - Gas volume in dry cubic metres at standard temperature and pressure (0°C and 101.3 kPa) and corrected to a standardised value (e.g. 7% O ₂).



APPENDIX A: GLOSSARY OF TERMS

STP	Standard Temperature and Pressure (0°C and 101.3 kPa).
TVOC	Total Volatile Organic Compounds. These compounds can be both toxic and odorous.
USEPA	United States Environmental Protection Agency