Annual Review 2018

Borg Panels Oberon

124 Lowes Mount Road, Oberon NSW

Borg Panels Pty Ltd

21 August 2018

Revision History

Rev No.	Revision Date	Author / Position	Details	Authorised	
				Name / Position	Signature
0	15/05/18	Malcolm Macleod	Draft	Victor Bendevski Environmental and Regulatory Compliance	
1	25/7/2018	Victor Bendevski	Final	Victor Bendevski Environmental and Regulatory Compliance	
2	21/8/18	Victor Bendevski	Include DOP & E comments	Victor Bendevski Environmental and Regulatory Compliance	

Table of Contents

Annual Review Title Block.

Name of operation	Borg Panels Pty Ltd.
Name of operator	Borg Manufacturing
Development consent / project approval #	SSD 7016
Name of holder of development consent / project approval	Borg Construction
Mining lease #	N/A
Name of holder of mining lease	N/A
Water Access Licence #	80WA715797
Name of holder of water licence	Borg Panels Pty Ltd.
MOP/RMP start date	N/A
MOP/RMP end date	N/A

I, Victor Bendevski, certify that this audit report is a true and accurate record of the compliance status of Borg Panels Oberon for the period 1st May 2017 to 30th April 2018 and that I am authorised to make this statement on behalf of Borg Panels Pty Ltd

Note.

a) *The Annual Review is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000.*

b) *The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment, $22,000, or both.)*

Name of authorised reporting officer	Victor Bendevski
Title of authorised reporting officer	Environment and Compliance
Signature of authorised reporting officer	
Date	21/8/18

1 Introduction

1.1 Scope

This Annual Review has been prepared for the Borg Panels Oberon site and covers the twelve-month reporting period from 1 May 2017 to 30 April 2018. This Annual Review has been prepared to satisfy Condition C11 of Development Consent SSD 7016 issued by the Minister for Planning on 29 May 2017.

The Borg Panels facility is located at 124 Lowes Mount Road, Oberon and consists of a Medium Density Fibreboard (MDF) manufacturing plant and a mouldings manufacturing plant. A particleboard manufacturing plant is under construction at the site.

The Annual Review is submitted to NSW Department of Planning and Environment (DP&E), NSW Environment Protection Authority (EPA) and Oberon Council to ensure all interested parties are kept informed of the environmental performance of the Development. The Annual Review is also available on the Borg website.

Borg Panels maintained compliance with all necessary approvals and licenses with the exception of two surface water quality tests.

Table 1- Compliance

Relevant approval	Condition #	Condition description (summary)	Compliance status	Comment	Where addressed in Annual Review
SSD 7016			Compliant		Page 4
EPL 3035	**Section3, L4.1**	Noise	Compliant		Page 28
EPL 3035	**Section3, L2.4**	Air Quality	Compliant		Page 15
EPL 3035	**Section3, L2.5**	Water Quality	Non-compliant	Minor exceedance for BOD and TSS.	Page 26
WAL28951		Aquifer extraction	Compliant		Page 26

1.2 Background

In March 2010, Borg Panels acquired the former Carter Holt Harvey MDF and mouldings plant at Oberon. In 2012 Borg Panels also acquired the associated JeldWen factory, located adjoining the MDF plant. Borg have integrated the facilities into one site, which they own and operate.

The Borg Panels facility manufactures a range of MDF products (Custom wood) including:

- Standard MDF;
- Moisture Resistant MDF;
- E0 (Low Formaldehyde Emitting) MDF;
- Ultraprime MDF Mouldings;
- Decorative Laminated MDF and Particle Board; and
- Treated paper for the lamination of MDF and Particle Board.

The Borg Panels facility forms part of the wider Oberon Timber Complex (OTC).

Figure 1-Regional context

1.3 Consent

From May 2017, the Borg Panels facility operated under Ministerial Consent DA27/95, approved on 5 October 1995 by the then Minister for Urban Affairs and Planning. DA27/95 governs the operations of Borg Panels and Highland Pine Products Sawmill 2 that form part of the OTC. Highland Pine Products Sawmill 2 is not owned or operated by Borg.

Development Consent SSD 7016 was issued by the Minister for Planning on 29 May 2017 to construct and operate a particleboard facility, and to continue operating, and make alterations and additions to the existing MDF facility. As of 29 May 2017, the site now operates under this new consent SSD 7016.

Condition A26 of Development Consent SSD 7016, seeks to remove the Borg Panels operations from the previous consent DA27/95 (that applies to the OTC) and consolidate all Borg operations under the new Development Consent SSD 7016.

Condition A26 of SSD 7016 requires Borg Panels to surrender DA27/95, which is to occur within 6 months from 29 May 2017. Borg Panels submitted an application under Clause 97

of the *Environmental Planning and Assessment Regulation 2000* to the DP&E on 30 November 2017 to remove itself from DA27/95. This request to surrender DA 27/95 has been withdrawn and a modification to SSD 7016 has been submitted to DOP&E to remove condition A26

A summary of development consents currently held by Borg Panels is outlined in **Table 1**.

Table 2 – Borg Panels Development Consents

Consent Description	Date	Approval Authority	Approved Development
DA27/95	5 October 1995	Then Minister for Urban Affairs and Planning	Expand and upgrade existing MDF plant; construct new sawmill with planer and dryer; and develop a tannin extraction plant (Radtan) to make resins for the particle board plant. Increase in road transport of raw materials and product.
DA27/95 M1	3 May 2001	Then Minister for Urban Affairs and Planning	
DA27/95 MOD-83-10-2002-i	27 February 2003	Then Minister for Urban Affairs and Planning	
DA27/95 MOD-27-2-2005-i	17 May 2005	Then Minister for Urban Affairs and Planning	Construct and operate a paint manufacturing plant to manufacture coatings material to be used on door skins within the Jeld-Wen Plant.
DA27/95 MOD 4	26 June 2008	Then Minister for Urban Affairs and Planning	Paint coating line.
DA27/95 MOD 5	17 February 2012	Then Minister for Urban Affairs and Planning	Upgrade existing MDF plant - warehouse extensions. Erection of a new warehouse to the west of the existing mouldings plant. Building extension between two existing industrial buildings. Building extension to the south of the existing mouldings plant. Workshop to the south of the primary new warehouse building, connected to the warehouse. Ancillary works, including awnings and hardstand areas.
DA27/95 MOD 6	November 2014	Then Minister for Urban Affairs and Planning	Refer MOD 7.

Consent Description	Date	Approval Authority	Approved Development
DA27/95 MOD 7	3 August 2015	Minister for Planning	Temporary hardstand area on Lot 2902 DP 1056754 for short-term storage of materials, machinery, construction plant and equipment for the duration of construction. Construction of a new Debarker Building, log lifter and log storage area. New Bark Building and retaining wall. Relocation of existing cyclone bunker. Relocation of existing Fire tanks, Pump House and Fire Control Centre. Relocation of the existing front entry gate and gatehouse. Installation of permanent hardstand area for additional truck parking to the southwest corner of the site.
DA27/95 MOD 8	11 December 2015	Minister for Planning	Gas Fired Cogeneration Units. Removal of two gas fired steam boilers and installation of a Gas Fired Co-Generation Plant.
Development Consent SSD7016	29 May 2017	Minister for Planning	Construction and operation of a particle board facility and continuation of, and alterations and additions to, the existing medium density fibreboard facility. Surrender of DA27/95 (to be undertaken).

1.4 Annual Review Requirements

Annual Review requirements, in accordance with Condition C11 of Development Consent SSD 7016, and the section these requirements are addressed are summarised in **Table 2**.

Table 3 – Annual Review Requirements

Development Consent SSD 7016 – Condition C11	Section of Annual Review
By 31 July 2017, and each year thereafter, unless otherwise agreed by the Secretary, the Applicant must review and submit a report to the Secretary detailing the environmental performance of the Development to the satisfaction of the Secretary. This review must:	This Report
(a) describe the development that was carried out during the reporting period, and the development that is proposed to be carried out over the next reporting period;	Section 2 Section 7

Development Consent SSD 7016 – Condition C11	Section of Annual Review
(b) include a comprehensive review of the monitoring results and complaints records of the Development over the previous reporting period, which includes a comparison of these results against the: i. relevant statutory requirements, limits or performance measures/criteria; ii. requirements of any plan or program required under this consent; iii. the monitoring results of previous years; and iv. the relevant predictions in the EIS;	Section 4 Section 5
(c) identify any non-compliance during the reporting period, and describe what actions were (or are being) taken to ensure compliance;	Section 4 Section 6
(d) identify any trends in the monitoring data over the life of the Development;	Section 4
(e) identify any discrepancies between the predicted and actual impacts of the Development, and analyse the potential cause of any significant discrepancies; and	Section 4
(f) describe what measures will be implemented over the next reporting period to improve the environmental performance of the Development.	Section 7

1.5 Environment Protection Licence

Borg Panels operates in accordance with Environment Protection Licence 3035 (EPL 3035), issued on 14 February 2001 by the NSW Environment Protection Authority (EPA) under Section 55 of the *Protection of the Environment Operations Act 1997*. The current Licence version date is 22 November 2017.

1.6 Water Licences

Borg Panels holds a Water Access Licence for use of groundwater in operations. Current licence details issued under the *Water Management Act 2000* are summarised in **Table 3**.

Table 4 – Water Licences

Approval Details	Approval Number	Validity of Licence	Approval Kind	Extraction Limit
WAL28951	80WA715797	16 January 2012 – 01 March 2026	Water Extraction	28 Units

1.7 Trade Waste Licence

Borg Panels Trade Waste Service Contract with Oberon Council, for the discharge of liquid trade wastes into Council's sewerage system, was not applicable this reporting period as there was no renewal of the licence. Borg Panels now treats its liquid trade waste on site

1.8 Environmental Management Plan

As documented in **Section 1.3**, during the reporting period the Borg Panels facility operated primarily under Development Consent SSD 7016.

Development Consent SSD 7016, approved on 29 May 2017, required within six months of the date of this consent that an Operational Environmental Management Plan (OEMP) for the existing operation be prepared to the satisfaction of the Secretary. A modernised OEMP (Borg Panels, 30 November 2017) was prepared and is being implemented. This OEMP replaces the previous Environmental Management Plan (last modified 19 February 2016) prepared under Condition 46 of DA27/95.

Additionally, in accordance with Condition C1 of Development Consent SSD 7016, a Construction Environmental Management Plan (CEMP) (Borg Construction, 31 May 2017) was prepared and approved by DP&E prior to commencement of the construction of the particleboard plant. Construction activities continue to be carried out in accordance with this CEMP.

1.9 Contacts

Table 4 outlines the contact details for site personnel responsible for operating the Borg Panels facility.

Table 5 – Site Personnel

Name	Title	Contact Details
Tony Truscott	Operations Manager - Oberon	+61 436 613292
Sharon Cutting	Work, Health, Safety and Environment Coordinator	+61 408 635258
Aaron Evans	Process Development and Environment Manager	(02) 6339 6066
Victor Bendevski	Environmental and Regulatory Compliance	(02) 4340 9827

1.10 Actions Required from Previous Annual Review

The following actions were identified in the previous Annual Review for implementation during this reporting period.

Table 6 – Proposed Activities for 2017-18 Reporting Period

	Activities Proposed in 2017-18 Reporting Period	Results achieved
1	Preparation of an Operational Environmental Management Plan for the existing development, including: • Operational Air Quality Management Plan • Operational Noise Management Plan • Mobile Wood Chipper Operation Management Plan • Surface Water Management Plan • Waste Management Plan	Operational Environmental Management Plan was completed including all relevant sub plans.
2	Convection Bundle for Esteel energy centre planned for replacement in December 2017	Convection bund was successfully completed
3	Construction of: • Particleboard Plant • Upgrade to electric chipper and chip conveyors • Crane Building 3 • New Press Building • Fill southern dam ready for construction • Swales upgrade around southern boundary • New lunchroom within T&D area • Construct new office entry, meeting rooms, gym and shower block	Most of the proposed construction activities were successfully completed during this reporting period. The only objectives not yet completed is; -The construction of the Particleboard Plant, of which is still in progress. -And the upgrade of swales on the southern boundary, of which are planned to be undertaken in the following reporting period.
4	On-going site remediation of the disused fuel depot at Lot 1 DP 1085563, monitoring and site validation.	Remediation of the disused fuel depot was successfully completed. A validation report, compiled by Enviro West Consulting. Concluded that remediation of the contaminated site was suitable for on-going industrial/commercial use. However, the excavated material stockpile needed further remediation. The validation report is attached to this document as **Appendix A.** Consequently, Envirowest deemed the contaminated excavated material stockpile successfully remediated and suitable for re-use on site in a letter dated 23/11/2017. This report is attached to this document as **Appendix A.**

2 Operations During the Reporting Period

2.1 Operations

2.1.1 Production

Development Consent SSD 7016 allows for production of up to 380,000 m^3 of MDF and 500,000 m^3 of particleboard per calendar year.

During the reporting period the Borg Panels facility manufactured 200,135 m^3 of MDF board. The particleboard plant is still under construction, and therefore no particleboard was produced.

2.1.2 Facility Improvements

The following facility improvements were made to existing site infrastructure, plant and or equipment as a result of hazard identification or environmental incidents that occurred during the reporting period:

- Road repair works, North Road
- Pavement repairs to Log Yard
- Replaced Debarker control room windows
- Continued concreting of unpaved areas around the site.
- Build a Variable Speed Drive (VSD) room for the Conti 2 Dryer Fan
- Installed Conti 2 press extraction system.
- Installed skylights above the saws area
- Install roof over Mixed fuel walking floor
- Replaced Thermal oil convection bundle on the heat plant.
- Set up work shop with walls, compressed air, installed new work bench’s

2.1.3 Site activities during 2017-2018.

During the reporting period, the site has seen significant changes associated with the construction of the particleboard facility and some changes to the existing operations.

Particleboard construction related activities included:

- Completed remediation of the Fuel Depot.
- Construction and Erection of Particleboard Area 3000, Flake preparation area.
- Construction and Erection of Particleboard Area 4000, Particleboard dryer.
- Construction and Erection of the Particleboard Area 5000, Screening Area.

- Construction and Erection of the press building, including particleboard process areas 6000-8000, Infrastructure points 13-21 in Figure 2.
- Changes to the stormwater system at the Southern area of the site including reclamation of the first flush basin.
- Commencement of construction of the new first flush basin and emergency catchment pond, Infrastructure points 32 & 33 in Figure 2.
- Completed construction of the Administration building. Infrastructure points 19 - 21 in Figure 2.
- Commencement of construction of Chipper and wet chip silo areas. Infrastructure points 10 & 11 in Figure 2

Various commitments and management or mitigation measures have been implemented, these include the following:

- Creation of Operational Management plans, training and implementation is still ongoing
- Installation and commissioning of the new Conti 2 press extraction system.
- Installation of Noise attenuation to the Conti 1 drier fan intake and Main fibre transport fan.

A modification of the SSD 7016 consent was submitted the Department in the January 2018, this included a minor change to the orientation of the Material Handling building at the particleboard plant and a change to the warehouse at the Northern end of the site with an increase in the warehouse foot print and changes to the stormwater management system. A determination is yet to be received from the Department on this application for modification.

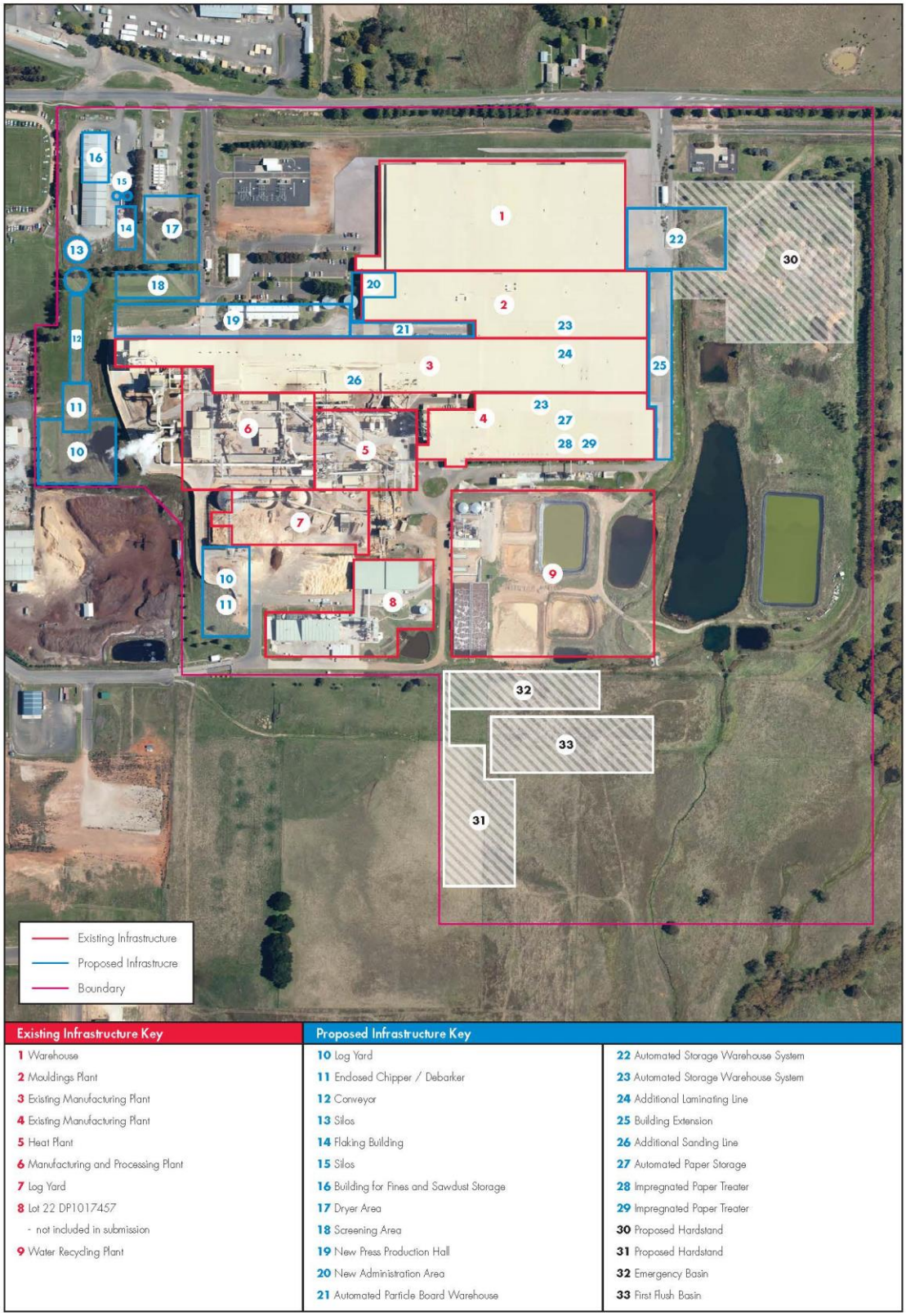


Figure 2- Approved development area

3 Waste Management

Waste generated at the Borg Panels site is managed in accordance with the Waste Management Plan (Borg Panels, 24 November 2017). The waste management process incorporates a system of recycling and re use of waste materials generated on site with the last resort being off site landfill disposal .

3.1 Liquid and Solid Waste

A summary of the date, quantity, description and destination of waste removed from the Borg Panels facility during the reporting period is provided in **Table 6**.

Table 7 – Waste Management 2017-18

Month	Quantity			Description	Destination
	m^3	Litres	Tonnes		
May 2016					
June 2016	590			General Waste	Oberon Council Waste Depot
July 2016				General Waste	Oberon Council Waste Depot
August 2016	120			General Waste	Oberon Council Waste Depot
September 2016			20.76	Waste requiring Burial	Bathurst Council Waste Management Centre
October 2016	70			General Waste	Oberon Council Waste Depot
November 2016			21.02	Waste requiring Burial	Bathurst Council Waste Management Centre
December 2016	210			General Waste	Oberon Council Waste Depot
			10.38	Waste requiring Burial	Bathurst Council Waste Management Centre
January 2017	80			General Waste	Oberon Council Waste Depot
	500			Ash	Oberon Council Waste Depot
February 2017	640			General Waste	Oberon Council Waste Depot
March 2017			38.92	Waste requiring Burial	Bathurst Council Waste Management Centre
April 2017			10.38	Waste requiring Burial	Bathurst Council Waste Management Centre
May 2018	20			Ash	Oberon Council Waste Depot
	40			Building Demolition Waste	Oberon Council Waste Depot
	260			General Waste	Oberon Council Waste Depot
	30			Building Demolition Waste	Oberon Council Waste Depot

Month	Quantity			Description	Destination
	m^3	Litres	Tonnes		
	160			General Waste	Oberon Council Waste Depot
			10.44	Waste requiring Burial	Bathurst Council Waste Management Centre
TOTAL	**2630**			**General Waste**	**Oberon Council Waste Depot**
	20			**Ash**	**Oberon Council Waste Depot**
	70			**Building Demolition Waste**	**Oberon Council Waste Depot**
			111.9	**Waste requiring Burial**	**Bathurst Council Waste Management Centre**
		29600		**Waste Oil**	**Transpacific**

Waste types in **Table 7** are further described as:

- General waste including a mix of both putrescible and non-putrescible waste.
- Bottom ash being the ash removed from the furnaces.
- Waste requiring burial made up of urea formaldehyde spade-able resin and paraffin wax bladders.
- Building and demolition waste including bricks, concrete, paper, plastics, glass, metal and timber are recycled when appropriate.
- Used oils from the plant process oil systems and mechanical workshop are recycled off site via third parties.

No waste generated by the facility-required tracking during transporting, as shown in **Table 8**.

Table 8 – Types and Quantities of Trackable Waste Generated 2017-18

Liquid Waste (Litres)					Hazardous Waste (Tonnes)	
Waste Oil	**Oily Water**	**Liquid Resin**	**Paint Waste**	**Laboratory Waste**	**UV Paint Solvent**	**UV Paint Rags**
Nil	Nil	Nil	Nil	Nil	Nil	Nil

3.2 Trade Waste

Borg Panels Trade Waste Service Contract with Oberon Council, for the discharge of liquid trade wastes into Council's sewerage system, was not applicable this reporting period as there was no renewal of the licence. Borg Panels now treats its liquid trade waste on site.

4 Environmental Management and Performance

4.1 Environmental Management

Borg Panels operates in accordance with the OEMP (Borg Panels, 30 November 2017), as documented in **Section 1.8**. This OEMP aims to ensure adequate management, monitoring and mitigation regimes are in place to protect the surrounding environment.

Additionally, construction activities carried out on-site are undertaken in accordance with the (CEMP) (Borg Construction, 31 May 2017).

Environmental monitoring was undertaken in accordance with the requirements of Development Consent SSD 7016 and EPL 3035. Environmental monitoring is an integral part of the environmental management system. The measurement and evaluation of monitoring results allows for the assessment of performance against quantitative and qualitative standards and assists in the identification of any non-conformances or areas that may require additional attention.

4.2 Meteorological Data

In accordance with Development Consent SSD 7016 and EPL 3035, Borg Panels operate and maintain a meteorological monitoring station located east of the existing Spring Dam. The following section summarises the meteorological data for the 2017-18 reporting period.

4.2.1 Rainfall

The total monthly rainfall (mm) and number of rain days during the reporting period is shown in **Table 9** and **Figure 1**. A total rainfall of 651.2mm was recorded during the 2017-18 reporting period. This is 186.7mm below the annual mean rainfall (837.9mm) for the Oberon region (Bureau of Meteorology, Oberon Springbank Site No. 063063). Indicating quite a dry year for the region.

Table 9 – Recorded Rainfall 2017-18

Total Monthly Rainfall (mm)												
May	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**Total**
50.6	9.2	28.4	56.6	59	63	80.4	114.2	47	44.2	54.2	44.4	651.2
Number of Rain Days (≥0.2mm)												
19	19	18	16	11	9	12	12	10	10	8	8	152

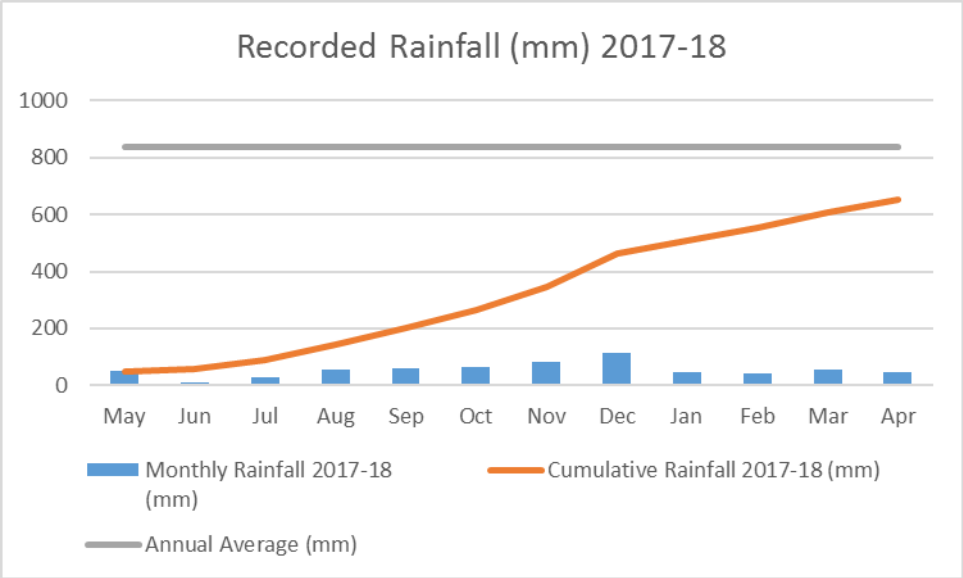


Figure 3- Recorded Rainfall at Borg Panels Meteorological Station(mm)2017-2018

4.2.2 Temperature

Monthly maximum and minimum temperatures recorded during the reporting period are shown in **Table 10**.

Table 10 – Monthly Minimum and Maximum Temperatures 2017-18

Minimum and Maximum Monthly Temperatures (°C)											
May	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**
-7	-5.5	-8.9	-5.9	-5.3	-1.7	-0.2	4.5	3.9	5	-0.7	1.3
16	13.8	15.3	15.7	25.2	24.7	26.1	30.4	34.3	32.8	29.4	27.5

4.2.3 Wind Speed and Direction

The recorded wind speed and direction data is summarised in **Table 11**. The annual wind rose for the reporting period is displayed in **Figure 4**.

Table 11 – Monthly Daily Wind Data 2017-18

Month	Maximum Wind Speed (km/hr)	Mean Wind Speed (km/hr)	Dominant Wind Direction
May 2017	51.1	9.4	S – E
June 2017	38.1	9.5	ESE
July 2017	44.4	12.7	W
August 2017	53	14.3	W – WNW
September 2017	64.1	15.2	W
October 2017	53.6	12.3	S
November 2017	47.1	13.1	E
December 2017	65.1	12.5	S – E
January 2018	59.5	11.4	SE
February 2018	52.2	14.0	E – ESE
March 2018	57	14.9	E
April 2018	61.5	10.9	ESE

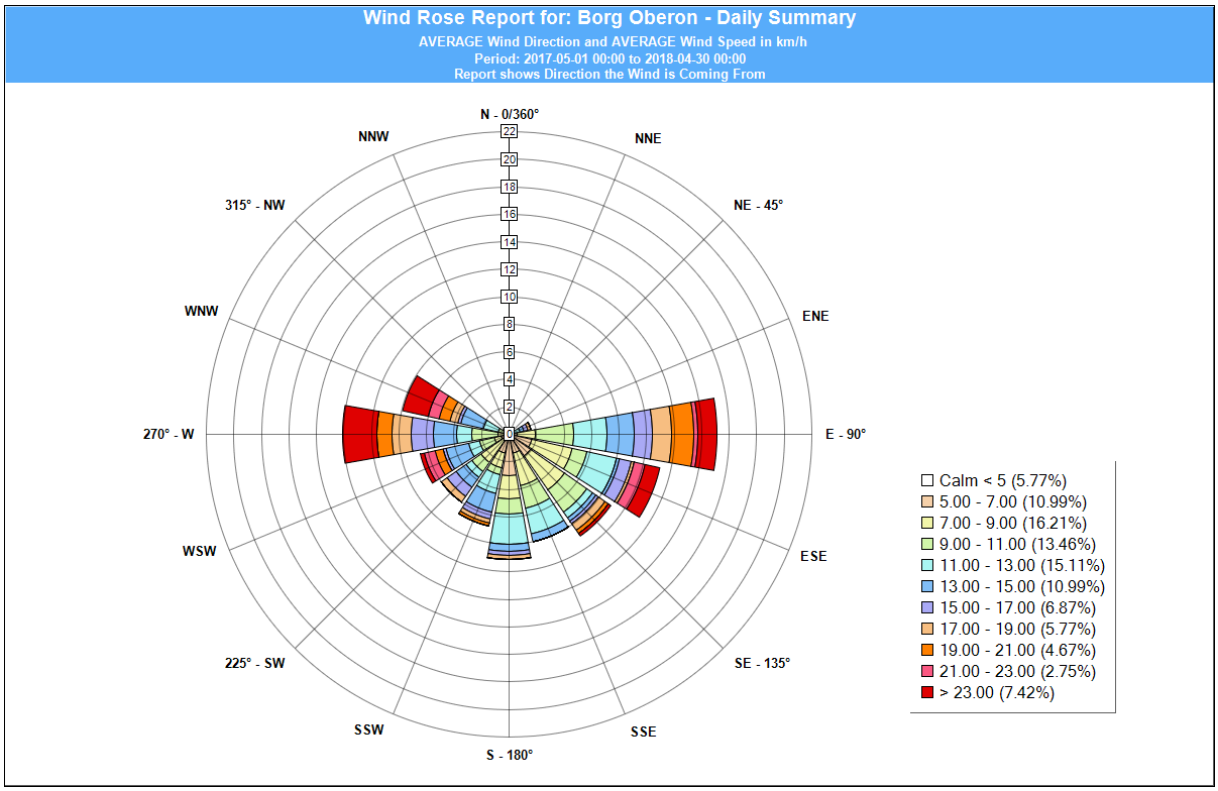


Figure 4- Daily Summary Average Wind Rose 2017-2018

4.3 Air Quality

4.3.1 Dust Depositional Gauges

Borg Panels operate a network of six (6) dust depositional gauges within and around the facility. The location of dust depositional gauges is listed in **Table 12**.

Table 12 – Location of Dust Depositional Gauges

Dust Depositional Gauge	Location Description
DDG 1	Borg Panels eastern boundary with Woodchem
DDG 2	South West of Conti 2
DDG 3	Water treatment plant
DDG 4	Water treatment plant
DDG 5	Highlands Motor Inn, South of Borg Panels Plant
DDG 6	Albion Street, East of Borg Panels plant

Dust deposition monitoring is undertaken in accordance with the Borg Panels *Operational Air Quality Management Plan* (OAQMP) (28 November 2017). Dust deposition monitoring is not a requirement of a consent or licence. Whilst there are no site limits, depositional dust monitoring is conducted to assist with site management.

DDGs 1-4 are located on the periphery of the site. DDG 5 and DDG 6 are located at sensitive receivers.

DDG 1 is located within the operational boundary of the site immediately adjacent to an unsealed laydown area and in general proximity of an unsealed road. DDG 2 is located immediately adjacent to an active construction site. The dust deposition criterion however does not apply to the on-site dust conditions, only off-site dust levels.

DDG 5 and DDG 6, the off-site sensitive receivers' results are well below the applicable dust deposition criterion.

The air quality criteria adopted for Borg Panels for deposited dust is provided in **Table 12**.

Table 13 – Air Quality Criteria Deposited Dust

Averaging Period	Impact	Criteria
Annual	Incremental	2 g/m^2/month
	Total	4 g/m^2/month

Deposited dust is assessed as insoluble solids as defined by *Standards Australia AS3580.10.1-2003: Methods for Sampling and Analysis of Ambient Air – Determination of Particulates – Deposited Matter – Gravimetric Method*.

During the reporting period all dust samples were collected by trained specialists and analysed by NATA certified laboratories.

Table 14 provides a summary of Borg Panels annual average results for insoluble solids during the reporting period and for previous two years. Monthly data and rolling annual average data is provided in **Appendix B**.

Table 14 – Dust Depositional Gauges Annual Average

No.	Location	Annual Average Insoluble Solids (g/m^2/month) 2015-16	Annual Average Insoluble Solids (g/m^2/month) 2016-17	Annual Average Insoluble Solids (g/m^2/month) 2017-18
DDG 1	Borg Panels eastern boundary with Woodchem	8.5	10.1	9.4
DDG 2	South West of Conti 2	4.0	2.6	3.9
DDG 3	Water treatment plant	1.4	1.0	1.2
DDG 4	Water treatment plant	1.1	0.6	0.9
DDG 5	Highlands Motor Inn	2.3	1.6	1.7
DDG 6	Albion Street east of Borg Panels plant	1.1	0.7	0.9

Results for the 2017/18 reporting period resemble previous year's data. DDG 1 returned depositional results that exceeded the annual average criteria of $4mg/m^2$, and all other monitoring points were below the annual average criteria.

Probable reasons for dust depositional results exceeding the criteria adopted by Borg Panels at DDG 1 is likely to be the result of two contributing factors. Firstly, during the reporting period, below average annual rainfall was experienced making conditions dryer than usual. Secondly, DDG 1 is located on the boundary of the Borg Panels and Woodchem sites, another Borg Group company. This dust depositional gauge is adjacent to the excavation pit area and an unpaved road used by vehicles carting soil from the borrow pit to the construction site. It is also close to the site heat plant fuel wood stockpile and preparation area and is therefore exposed to significant plant traffic in day-to-day activities. A water cart regularly wets down unsealed roads when vehicle movements are generating dust as part of the Dust Management Plan for the CEMP covering construction works under SSD7016.

Graphs for the rolling data encompassing this reporting period are included in this document as **Appendix B.**

4.3.2 Air Emissions

In accordance with EPL 3035, Borg Panels monitor air emissions from the plant. The locations of air emissions monitoring is listed in **Table 15**. There is no air emission monitoring required under SSD7016. Full laboratory results are attached to this document as **Appendix C.**

Table 15 – Location of Air Emissions Monitoring

EPA Identification No.	Description
4	DC1 Baghouse
5	DC2 Baghouse
7	Conti 2 Stage 1 Dryer Cyclone #1 (west)
8	Conti 2 Stage 1 Dryer Cyclone #2 (east)
9	Conti 1 Dryer Cyclone #1 (south)
10	Conti 1 Dryer Cyclone #2 (north)
11	Conti 2 Heat Plant
12	Press Vents Conti 1
13	Press Vents Conti 2
17	Conti 1 Heat Plant
18	Press exhaust vents discharge
19	Dryer stack
20	Reject cyclone DC 11
21	Reject cyclone DC 12
22	Reject cyclone DC 13
27	Combined Stack Venting Conti 2 Press Vents and DC1 and DC2 Bag Houses

While EPA Identification Points 20, 21 and 22 (reject cyclones) are recognised as discharge points in EPL 3035, there is no requirement to monitor the concentration of pollutants discharged at these points. In any case, this plant is dormant.

EPA Identification Point 23 was removed from EPL 3035 in the licence variation on 9 October 2017. Exhaust from Point 23 Paper Oven Vent Discharge is ducted to Point 11 Conti 2 Heat Plant.

Point 13 (press vents) were not monitored this year as the new press extraction system was installed and utilised the newly created point 27. Point 27 had intended to incorporate Point 4 & 5 but this has not been completed hence results were recorded independently for Point 4, 5, & 27.

Environment Protection Licence 3035 contains air concentration limits for several of the existing emission points on the Premises. The emission limits are summarised in **Table 15**.

Table 16 – EPL 3035 Air Concentration Limits Point 9, 10, 11, 17

Pollutant	Units of Measure	100 Percentile Concentration Limit
Solid Particulates	mg/m^3	200
Volatile Organic Compounds	mg/m^3	10
Formaldehyde	mg/m3	5

Source: NSW EPA EPL 3035 (9 October 2017)
mg/m^3 = milligrams per cubic metre

Emissions to air monitoring results are assessed against the criteria in **Table 15** for the existing plant to determine compliance with EPL limits.

Emissions to air monitoring is performed in accordance with the methodologies recommended by the NSW Office of Environment and Heritage as specified in the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales* (January 2007) and the requirements of EPL 3035. USEPA Method GD-008 is the approved method for determining flow rate and sampling for particulate matter in cyclonic flow from licenced discharge points 7, 8, 9, 10.

Air emissions monitoring was undertaken by trained specialists and samples analysed by NATA certified laboratories. Monitoring equipment is maintained and calibrated in accordance with the manufacturer's specifications by qualified specialists.

For each discharge point identified in **Table 14**, Borg Panels monitored the concentration of each pollutant as specified in EPL 3035. Current reporting period results are compared against results from the previous two years in **Table 16-28**.

Table 17 – Air Emissions Monitoring Results EPA Identification Point 4

Pollutant	Units	Frequency	2015-16	2016-17	2017/18
Particulate Matter	mg/m^3	Yearly	4.3	2.3	<2
Formaldehyde	mg/m^3	Yearly	0.09	3.7	1.8

Table 18 – Air Emissions Monitoring Results EPA Identification Point 5

Pollutant	Units	Frequency	2015-16	2016-17	2017/18
Particulate Matter	mg/m^3	Yearly	4.3	2.3	2.2
Formaldehyde	mg/m^3	Yearly	0.09	3.7	<0.02

Table 19 – Air Emissions Monitoring Results EPA Identification Point 7

Pollutant	Units	Frequency	2015-16	2016-17	2017/18
Particulate Matter	mg/m^3	Yearly	19	40	29

Table 20 – Air Emissions Monitoring Results EPA Identification Point 8

Pollutant	Units	Frequency	2015-16	2016-17	2017/18
Particulate Matter	mg/m^3	Yearly	21	33	26

Table 21 – Air Emissions Monitoring Results EPA Identification Point 9

Pollutant	Units	Frequency	2015-16	2016-17	2017/18
Particulate Matter	mg/m^3	Yearly	29	9.8	36
Formaldehyde	mg/m^3	Yearly	3	1.1	5.8
Nitrogen Oxides	mg/m^3	Yearly	250	150	220
PM10	mg/m^3	Yearly	25	5.9	32
Smoke Emissions	Percent Opacity	6 Monthly			1
Volatile Organic Compounds	mg/m^3	Yearly	1.3	2.9	8.2

Table 22 – Air Emissions Monitoring Results EPA Identification Point 10

Pollutant	Units	Frequency	2015-16	2016-17	2017/18
Particulate Matter	mg/m^3	Yearly	31	21	42
Formaldehyde	mg/m^3	Yearly	3.1	2.4	6.5
Nitrogen Oxides	mg/m^3	Yearly	250	170	220
PM10	mg/m^3	Yearly	28	8	36
Smoke Emissions	Percent Opacity	6 Monthly			1
Volatile Organic Compounds	mg/m^3	Yearly	1.5	5.3	2.4

Table 23 – Air Emissions Monitoring Results EPA Identification Point 11

Pollutant	Units	Frequency	2015-16	2016-17	2017/18
Particulate Matter	mg/m^3	Yearly	75*	130*	140
Formaldehyde	mg/m^3	Yearly	<0.01	<0.01	1.9
Nitrogen Oxides	mg/m^3	Yearly	530	530	670
PM10	mg/m^3	Yearly	37*	80*	97
Volatile Organic Compounds	mg/m^3	Yearly	0.99	0.12	0.26
Smoke Emissions	Percent Opacity	6 Monthly	0	0	0

Note: * Corrected to 6.5% CO_2 mg/m^3

Table 24 – Air Emissions Monitoring Results EPA Identification Point 12

Pollutant	Units	Frequency	2015-16	2016-17	2017/18
Particulate Matter	mg/m^3	Every 3 years	-	-	29
Formaldehyde	mg/m^3	Every 3 years	-	-	2.5
Nitrogen Oxides	mg/m^3	Every 3 years	-	-	<3
PM10	mg/m^3	Every 3 years	-	-	24
Volatile Organic Compounds	mg/m^3	Every 3 years	-	-	0.88

Note: EPA Point 12 due for sampling in 2018

Table 25 – Air Emissions Monitoring Results EPA Identification Point 13

Pollutant	Units	Frequency	2015-16	2016-17	2017/18
Particulate Matter	mg/m^3	Every 3 years	-	-	
Formaldehyde	mg/m^3	Every 3 years	-	-	
Nitrogen Oxides	mg/m^3	Every 3 years	-	-	
PM10	mg/m^3	Every 3 years	-	-	
Volatile Organic Compounds	mg/m^3	Every 3 years	-	-	
Carbon Dioxide	mg/m^3	Every 3 years	-	-	
Carbon Monoxide	mg/m^3	Every 3 years	-	-	

Note: EPA Point 13 No longer in use.

Table 26 – Air Emissions Monitoring Results EPA Identification Point 17

Pollutant	Units	Frequency	2015-16	2016-17~	2017/18
Particulate Matter	mg/m^3	Yearly	190*	0	0
Formaldehyde	mg/m^3	Yearly	0.017	0	0
Nitrogen Oxides	mg/m^3	Yearly	1000	0	0
PM10	mg/m^3	Yearly	140*	0	0
Volatile Organic Compounds	mg/m^3	Yearly	1	0	0
Smoke Emissions	percent Opacity	Every 6 months	0	0	0

Note: * Corrected to 6.5% CO2 mg/m^3
~ No flow. Exhaust from Conti 1 Heat Plant now ducted back into the Conti 1 production system

Table 27 – Air Emissions Monitoring Results EPA Identification Point 18

Pollutant	Units	Frequency	2015-16	2016-17	2017/18
Particulate Matter	mg/m^3	Every 3 years	Dormant	Dormant	Dormant
Formaldehyde	mg/m^3	Every 3 years	Dormant	Dormant	Dormant
Volatile Organic Compounds	mg/m^3	Every 3 years	Dormant	Dormant	Dormant
Velocity	mg/sec	Every 3 years	Dormant	Dormant	Dormant

Note: EPA Point 18 due for sampling in 2018

Table 28 – Air Emissions Monitoring Results EPA Identification Point 19

Pollutant	Units	Frequency	2015-16	2016-17	2017/18
Particulate Matter	mg/m^3	Yearly	Dormant	Dormant	Dormant
Nitrogen Oxides	mg/m^3	Yearly	Dormant	Dormant	Dormant
Volatile Organic Compounds	mg/m^3	Yearly	Dormant	Dormant	Dormant
Velocity	mg/sec	Yearly	Dormant	Dormant	Dormant

Table 29 – Air Emissions Monitoring Results EPA Identification Point 27

Pollutant	Units	Frequency	2015-16	2016-17	2017/18
Particulate Matter	mg/m^3	Yearly	N/A	N/A	15
Formaldehyde	mg/m^3	Yearly	N/A	N/A	1.5
Nitrogen Oxides	mg/m^3	Yearly	N/A	N/A	<3
PM10	mg/m^3	Yearly	N/A	N/A	15
Volatile Organic Compounds	mg/m^3	Yearly	N/A	N/A	0.27

EPA Identification Points 9, 10, 11 and 17 have specified air concentration limits for pollutants discharged. Monitoring results for EPA above-mentioned Identification Points were below licence limits.

In addition, it must be noted that air emission testing this year was not conducted at EPA Identification Point 17, Conti 1 Heat Plant. This is due to the exhaust from this heat plant now being diverted back into the Conti 1 production system.
Point 27 has replaced Point 13 but has not incorporated Points 4 & 5; this is planned to occur as the project construction continues.

The former Jeldwen plant (surrendered EPL 11172) is not operational, as a result EPA 3035 Identification Points 18 (press exhaust vents discharge) and 19 (dryer stack) are dormant.

EPA Identification Points 12, 13 and 18 were due for monitoring this year as per the 3-year special frequency monitoring. However, EPA Identification Point 13 is no longer in use and has been replaced by point 27, EPA Identification Point 18 is currently dormant. Therefore only EPA Identification Point 12 produced data. Environmental Protection Licence 3035 does not specify air concentration limits for these monitoring points.

4.4 Surface Water

The existing surface water management system includes runoff from adjoining properties in the Oberon Timber Complex on the western side of Lowes Mount Road, and operates as follows:

- Runoff from Structaflor particleboard flooring facility and Highland Pine Products Sawmill 2 flows across Lowes Mount Road and is directed onto the site in a ‘dirty’ water swale.
- Clean water from rural undeveloped parts of Lowes Mount Road is also directed onto the site in a ‘clean’ water swale, which runs alongside the dirty water swale and to the north following the boundary.
- Borg Panels roof runoff and runoff from the western side of the facility is directed into the dirty water swale and then conveyed into an existing stormwater treatment pond.
- Runoff from the eastern and open parts of the site, which contains fine fibrous wood material, is directed first to a gross pollutant trap and then into the stormwater treatment pond.
- Runoff from the construction site is managed in accordance with Erosion Sediment Control Plans (ESC) as apart of the CEMP for SSD7016. Water leaving the designate construction area is directed into the dirty ‘water’ swale of which flows into the stormwater treatment pond. Finally it is incorporated into the monitoring at the V-notch weir.

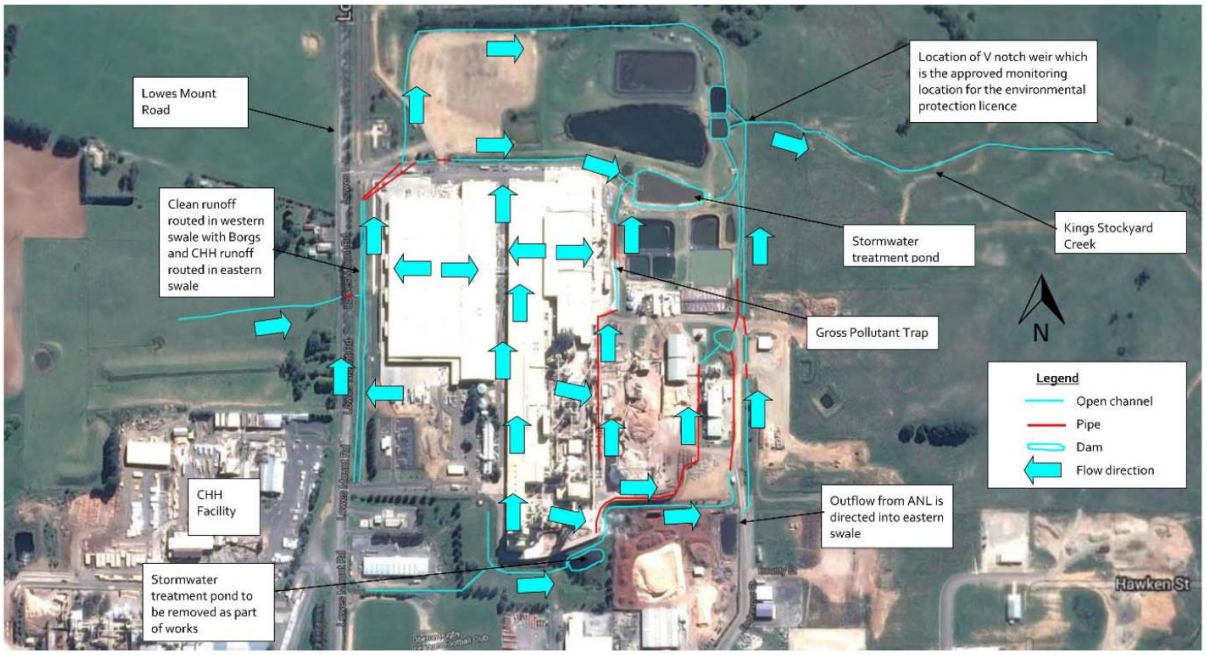


Figure 5- Existing Surface Water Management system

In accordance with EPL 3035, Borg Panels monitor discharge from the 'v'-notch weir shown in figure 3 (EPA Identification Point 1) to the unnamed creek that discharges to Kings Stockyard Creek. The location of the 'v'-notch weir on the outflow of the southern dam as shown on **Figure 5**.

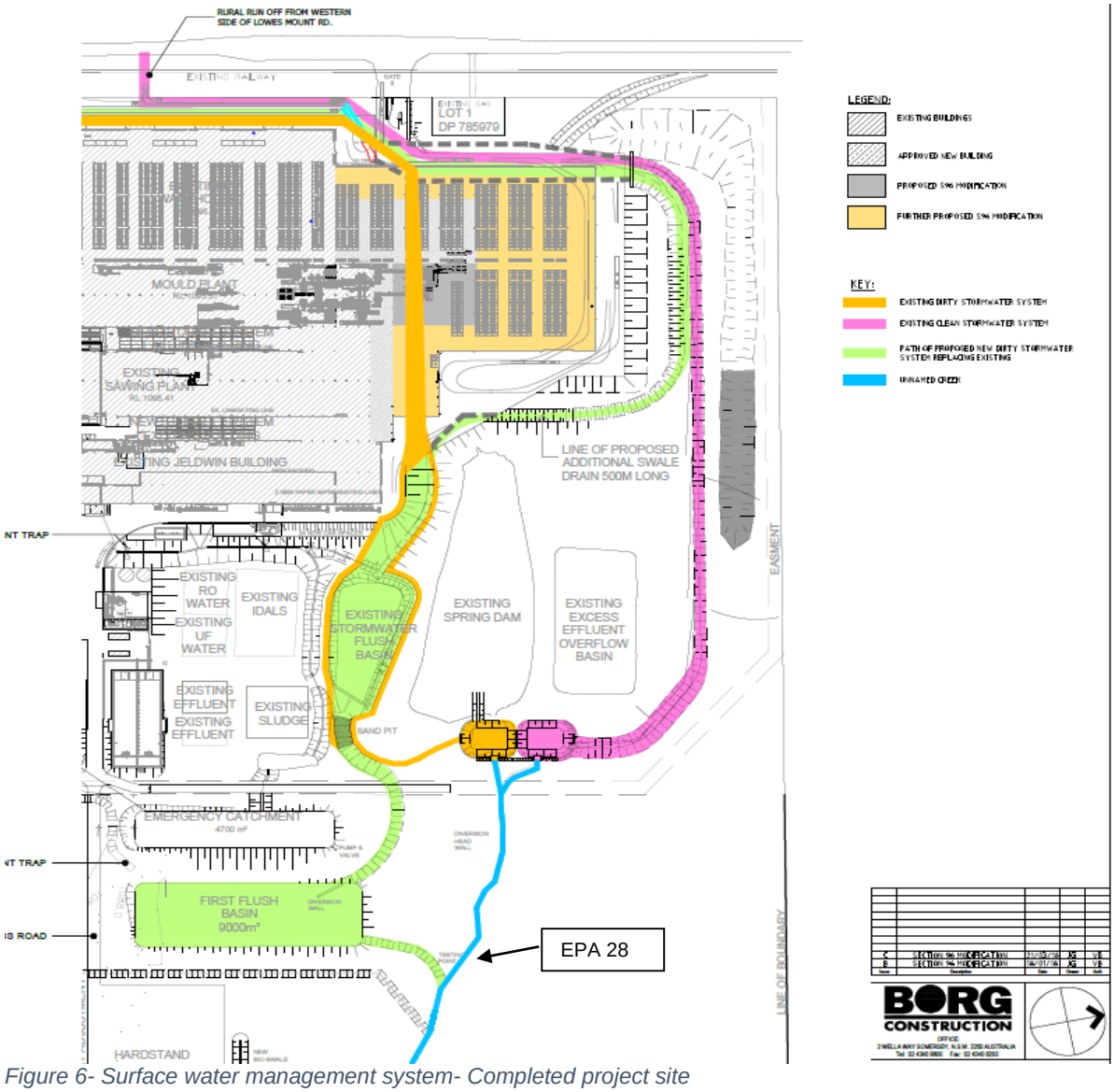
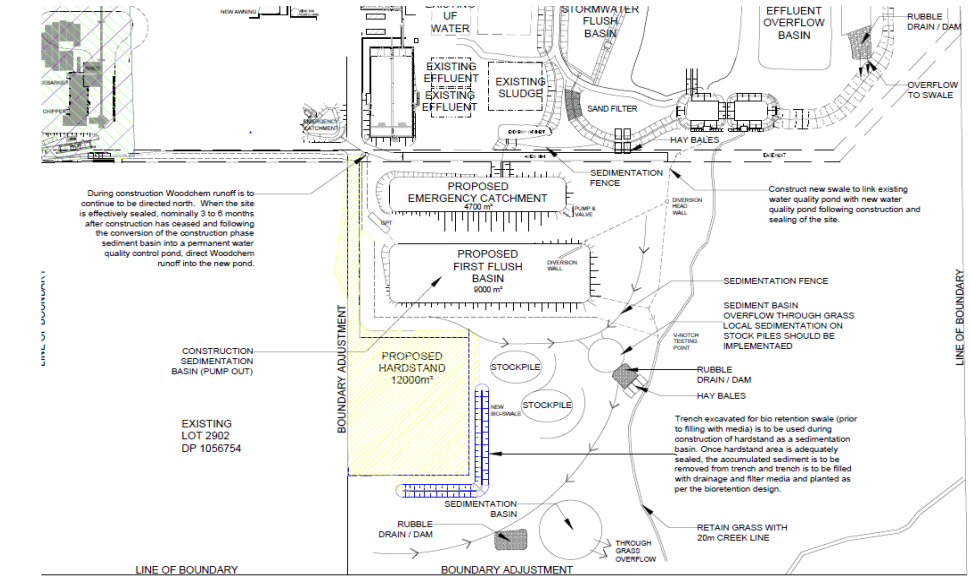


Figure 6- Surface water management system- Completed project site

A new monitoring point was added to EPL 3035, EPA Identification Point 28 that is a discharge point from the new first flush basin. This monitoring point is shown on **Figure 6.** However, although construction on the proposed first flush basin and emergency storage has begun it has not yet been completed and all surface water is managed as per **Figure 3**5 EPA Identification Point 28 has not had any monitoring conducted during this review period.



Small Sediment Basin Sizing

Parameter	Value Assigned	Comment
Soil Hydrologic Group	C	Appendix F, moderate to high runoff potential, moderately fine clay loam etc.
Mean annual rainfall (mm)	800	744.8mm/year at Jenolan Caves rd station and 840.5 at Springbank Station, estimated interpolated value of 800mm/yr assumed
$R_{(75\%,5day)}$	22.50	
C_v	0.35	Appendix F Table F2, depends on soil hydraulic group and design rainfall depth
A	3.4 Ha	Total area draining to southern swale and therefore directed into main sed basin. Only 6.63Ha disturbed.
Settling Zone	113m³	Sz = A x Cv X R
Storage Zone	57m³	50% of Settling zone.
Total required Volume	170m³	Only approx 20% of the total proposed water quality pond will be required during construction as a sediment basin.
Total required volume if soil type D	2,323 m³	

Large Sediment Basin Sizing

Parameter	Value Assigned	Comment
Soil Hydrologic Group	C	Appendix F, moderate to high runoff potential, moderately fine clay loam etc.
Mean annual rainfall (mm)	800	744.8mm/year at Jenolan Caves rd station and 840.5 at Springbank Station, estimated interpolated value of 800mm/yr assumed
$R_{(75\%,5day)}$	22.50	
C_v	0.35	Appendix F Table F2, depends on soil hydraulic group and design rainfall depth
A	2.7 Ha	Total area draining to southern swale and therefore directed into main sed basin. Only 6.63Ha disturbed.
Settling Zone	219m³	Sz = A x Cv X R
Storage Zone	110m³	50% of Settling zone.
Total required Volume	329m³	Only approx 20% of the total proposed water quality pond will be required during construction as a sediment basin.
Total required volume if soil type D	2,323 m³	

Figure 7- Stormwater basin construction sediment management.

First flush basin construction has local sediment management installed as per Figure 7.

The concentration of a pollutant discharged from EPA Point 1'v'-notch weir must not exceed the water concentration limits specified in **Table 29**. Monitoring must be undertaken weekly during any discharge.

Table 30 –EPA Identification Point 1- Water pollution limits

Pollutant	Units of Measure	50 percentile concentration limit	100 percentile concentration limit
Aldrin	µg/L		0.3
Biochemical Oxygen Demand (BOD)	mg/L		20
Colour	Hazen	80	160
Dieldrin	µg/L		0.3
Methylene Blue Active Substances (MBAS)	mg/L		0.5
Nitrogen (Total)	mg/L		10
Oil and Grease	mg/L		10
pH	pH		6.5-8.5
Phosphorus (Total)	mg/L		0.3
Total Suspended Solids	mg/L		50

Stormwater samples are collected by trained Borg personnel, and analysed by NATA certified laboratories.

Table 31 provides a summary of Borg Panels annual average water monitoring results for discharge from the 'v'-notch weir during the reporting period and for the previous two years. Full results for the 2017-18 reporting period are provided in **Appendix D**.

Table 31 – Annual Average Water Quality Monitoring Results EPA Point 1

Pollutant	Units of Measure	2015-16	2016-17	2017-18
Aldrin	µg/L	0	0	0
Biochemical Oxygen Demand (BOD)	mg/L	9.3	3.4	12.5
Colour	Hazen	58.8	63.6	77.5
Dieldrin	µg/L	0	0	0
Methylene Blue Active Substances (MBAS)	mg/L	0.1	0.1	0.1
Nitrogen (Total)	mg/L	3.3	3.1	5.4
Oil and Grease	mg/L	4.4	0	2.5
pH	pH	7.7	7.6	7.4
Phosphorus (Total)	mg/L	0.1	0.1	0.1
Total Suspended Solids	mg/L	20.2	13.6	30

Four samples were collected and analysed during discharges within the 2017-18 reporting period. Two exceedances of EPL limits occurred during this reporting period.

A minor exceedance of Total Suspended Solids (TSS) and Biochemical Oxygen Demand (BOD) occurred on 8 August 2017. The EPL limit for TSS is 50 mg/L and the monitored result was 57 mg/L. The EPL limit for BOD is 20 mg/L and the monitored result was 21 mg/L. As the exceedance was minor Borg Panels did not conduct an in-depth investigation, there were no environmental incidents that may have contributed to the breach. It is probable that the minor exceedance observed were due to a prolonged dry weather period, which has caused a build-up of tannins and wood dust in the catchment area of the dirty stormwater system. When a rainfall event was experienced, the wood dust is likely to have made its way through the V-Notch Weir. As the material is, biodegradable nutrients released may have caused the elevated levels of BOD as well as Elevated TSS.

Borg Panels conducted ad hoc stormwater harvesting which averaged out at 120m3/day over the reporting period. Stormwater harvesting of polluted runoff from the site is an integral part of the current site operations and is a fundamental component of the sites long-term operational plans once the particleboard plant commences operation.

The Sustainability Workshop (May 2016) prepared a *Water Cycle Impact Assessment* for the expansion of the Borg Panels facility as part of the Environmental Impact Statement for the Project. Further information was also provided as part of the Response to Submissions (Sustainability Workshop, September 2016). It was determined the existing 'v'-notch weir

would not be impacted by the expansion and that maximum discharge concentrations would be below current EPL limits. With the exception of the two exceedances detailed above, all EPL limits were met during the reporting period. Regardless, Borg Panels will continue to construct the proposed modifications depicted in **Figure 6** to ensure surface water entering and leaving the site in adequately managed.

4.5 Groundwater

In accordance with EPL 3035, Borg Panels monitor groundwater bores. The locations of groundwater monitoring points are listed in **Table 32**.

Table 32 – Location of Groundwater Monitoring Bores

EPA Identification No.	Location Description
14	North western boundary of site
15	East of stormwater treatment pond
16	East of Woodchem
24	North of western end of Spring dam

Water samples were collected by trained third party specialists and analysed by NATA certified laboratories. This work is carried out in accordance with statutory requirements and relevant standards. Monitoring equipment is maintained in accordance with the manufacturer's specifications by qualified specialists.

Tables 33-36 present results for EPA Identification Points 14, 15, 16 and 24 during the reporting period and compares them with the previous two years.

Table 33 – Groundwater Monitoring Results EPA Identification Point 14 (GW05)

Pollutant	Unit of Measure	Frequency	2015-16	2016-17	2017-18
Aldrin	µg/L	Yearly	<0.5	<0.5	<0.5
Ammonia as N	mg/L	Yearly	<0.07	0.06	0.23
Chemical Oxygen Demand	mg/L	Yearly	<10	<10	<10
Electrical Conductivity	µS/cm	Yearly	333	362	358
Dieldrin	µg/L	Yearly	<0.5	<0.5	<0.5
Formaldehyde	mg/L	Yearly	<0.1	0.1	0.2
pH	pH Units	Yearly	7.4	7.66	7.66
Total Dissolved Solids	mg/L	Yearly	202	188	220
Total Organic Carbon	mg/L	Yearly	<1	1	1
Total Petroleum Hydrocarbons	µg/L	Yearly	<50	<50	<50
Total Suspended Solids	mg/L	Yearly	31	31	31
Water Height	m	Yearly	6.48	6.53	7.3

Table 34 – Groundwater Monitoring Results EPA Identification Point 15 (GW02)

Pollutant	Unit of Measure	Frequency	2015-16	2016-17	2017-18
Aldrin	µg/L	Yearly	<0.5	<0.5	<0.5
Ammonia as N	mg/L	Yearly	<0.01	0.08	<0.01
Chemical Oxygen Demand	mg/L	Yearly	<10	56	18
Electrical Conductivity	µS/cm	Yearly	1071	1007	1035
Dieldrin	µg/L	Yearly	<0.5	<0.5	<0.5
Formaldehyde	mg/L	Yearly	<0.1	0.1	0.1
pH	pH Units	Yearly	7.06	7.01	7.20
Total Dissolved Solids	mg/L	Yearly	585	714	618
Total Organic Carbon	mg/L	Yearly	2	6	4
Total Petroleum Hydrocarbons	µg/L	Yearly	<50	<50	<50
Total Suspended Solids	mg/L	Yearly	87	168	42
Water Height	m	Yearly	2.76	3.05	4.2

Table 35 – Groundwater Monitoring Results EPA Identification Points 16 (GW01)

Pollutant	Unit of Measure	Frequency	2015-16	2016-17	2017-18
Aldrin	µg/L	Yearly	<0.5	<0.5	<0.5
Ammonia as N	mg/L	Yearly	<0.01	0.04	0.03
Chemical Oxygen Demand	mg/L	Yearly	<10	130	14
Electrical Conductivity	µS/cm	Yearly	214	150	199
Dieldrin	µg/L	Yearly	<0.5	<0.5	<0.5
Formaldehyde	mg/L	Yearly	<0.1	0.6	<0.1
pH	pH Units	Yearly	6.51	7.31	6.8
Total Dissolved Solids	mg/L	Yearly	138	350	110
Total Organic Carbon	mg/L	Yearly	2	15	3
Total Petroleum Hydrocarbons	µg/L	Yearly	<50	<50	<50
Total Suspended Solids	mg/L	Yearly	388	410	415
Water Height	m	Yearly	1.66	1.66	1.0

Table 36 – Groundwater Monitoring Results EPA Identification Points 24 (GW26)

Pollutant	Unit of Measure	Frequency	2015-16	2016-17	2017-18
Aldrin	µg/L	Yearly	<0.5	<0.5	<0.5
Ammonia as N	mg/L	Yearly	<0.01	0.05	0.01
Chemical Oxygen Demand	mg/L	Yearly	<10	<10	12
Electrical Conductivity	µS/cm	Yearly	2190	376	400
Dieldrin	µg/L	Yearly	<0.5	<0.5	<0.5
Formaldehyde	mg/L	Yearly	<0.1	0.1	<0.1
pH	pH Units	Yearly	6.51	7.27	7.1
Total Dissolved Solids	mg/L	Yearly	112	228	284
Total Organic Carbon	mg/L	Yearly	<1	2	1
Total Petroleum Hydrocarbons	µg/L	Yearly	<50	<50	<50
Total Suspended Solids	mg/L	Yearly	137	31	37
Water Height	m	Yearly	1.42	1.97	1.71

At EPA Point 14, analytes tested for during this reporting period did not differ significantly from previous reporting periods.

At EPA Point 15, there was a slight decrease in a few parameters, these are considered of almost no consequence when all 3 years of data is compared. An increase in water depth from 3.05 to 4.2m across 2016-17 & 2017-18 reporting period is consistent with the lower rainfall in the area and with the aquifer discharge activities conducted at site.

At EPA Point 16 chemical oxygen demand increased from <10mg/L to 130mg/L across the 2015-16 and 2016-17 reporting periods. This reporting period COD results returned to 201516 levels. Similarly, the total dissolved solids increase from 138mg/L to 350mg/L across the 2015-16 and 2016-17 , where the 2017-18 reportign period results showed a return to 110mg.mL. TOC, Total Organic Carbon also returned to lower levels as recorded in 2015-2016, 3mg/L.. All other anolytes have remained relatively stable at this monitoring point across the 3 most recent reporting periods.

At EPA Point 24 no notable change from the 2016-17 reporting period to this reporting period

There are no EPL concentration limits for groundwater monitoring bores. Laboratory analysis report provided by ALS are attached as **Appendix E**.

4.6 Noise

In accordance with EPL 3035 and site management plans, Borg Panels monitor noise emissions from the existing plant. Noise from the premises must not exceed the limits on **Table 37**. Furthermore, in accordance with the development consent (SSD 7016) all construction activities related to the development must also comply with the limits on **Table 37.**

Table 37 – Noise Limits dB(A)

Location	Day $L_{Aeq(15\ minute)}$	Evening $L_{Aeq(15\ minute)}$	Night $L_{Aeq(15\ minute)}$
All sensitive receivers	55	50	45
Note: Day – The period from 7:00am to 6:00pm on Monday to Saturday, and 8:00am to 6:00pm on Sundays and Public Holidays Evening – The period from 6:00pm to 10:00pm Night – The period from 10:00pm to 7:00am on Monday to Saturday, and 10:00pm to 8:00am on Sundays and Public Holidays L_{Aeq} means the equivalent continuous noise level – the level of noise equivalent the energy-average of noise levels occurring over a measurement period.			

The noise limits set out in **Table 37** apply under all meteorological conditions except for the following:

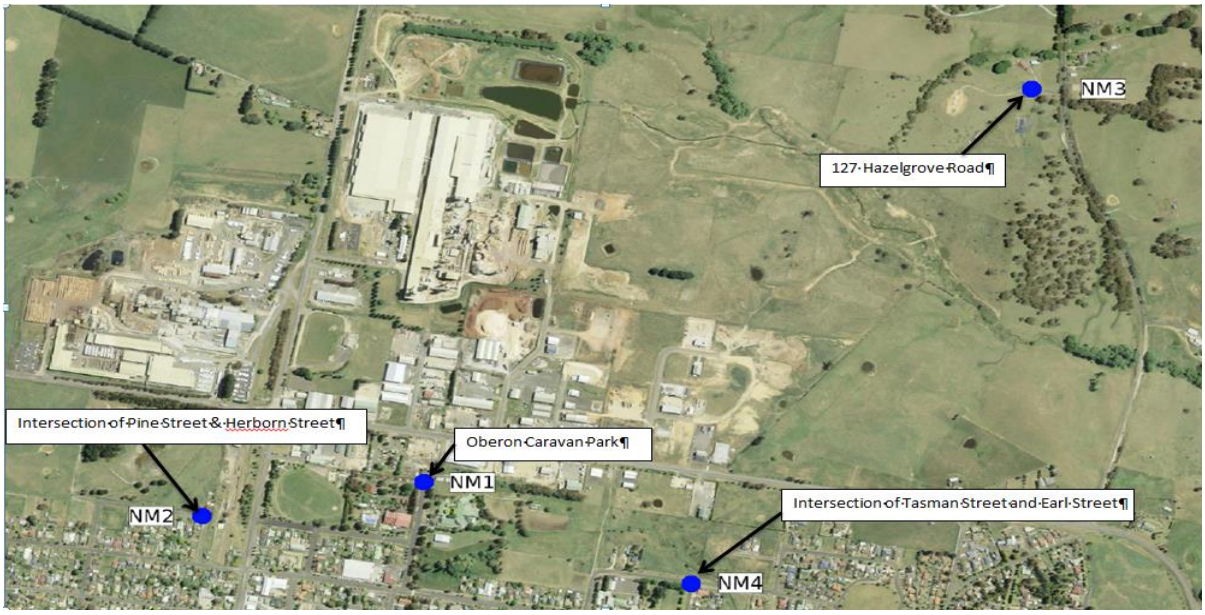
a) Wind speeds greater than 3 meters/second at 10 metres above ground level; or
b) Stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
c) Stability category G temperature inversion conditions.

Data recorded by the meteorological station identified as EPA Identification Point 26 must be used to determine meteorological conditions. Temperature inversion conditions (stability category) are to be determined by the sigma-thetas method referred to in Part E4 of Appendix E to the *Industrial Noise Policy* (EPA, January 2000).

4.6.1 Operational Noise

EPL 3035 stipulates that noise monitoring to determine compliance must be carried out at least once annually during the day, evening, and night time hours specified in **Table 37.** Noise monitoring must be undertaken in accordance with *Australian Standard AS 2659.1 (1998): Guide to use of sound measuring equipment – portable sound level meters*, and the compliance monitoring guidance provided in the *NSW Industrial Noise Policy*.

Figure 8- Borg Panels noise monitoring locations



During the 2017-18 reporting period, Global Acoustics conducted an *Annual Noise Monitoring* report for operational noise generated by the Borg Panels facility. The attended noise monitoring was conducted at four locations, as shown in **Figure 8.** Evening and night monitoring took place on the 26th of March 2018, and day monitoring on the 27th of March 2018. **Table 38** presents and compares results of the attended monitoring**.**

Table 38 – Attended Noise Monitoring $L_{Aeq(15\ minute)}$

Location	Start Date and time	Wind Speed m/s	Stability Class	VTG ˚C per 100m	Criterion dB	Criterion Applies	Borg $L_{Aeq(15\ min)}$	Exceedance
NM1	27/03/2018 10:45	3.0	B	-1.8	55	Yes	44	Nil
NM2	27/03/2018 10:25	4.2	D	-1.0	55	No	44	NA
NM3	27/03/2018 11:45	3.1	B	-1.8	55	No	<30	NA
NM4	27/03/2018 11:08	3.6	A	-2.0	55	No	<40	NA
NM1	26/03/2018 21:07	2.3	E	0.5	50	Yes	NM	Nil
NM2	26/03/2018 21:30	1.9	D	-1.0	50	Yes	NM	Nil
NM3	26/03/2018 20:25	2.5	E	0.5	50	Yes	<40	Nil
NM4	26/03/2018 20:47	2.6	E	0.5	50	Yes	41	Nil

NM1	26/03/2018 23:02	1.3	F	3.0	45	Yes	<40	Nil
NM2	26/03/2018 22:31	2.0	F	3.0	45	Yes	NM	Nil
NM3	26/03/2018 23:47	0.6	F	3.0	45	Yes	38	Nil
NM4	26/03/2018 23:22	1.7	E	0.5	45	Yes	38	Nil

Note: -Atmospheric data was sourced from the Borg weather station at Oberon.
-NM = Not Measurable means some noise from the source of interest was audible at low levels, but could not be quantified.

The attended noise monitoring conducted by Global Acoustics (2018) recorded no exceedance of limits set out in in table 36 when measurements were undertaken as per *The Industrial Noise Policy* (EPA, January 2000). The report was compiled by Global Acoustics for the annual noise monitoring is attached to this document as **Appendix F.**

4.6.2 Construction Noise

The Borg Construction Noise Management Plan (CNMP), as a part of the CEMP, sets out an attended monitoring regime of once per quarter. A suitably qualified noise expert conducts attended noise monitoring. Attended monitoring locations are shown in **Figure 8**. If there are any exceedances demonstrated, additional mitigation will be implemented and follow-up monitoring undertaken within one week of the exceedance. Global Acoustics conducted the monitoring this reporting period. **Table 39, 40,41 and 42,** show monitoring results for quarters 3, 4, 1 and 2 respectively.

Table 39 Construction Noise Quarter 3

Location	Start Date and time	Wind Speed m/s	Stability Class	VTG ˚C per 100m	Criterion dB	Criterion Applies	Borg $L_{Aeq(15\ min)}$	Exceedance
NM1	27/07/2017	2.2	A	-2	55	Yes	45	Nil
NM2	27/07/2017	1.8	A	-2	55	Yes	40	Nil
NM3	27/07/2017	0.4	A	-2	55	Yes	32	Nil
NM4	27/07/2017	1.8	A	-2	55	Yes	34	Nil

Table 40 Construction Noise Quarter 4

Location	Start Date and time	Wind Speed m/s	Stability Class	VTG ˚C per 100m	Criterion dB	Criterion Applies	Borg $L_{Aeq(15\ min)}$	Exceedance
NM1	18/10/2017	5.7	C	-1.6	55	No	43	Nil
NM2	18/10/2017	5.0	B	-1.8	55	No	NM	Nil
NM3	18/10/2017	5.0	A	-2.0	55	No	IA	Nil
NM4	18/10/2017	4.9	B	-1.8	55	No	IA	Nil

Table 41 Construction Noise Quarter 1

Location	Start Date and time	Wind Speed m/s	Stability Class	VTG ˚C per 100m	Criterion dB	Criterion Applies	Borg $L_{Aeq(15\ min)}$	Exceedance
NM1	27/03/2018	3.0	B	-1.8	55	Yes	44	Nil
NM2	27/03/2018	4.2	D	-1.0	55	No	44	NA
NM3	27/03/2018	3.1	B	-1.8	55	No	<30	NA
NM4	27/03/2018	3.6	A	-2.0	55	No	<40	NA

Table 42 Construction Noise Quarter 2

Location	Start Date and time	Wind Speed m/s	Stability Class	VTG ˚C per 100m	Criterion dB	Criterion Applies	Borg $L_{Aeq(15\ min)}$	Exceedance
NM1	24/05/2018	2.6	A	-2.0	55	Yes	NM	Nil
NM2	24/05/2018	3.1	B	-1.8	55	No	IA	NA
NM3	24/05/2018	3.1	B	-1.8	55	No	43	NA
NM4	24/05/2018	3.2	B	-1.8	55	No	<40	NA

Note: -Atmospheric data was sourced from the Borg weather station at Oberon.
-NM = Not Measurable means some noise from the source of interest was audible at low levels, but could not be quantified.
-IA = Inaudible, there was no noise from the source of interest audible at the monitoring location.

No exceedances were recorded for all four monitoring periods.

In the 2017-18 Borg implemented commitment from the development consent, Borg Panels implemented the limited operation of the mobile wood chipper and provided further noise attenuation to new and existing plant. As a result, a Mobile Wood Chipper Operation Management Plan (MWCOMP) was prepared and implemented. The MWCOMP takes into account wind direction for the operation of the mobile wood chippers to best mitigate impacts of noise. Reports compiled by Global Acoustics for each quarter are attached to this document as **Appendix G.**
Noise mitigation measures that were implemented as site controls and or commitments from the EIS are:

- Conti1 dryer fan air intake redesign
- Main fibre transport fan attenuation enclosure
- Conti 2 start-up cyclone enclosure.
- Process controls to automatically limit steam discharge pressures when critical times are breached.
- Live monitoring of weather data on site process interface screen.

4.7 Independent Environmental Audit

The Independent Environmental Audit for Borg Panels was commissioned prior to 29 May 2018. The results of the audit, however, are not yet finalised. The next independent audit will be due in three years' time.

5 Community Relations

5.1 Environmental Complaints

Four complaints were received in total during the reporting period. Of these, two were noise related, one dust related and one water related.

The two noise complaints resulted in the installation of noise loggers in the vicinity of where the complaint related to. Monitoring is ongoing to determine specific causes of noise and furthermore provide possible mitigation strategies. Data reviewed to date indicates compliance however operational practices may be contributing to Tonal or Impulsive noise.

The complaint relating to air quality was made due to a member of the public noticing a coating of wood fibres on their car. On the date of the incident the were some issues experienced with the Conti 1 fibre blow line and storage bin. It is not likely that this would be transported somewhat 1200m to the complainant's location however as this had occurred before blockage detection mechanisms have been installed on the fibre bin.

The complaint relating to water was a result of the town water supply pipeline to site being ruptured on site by Borg Panels construction. The pipeline was isolated and repaired, the dirty water described by the complainants was not caused by any foreign contamination from the site but by mobilisation of sediments already in the pipework throughout town.

Although regrettable, the incidents, relating to air quality and water, were not due to poor management plans, but rather due to one off mechanical or human error. In addition, Borg Panels continue to monitor and mitigate operational and construction noise in order not to adversely affect any surrounding receivers.

Positively however, the number of complaints received has decreased substantially from the previous reporting period, in which twenty-four complaints were recorded.

A summary of all complaints received during the reporting period is provided in **Appendix H**.

5.2 Community Liaison

5.2.1 Community Consultative Committee (CCC)

Borg has an established joint Community Consultative Committee (CCC) that meets nominally quarterly to discuss environmental and operational aspects of the Borg Panels site and greater Oberon Timber Complex. During the reporting period, one CCC meeting was held on the following date:

- 21 June 2017

The CCC meetings are used as a forum to discuss and address general construction and operational impacts and mitigation measures for the Borg Panels facility. The CCC meetings also provide a forum for feedback to Borg Panels in relation to the environmental management of the facility. A copy of the Minutes of the Meeting are attached to this document as **Appendix I.**

The major discussion points relating to Borg Panels in 2017-18 were:

- Updates on safety, Environment and production performance.
- Economic impacts/dynamics between Borg Panels and Carter Holt Harvey.
- Approval and key construction stages of the raw board development
- Ongoing focus on noise mitigation

Whilst limited CCC meetings were conducted with the other OTC members and the Oberon public during the review period as the business moved through this complex construction phase, it is intended that these discussion forums will continue as a course of normal operations into the future.

5.2.3 Opportunities for Information Exchange

Borg has in place the following avenues to register inquiries and complaints related to construction and operational activities:

- A 24-hour free call community liaison line (1800 802 795)
- Postal address for written complaints (Borg Panels, Private Mail Bag 1, Oberon NSW 2787)
- Email address for electronic complaints (oberon_site@borgs.com.au)

The telephone number, postal and email address is clearly displayed on a sign near the entrance to the site, in a position that is clearly visible to the public. This information is also widely disseminated in the community and included in public information communications, which may include the website, local area advertisements, letterbox notifications and Project specific fact sheets.

6 Environmental Incidents

Environmental incidents are administered under the Borg Panels Pollution Incident Response Management Plan (PRIMP) and are recorded in Data Station, Borgs Panels incident management system. Each incident report details the issue, the corrective and preventative actions taken, and the responsibilities and timing for completion of the actions. The report includes any comments and the completion date of corrective actions.

During the reporting period there we 4 reportable environmental incidents that occurred at the Borg Panels facility. A reportable environmental incident is defined as an incident causing or threatening material harm to the environment. As Borg Panels hold an Environment Protection Licence (EPL), the incident response measures are detailed in the site Pollution Incident Response Management Plan (PIRMP).

- Conti 1 Energy Centre Smoke Emission – 17 May 2017
    - Heat Transfer Oil leaking into Coni 1 Energy Centre causing black smoke to be emitted from stack. Conti 1 Energy Centre was shut down to fix leak. The tube bundle was replaced at the 2017 Christmas shut.

      This incident was reported to the EPA in a Letter dated 24/05/2017. A copy of the letter is attached to this document within **Appendix J.**

- Wet Ash Conveyor – 13 July 2017
    - Employee discovered wet ash conveyor overflowing with brine. Wet ash feed water isolated. Attempted to close slide gate on box drain, which didn't isolate appropriately due to build-up, on the seal face. A further isolation valve was closed at the GPT, no effluent escaped the GPT and all water was recycled into the on-site Water Treatment Plant.
    - Slide gate was added to site preventative maintenance systems

- Hydraulic Oil Pipe
    - Hydraulic oil pipe burst at the energy centre causing some oil to enter local stormwater box drain. Closed local control penstock at energy plant and used fines to absorb oil. Left penstock shut for inspection on day shift where excess foreign matter was removed and valves were opened for normal service.

- PLT9004 Diesel Leak
    - PLT9004 was parked out front of the workshop & leak diesel overnight, some of this potentially went into the storm water drain. Placed absorbent material over spilt diesel, notified water treatment that some diesel will be in the storm water. Stormwater harvesting was under taken post this incident.

All PIRMP documents are attached to this review as **Appendix J.**

7 Activities Proposed for the next Annual Review Period

Borg Panels will endeavour to carry out the following activities during the 2018-19 reporting period, as outlined in **Table 43**.

Table 43 – Proposed Activities for 2018-19 Reporting Period

	Activities Proposed in 2018-19 Reporting Period
1	Continue implementation of an Operational Environmental Management Plans for the existing development, begin writing updating management plans for the project. Re enforce environmental awareness training.
2	Continue construction of the particleboard plant and begin commissioning.
3	Continue with implementation of various management and mitigation measures as detailed in the development consent.
4	Complete Pollution Reduction program for the site, begin implementation of recommendations.
5	Complete construction of the sedimentation dams and emergency catchment.
6	Begin construction of building and associated equipment at the Northern end of the site.
7	Conduct training surrounding incident reporting with a specific focus on content requirements.

Appendices

Appendix A – Contaminated Land Validation Investigation Report & Letter of Suitability for Re-use of Stockpiled Material

Envirowest Consulting Pty Ltd ABN 18 103 955 246
• 9 Cameron Place, Orange NSW • Tel (02) 6361 4954 • Fax (02) 6360 3960 •
• 6/72 Corporation Avenue, Bathurst NSW • Tel (02) 6334 3312 •
• PO Box 8158, Orange NSW 2800 • Email admin@envirowest.net.au • Web www.envirowest.net.au •
Environmental
Geotechnical
Asbestos
Services

23 November 2017

Victor Bendevskiv
Borg Manufacturing
Lowes Mount Road
Oberon NSW 2787

Attn: Victor Bendevskiv

Ref: L7951c2

Dear Victor,

Suitability of re-use for stockpiled material on-site at 46 Lowes Mount Road, Oberon NSW

1. Background

A stockpile of sandy clay soil has been formed at 46 Lowes Mount Road, Oberon NSW from previously excavated hydrocarbon impacted soil. The stockpile was formed from excavation of hydrocarbon impacted soil surrounding removed tanks and a leaking bowser.

2. Scope

Classify the impacted material for suitability to remain on-site against the health and ecological screening levels for the on-going commercial/industrial land-use (NEPM 1999).

3. Investigation

Sampling of the stockpiled material was undertaken on 2 November 2017. The samples were analysed for total recoverable hydrocarbons (TRH C6-C40) and benzene, toluene, ethylbenzene, xylenes, naphthalene (BTEXN).

4. Assessment criteria

The criteria for suitability to remain on-site for the on-going land-use of commercial/industrial against the NEPM (1999) health and ecological screening levels (Table 1).

Table 1. Soil assessment criteria (mg/kg) (NEPC 1999)

Analyte	HSL Commercial / clay soil		EIL Commercial	ESL Commercial / fine soil	Management limits for TRH in soil / commercial
	0m to <1m	1m to <2m			
TRH (C6-C10)	310	480	-	215	800
TRH (>C10-C16)	NL	NL	-	170	1,000
TRH (>C16-C34)	NA	NA	-	2,500	5,000
TRH (>C34-C40)	NA	NA	-	6,600	10,000
Benzene	4	6	-	95	-
Toluene	NL	NL	-	135	-
Ethylbenzene	NL	NL	-	185	-
Xylenes	NL	NL	-	95	-
Naphthalene	NL	NL	370	-	-

HSL – health screening level, EIL – ecological investigation level, ESL – ecological screening level, NL – non limiting, NA – not applicable

5. Quality control and quality assurance

All media appropriate to the objectives of this investigation have been adequately analysed and no area of significant uncertainty exist. It is concluded the data is usable for the purposes of the investigation.

The quality control results are outlined in Attachment 1 as part of the laboratory reports.

6. Results

The material is yellowish brown and brown sandy clay. Approximately 2,500m^3 of material is stockpiled from impacted material removed from underground storage tanks and a leaking bowser.

The analytical levels have previously exceeded the adopted thresholds (R7951val1.2). The levels of hydrocarbons have indicated a decline of hydrocarbon levels over time within the stockpile. The material has been remediated through land farming including addition of ameliorant and regular turning of material.

The soil samples from the stockpiled material were below the adopted health and ecological screening levels for hydrocarbons for commercial/industrial land-use (Table 2). The material is suitable to be re-used on site.

Table 2. Soil sample analysis results (2 November 2017)

Sample ID	Location	TRH >C6-C10	TRH >C10-C16	TRHC >16-C34	TRH >C34-C40	Benzene	Toluene	Ethyl-benzene	Xylenes	Naphthalene
511	Stockpiled material	ND	95	290	ND	ND	ND	ND	ND	ND
512	Stockpiled material	ND	98	250	ND	ND	ND	ND	ND	ND
513	Stockpiled material	ND	72	230	ND	ND	ND	ND	ND	ND
514	Stockpiled material	ND	54	220	ND	ND	ND	ND	ND	ND
515	Stockpiled material	ND	58	240	ND	ND	ND	ND	ND	ND
516	Stockpiled material	ND	63	240	ND	ND	ND	ND	ND	ND
HSL – commercial / clay soil	*0m to <1m*	*310*	*NL*	*NA*	*NA*	*4*	*NL*	*NL*	*NL*	*NL*
	1m to <2m	*480*	*NL*	*NA*	*NA*	*6*	*NL*	*NL*	*NL*	*NL*
EIL – commercial		*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*370*
ESL – commercial / fine soil		*215*	*170*	*2,500*	*6,600*	*9*	*135*	*185*	*95*	*-*
Management limits for TRH fractions in soil		*800*	*1,000*	*5,000*	*10,000*	*-*	*-*	*-*	*-*	*-*

HSL – health screening level, EIL – ecological investigation level, ESL – ecological screening level, NL – non limiting, NA – not applicable, ND – not detected

7. Conclusions

The stockpiled material is suitable for re-use on site. The material is below the adopted health and ecological thresholds for commercial-industrial land-use.

Regards,

Ashleigh Pickering BSc
Environmental Scientist

Checked by,

Greg Madafiglio CEnvP
Senior Environmental Scientist

Attachments

Attachment 1. SGS report SE172186 and chain of custody form

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Ashleigh Pickering
Client	ENVIROWEST CONSULTING PTY LIMITED
Address	PO BOX 8158 ORANGE NSW 2800
Telephone	61 2 63614954
Facsimile	(Not specified)
Email	ashleigh@envirowest.net.au
Project	**7951-6**
Order Number	(Not specified)
Samples	7

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE172186 R0**
Date Received	3/11/2017
Date Reported	10/11/2017

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

SIGNATORIES

Ly Kim Ha
Organic Section Head

VOC's in Soil [AN433] Tested: 7/11/2017

PARAMETER	UOM	LOR	601 SOIL - 2/11/2017 SE172186.001	602 SOIL - 2/11/2017 SE172186.002	603 SOIL - 2/11/2017 SE172186.003	604 SOIL - 2/11/2017 SE172186.004	605 SOIL - 2/11/2017 SE172186.005
Benzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	0.1	**0.1**	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o-xylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Xylenes	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

PARAMETER	UOM	LOR	606 SOIL - 2/11/2017 SE172186.006	DC SOIL - 2/11/2017 SE172186.007
Benzene	mg/kg	0.1	<0.1	<0.1
Toluene	mg/kg	0.1	**0.1**	**0.1**
Ethylbenzene	mg/kg	0.1	<0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2	<0.2
o-xylene	mg/kg	0.1	<0.1	<0.1
Total Xylenes	mg/kg	0.3	<0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1	<0.1

Volatile Petroleum Hydrocarbons in Soil [AN433] Tested: 7/11/2017

PARAMETER	UOM	LOR	601 SOIL - 2/11/2017 SE172186.001	602 SOIL - 2/11/2017 SE172186.002	603 SOIL - 2/11/2017 SE172186.003	604 SOIL - 2/11/2017 SE172186.004	605 SOIL - 2/11/2017 SE172186.005
TRH C6-C9	mg/kg	20	<20	<20	<20	<20	<20
Benzene (F0)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TRH C6-C10	mg/kg	25	<25	<25	<25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	<25	<25	<25

PARAMETER	UOM	LOR	606 SOIL - 2/11/2017 SE172186.006	DC SOIL - 2/11/2017 SE172186.007
TRH C6-C9	mg/kg	20	<20	<20
Benzene (F0)	mg/kg	0.1	<0.1	<0.1
TRH C6-C10	mg/kg	25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25

TRH (Total Recoverable Hydrocarbons) in Soil [AN403] Tested: 7/11/2017

PARAMETER	UOM	LOR	601 SOIL - 2/11/2017 SE172186.001	602 SOIL - 2/11/2017 SE172186.002	603 SOIL - 2/11/2017 SE172186.003	604 SOIL - 2/11/2017 SE172186.004	605 SOIL - 2/11/2017 SE172186.005
TRH C10-C14	mg/kg	20	**32**	**40**	**25**	<20	<20
TRH C15-C28	mg/kg	45	**350**	**310**	**270**	**260**	**280**
TRH C29-C36	mg/kg	45	<45	<45	<45	<45	<45
TRH C37-C40	mg/kg	100	<100	<100	<100	<100	<100
TRH >C10-C16 (F2)	mg/kg	25	**95**	**98**	**72**	**54**	**58**
TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	**95**	**98**	**72**	**54**	**58**
TRH >C16-C34 (F3)	mg/kg	90	**290**	**250**	**230**	**220**	**240**
TRH >C34-C40 (F4)	mg/kg	120	<120	<120	<120	<120	<120
TRH C10-C36 Total	mg/kg	110	**380**	**350**	**300**	**260**	**280**
TRH C10-C40 Total (F bands)	mg/kg	210	**380**	**350**	**300**	**280**	**300**

PARAMETER	UOM	LOR	606 SOIL - 2/11/2017 SE172186.006	DC SOIL - 2/11/2017 SE172186.007
TRH C10-C14	mg/kg	20	**20**	<20
TRH C15-C28	mg/kg	45	**280**	**270**
TRH C29-C36	mg/kg	45	<45	<45
TRH C37-C40	mg/kg	100	<100	<100
TRH >C10-C16 (F2)	mg/kg	25	**63**	**61**
TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	**63**	**61**
TRH >C16-C34 (F3)	mg/kg	90	**240**	**220**
TRH >C34-C40 (F4)	mg/kg	120	<120	<120
TRH C10-C36 Total	mg/kg	110	**300**	**270**
TRH C10-C40 Total (F bands)	mg/kg	210	**300**	**290**

Moisture Content [AN002] Tested: 8/11/2017

PARAMETER	UOM	LOR	601 SOIL - 2/11/2017 SE172186.001	602 SOIL - 2/11/2017 SE172186.002	603 SOIL - 2/11/2017 SE172186.003	604 SOIL - 2/11/2017 SE172186.004	605 SOIL - 2/11/2017 SE172186.005
% Moisture	%w/w	0.5	**5.6**	**14.3**	**12.9**	**12.9**	**12.8**

PARAMETER	UOM	LOR	606 SOIL - 2/11/2017 SE172186.006	DC SOIL - 2/11/2017 SE172186.007
% Moisture	%w/w	0.5	**11.4**	**13.8**

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). F2 is reported directly and also corrected by subtracting Naphthalene (from VOC method AN433) where available.
AN403	Additionally, the volatile C6-C9 fraction may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Petroleum Hydrocarbons (TPH) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents .
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
AN433	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.

FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
		NVL	Not validated.	LOR	Limit of Reporting.
**	Indicative data, theoretical holding time exceeded.	IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/ Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

This document is issued by the Company under its General Conditions of Service accessible at www.sgs.com/en/Terms-and-Conditions.aspx. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client only. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law .

This report must not be reproduced, except in full.

STATEMENT OF QA/QC PERFORMANCE

SE172186 R0

CLIENT DETAILS

Contact	Ashleigh Pickering
Client	ENVIROWEST CONSULTING PTY LIMITED
Address	PO BOX 8158 ORANGE NSW 2800
Telephone	61 2 63614954
Facsimile	(Not specified)
Email	ashleigh@envirowest.net.au
Project	**7951-6**
Order Number	(Not specified)
Samples	7

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE172186 R0**
Date Received	03 Nov 2017
Date Reported	10 Nov 2017

COMMENTS

All the laboratory data for each environmental matrix was compared to SGS' stated Data Quality Objectives (DQO). Comments arising from the comparison were made and are reported below.

The data relating to sampling was taken from the Chain of Custody document and was supplied by the Client.
This QA/QC Statement must be read in conjunction with the referenced Analytical Report.
The Statement and the Analytical Report must not be reproduced except in full.

All Data Quality Objectives were met (within the SGS Alexandria Environmental laboratory).

SAMPLE SUMMARY

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	SGS	Sample cooling method	Ice Bricks
Samples received in correct containers	Yes	Sample counts by matrix	7 Soil
Date documentation received	3/11/2017	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	12.6°C	Sufficient sample for analysis	Yes
Turnaround time requested	Standard		

HOLDING TIME SUMMARY

SE172186 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS “Field Sampling Guide for Containers and Holding Time” (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

Moisture Content

Method: ME-(AU)-[ENV]AN002

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
601	SE172186.001	LB136038	02 Nov 2017	03 Nov 2017	16 Nov 2017	08 Nov 2017	13 Nov 2017	10 Nov 2017
602	SE172186.002	LB136038	02 Nov 2017	03 Nov 2017	16 Nov 2017	08 Nov 2017	13 Nov 2017	10 Nov 2017
603	SE172186.003	LB136038	02 Nov 2017	03 Nov 2017	16 Nov 2017	08 Nov 2017	13 Nov 2017	10 Nov 2017
604	SE172186.004	LB136038	02 Nov 2017	03 Nov 2017	16 Nov 2017	08 Nov 2017	13 Nov 2017	10 Nov 2017
605	SE172186.005	LB136038	02 Nov 2017	03 Nov 2017	16 Nov 2017	08 Nov 2017	13 Nov 2017	10 Nov 2017
606	SE172186.006	LB136038	02 Nov 2017	03 Nov 2017	16 Nov 2017	08 Nov 2017	13 Nov 2017	10 Nov 2017
DC	SE172186.007	LB136038	02 Nov 2017	03 Nov 2017	16 Nov 2017	08 Nov 2017	13 Nov 2017	10 Nov 2017

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
601	SE172186.001	LB135948	02 Nov 2017	03 Nov 2017	16 Nov 2017	07 Nov 2017	17 Dec 2017	10 Nov 2017
602	SE172186.002	LB135948	02 Nov 2017	03 Nov 2017	16 Nov 2017	07 Nov 2017	17 Dec 2017	10 Nov 2017
603	SE172186.003	LB135948	02 Nov 2017	03 Nov 2017	16 Nov 2017	07 Nov 2017	17 Dec 2017	10 Nov 2017
604	SE172186.004	LB135948	02 Nov 2017	03 Nov 2017	16 Nov 2017	07 Nov 2017	17 Dec 2017	10 Nov 2017
605	SE172186.005	LB135948	02 Nov 2017	03 Nov 2017	16 Nov 2017	07 Nov 2017	17 Dec 2017	10 Nov 2017
606	SE172186.006	LB135948	02 Nov 2017	03 Nov 2017	16 Nov 2017	07 Nov 2017	17 Dec 2017	10 Nov 2017
DC	SE172186.007	LB135948	02 Nov 2017	03 Nov 2017	16 Nov 2017	07 Nov 2017	17 Dec 2017	10 Nov 2017

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
601	SE172186.001	LB135937	02 Nov 2017	03 Nov 2017	16 Nov 2017	07 Nov 2017	17 Dec 2017	10 Nov 2017
602	SE172186.002	LB135937	02 Nov 2017	03 Nov 2017	16 Nov 2017	07 Nov 2017	17 Dec 2017	10 Nov 2017
603	SE172186.003	LB135937	02 Nov 2017	03 Nov 2017	16 Nov 2017	07 Nov 2017	17 Dec 2017	10 Nov 2017
604	SE172186.004	LB135937	02 Nov 2017	03 Nov 2017	16 Nov 2017	07 Nov 2017	17 Dec 2017	10 Nov 2017
605	SE172186.005	LB135937	02 Nov 2017	03 Nov 2017	16 Nov 2017	07 Nov 2017	17 Dec 2017	10 Nov 2017
606	SE172186.006	LB135937	02 Nov 2017	03 Nov 2017	16 Nov 2017	07 Nov 2017	17 Dec 2017	10 Nov 2017
DC	SE172186.007	LB135937	02 Nov 2017	03 Nov 2017	16 Nov 2017	07 Nov 2017	17 Dec 2017	10 Nov 2017

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
601	SE172186.001	LB135937	02 Nov 2017	03 Nov 2017	16 Nov 2017	07 Nov 2017	17 Dec 2017	10 Nov 2017
602	SE172186.002	LB135937	02 Nov 2017	03 Nov 2017	16 Nov 2017	07 Nov 2017	17 Dec 2017	10 Nov 2017
603	SE172186.003	LB135937	02 Nov 2017	03 Nov 2017	16 Nov 2017	07 Nov 2017	17 Dec 2017	10 Nov 2017
604	SE172186.004	LB135937	02 Nov 2017	03 Nov 2017	16 Nov 2017	07 Nov 2017	17 Dec 2017	10 Nov 2017
605	SE172186.005	LB135937	02 Nov 2017	03 Nov 2017	16 Nov 2017	07 Nov 2017	17 Dec 2017	10 Nov 2017
606	SE172186.006	LB135937	02 Nov 2017	03 Nov 2017	16 Nov 2017	07 Nov 2017	17 Dec 2017	10 Nov 2017
DC	SE172186.007	LB135937	02 Nov 2017	03 Nov 2017	16 Nov 2017	07 Nov 2017	17 Dec 2017	10 Nov 2017

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	601	SE172186.001	%	60 - 130%	85
	602	SE172186.002	%	60 - 130%	81
	603	SE172186.003	%	60 - 130%	74
	604	SE172186.004	%	60 - 130%	75
	605	SE172186.005	%	60 - 130%	78
	606	SE172186.006	%	60 - 130%	75
	DC	SE172186.007	%	60 - 130%	72
d4-1,2-dichloroethane (Surrogate)	601	SE172186.001	%	60 - 130%	99
	602	SE172186.002	%	60 - 130%	78
	603	SE172186.003	%	60 - 130%	80
	604	SE172186.004	%	60 - 130%	71
	605	SE172186.005	%	60 - 130%	82
	606	SE172186.006	%	60 - 130%	86
	DC	SE172186.007	%	60 - 130%	81
d8-toluene (Surrogate)	601	SE172186.001	%	60 - 130%	80
	602	SE172186.002	%	60 - 130%	77
	603	SE172186.003	%	60 - 130%	75
	604	SE172186.004	%	60 - 130%	78
	605	SE172186.005	%	60 - 130%	77
	606	SE172186.006	%	60 - 130%	77
	DC	SE172186.007	%	60 - 130%	74
Dibromofluoromethane (Surrogate)	601	SE172186.001	%	60 - 130%	89
	602	SE172186.002	%	60 - 130%	80
	603	SE172186.003	%	60 - 130%	74
	604	SE172186.004	%	60 - 130%	72
	605	SE172186.005	%	60 - 130%	80
	606	SE172186.006	%	60 - 130%	79
	DC	SE172186.007	%	60 - 130%	78

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	601	SE172186.001	%	60 - 130%	85
	602	SE172186.002	%	60 - 130%	81
	603	SE172186.003	%	60 - 130%	74
	604	SE172186.004	%	60 - 130%	75
	605	SE172186.005	%	60 - 130%	78
	606	SE172186.006	%	60 - 130%	75
	DC	SE172186.007	%	60 - 130%	72
d4-1,2-dichloroethane (Surrogate)	601	SE172186.001	%	60 - 130%	99
	602	SE172186.002	%	60 - 130%	78
	603	SE172186.003	%	60 - 130%	80
	604	SE172186.004	%	60 - 130%	71
	605	SE172186.005	%	60 - 130%	82
	606	SE172186.006	%	60 - 130%	86
	DC	SE172186.007	%	60 - 130%	81
d8-toluene (Surrogate)	601	SE172186.001	%	60 - 130%	80
	602	SE172186.002	%	60 - 130%	77
	603	SE172186.003	%	60 - 130%	75
	604	SE172186.004	%	60 - 130%	78
	605	SE172186.005	%	60 - 130%	77
	606	SE172186.006	%	60 - 130%	77
	DC	SE172186.007	%	60 - 130%	74
Dibromofluoromethane (Surrogate)	601	SE172186.001	%	60 - 130%	89
	602	SE172186.002	%	60 - 130%	80
	603	SE172186.003	%	60 - 130%	74
	604	SE172186.004	%	60 - 130%	72
	605	SE172186.005	%	60 - 130%	80
	606	SE172186.006	%	60 - 130%	79
	DC	SE172186.007	%	60 - 130%	78

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Number	Parameter	Units	LOR	Result
LB135948.001	TRH C10-C14	mg/kg	20	<20
	TRH C15-C28	mg/kg	45	<45
	TRH C29-C36	mg/kg	45	<45
	TRH C37-C40	mg/kg	100	<100
	TRH C10-C36 Total	mg/kg	110	<110

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB135937.001	Monocyclic Aromatic	Benzene	mg/kg	0.1	<0.1
	Hydrocarbons	Toluene	mg/kg	0.1	<0.1
		Ethylbenzene	mg/kg	0.1	<0.1
		m/p-xylene	mg/kg	0.2	<0.2
		o-xylene	mg/kg	0.1	<0.1
	Polycyclic VOCs	Naphthalene	mg/kg	0.1	<0.1
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	83
		d4-1,2-dichloroethane (Surrogate)	%	-	77
		d8-toluene (Surrogate)	%	-	78
		Bromofluorobenzene (Surrogate)	%	-	75
	Totals	Total BTEX	mg/kg	0.6	<0.6

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB135937.001		TRH C6-C9	mg/kg	20	<20
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	83
		d4-1,2-dichloroethane (Surrogate)	%	-	77
		d8-toluene (Surrogate)	%	-	78

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Moisture Content

Method: ME-(AU)-[ENV]AN002

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE172161.004	LB136038.011	% Moisture	%w/w	0.5	38.12121212128.595271210(		31	1
SE172161.014	LB136038.022	% Moisture	%w/w	0.5	36.14775725597.984981226[		31	2
SE172187.001	LB136038.033	% Moisture	%w/w	0.5	<1.0	<1.0	200	0
SE172189.010	LB136038.039	% Moisture	%w/w	0.5	6.8	7.9	44	14

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE172146.049	LB135948.014		TRH C10-C14	mg/kg	20	0	0	200	0
			TRH C15-C28	mg/kg	45	0	0	200	0
			TRH C29-C36	mg/kg	45	0	0	200	0
			TRH C37-C40	mg/kg	100	0	0	200	0
			TRH C10-C36 Total	mg/kg	110	0	0	200	0
			TRH C10-C40 Total (F bands)	mg/kg	210	0	0	200	0
		TRH F Bands	TRH >C10-C16 (F2)	mg/kg	25	0	0	200	0
			TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	-0.01	0	200	0
			TRH >C16-C34 (F3)	mg/kg	90	0	0	200	0
			TRH >C34-C40 (F4)	mg/kg	120	0	0	200	0
SE172186.007	LB135948.025		TRH C10-C14	mg/kg	20	<20	<20	200	0
			TRH C15-C28	mg/kg	45	270	220	49	19
			TRH C29-C36	mg/kg	45	<45	<45	200	0
			TRH C37-C40	mg/kg	100	<100	<100	200	0
			TRH C10-C36 Total	mg/kg	110	270	220	75	19
			TRH C10-C40 Total (F bands)	mg/kg	210	290	230	111	20
		TRH F Bands	TRH >C10-C16 (F2)	mg/kg	25	61	47	76	26
			TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	61	47	76	26
			TRH >C16-C34 (F3)	mg/kg	90	220	190	74	18
			TRH >C34-C40 (F4)	mg/kg	120	<120	<120	200	0

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE172189.001	LB135937.014	Monocyclic	Benzene	mg/kg	0.1	<0.1	<0.1	200	0
		Aromatic	Toluene	mg/kg	0.1	<0.1	<0.1	200	0
			Ethylbenzene	mg/kg	0.1	<0.1	<0.1	200	0
			m/p-xylene	mg/kg	0.2	<0.2	<0.2	200	0
			o-xylene	mg/kg	0.1	<0.1	<0.1	200	0
		Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.8	3.9	50	1
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	3.9	3.8	50	2
			d8-toluene (Surrogate)	mg/kg	-	4.1	3.8	50	9
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.8	4.0	50	4
		Totals	Total Xylenes	mg/kg	0.3	<0.3	<0.3	200	0
			Total BTEX	mg/kg	0.6	<0.6	<0.6	200	0
SE172217.005	LB135937.024	Monocyclic	Benzene	mg/kg	0.1	<0.1	<0.1	200	0
		Aromatic	Toluene	mg/kg	0.1	0.2	0.1	101	14
			Ethylbenzene	mg/kg	0.1	<0.1	<0.1	200	0
			m/p-xylene	mg/kg	0.2	<0.2	<0.2	200	0
			o-xylene	mg/kg	0.1	<0.1	<0.1	200	0
		Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	197	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.4	4.0	50	10
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	5.0	4.9	50	1
			d8-toluene (Surrogate)	mg/kg	-	4.3	4.0	50	7
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.7	3.5	50	4
		Totals	Total Xylenes	mg/kg	0.3	<0.3	<0.3	200	0
			Total BTEX	mg/kg	0.6	<0.6	<0.6	150	0

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE172189.001	LB135937.014		TRH C6-C10	mg/kg	25	<25	<25	200	0
			TRH C6-C9	mg/kg	20	<20	<20	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.8	3.9	30	1
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	3.9	3.8	30	2
			d8-toluene (Surrogate)	mg/kg	-	4.1	3.8	30	9

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Volatile Petroleum Hydrocarbons in Soil (continued) — **Method: ME-(AU)-[ENV]AN433**

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE172189.001	LB135937.014	Surrogates	Bromofluorobenzene (Surrogate)	mg/kg	-	3.8	4.0	30	4
		VPH F Bands	Benzene (F0)	mg/kg	0.1	<0.1	<0.1	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	200	0
SE172217.005	LB135937.024		TRH C6-C10	mg/kg	25	<25	<25	200	0
			TRH C6-C9	mg/kg	20	<20	<20	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.4	4.0	30	10
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	5.0	4.9	30	1
			d8-toluene (Surrogate)	mg/kg	-	4.3	4.0	30	7
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.7	3.5	30	4
		VPH F Bands	Benzene (F0)	mg/kg	0.1	<0.1	<0.1	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	200	0

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB135948.002		TRH C10-C14	mg/kg	20	38	40	60 - 140	95
		TRH C15-C28	mg/kg	45	<45	40	60 - 140	103
		TRH C29-C36	mg/kg	45	<45	40	60 - 140	93
	TRH F Bands	TRH >C10-C16 (F2)	mg/kg	25	40	40	60 - 140	100
		TRH >C16-C34 (F3)	mg/kg	90	<90	40	60 - 140	103
		TRH >C34-C40 (F4)	mg/kg	120	<120	20	60 - 140	85

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB135937.002	Monocyclic	Benzene	mg/kg	0.1	2.0	2.9	60 - 140	70
	Aromatic	Toluene	mg/kg	0.1	2.2	2.9	60 - 140	76
		Ethylbenzene	mg/kg	0.1	2.2	2.9	60 - 140	74
		m/p-xylene	mg/kg	0.2	4.4	5.8	60 - 140	76
		o-xylene	mg/kg	0.1	2.2	2.9	60 - 140	75
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.3	5	60 - 140	85
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.3	5	60 - 140	85
		d8-toluene (Surrogate)	mg/kg	-	4.1	5	60 - 140	82
		Bromofluorobenzene (Surrogate)	mg/kg	-	4.4	5	60 - 140	88

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB135937.002		TRH C6-C10	mg/kg	25	<25	24.65	60 - 140	85
		TRH C6-C9	mg/kg	20	<20	23.2	60 - 140	74
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.3	5	60 - 140	85
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.3	5	60 - 140	85
		d8-toluene (Surrogate)	mg/kg	-	4.1	5	60 - 140	82
		Bromofluorobenzene (Surrogate)	mg/kg	-	4.4	5	60 - 140	88
	VPH F Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	7.25	60 - 140	109

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE172146.041	LB135948.026		TRH C10-C14	mg/kg	20	40	0	40	100
			TRH C15-C28	mg/kg	45	<45	0	40	108
			TRH C29-C36	mg/kg	45	<45	0	40	105
			TRH C37-C40	mg/kg	100	<100	0	-	-
			TRH C10-C36 Total	mg/kg	110	<110	0	-	-
			TRH C10-C40 Total (F bands)	mg/kg	210	<210	0	-	-
		TRH F Bands	TRH >C10-C16 (F2)	mg/kg	25	42	0	40	105
			TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	42	0	-	-
			TRH >C16-C34 (F3)	mg/kg	90	<90	0	40	110
			TRH >C34-C40 (F4)	mg/kg	120	<120	0	-	-

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE172186.001	LB135937.004	Monocyclic	Benzene	mg/kg	0.1	1.8	<0.1	2.9	63
		Aromatic	Toluene	mg/kg	0.1	2.1	0.1	2.9	70
			Ethylbenzene	mg/kg	0.1	2.1	<0.1	2.9	72
			m/p-xylene	mg/kg	0.2	4.3	<0.2	5.8	74
			o-xylene	mg/kg	0.1	2.2	<0.1	2.9	76
		Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	-	-
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.3	4.5	-	85
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.3	5.0	-	86
			d8-toluene (Surrogate)	mg/kg	-	4.1	4.0	-	81
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.2	4.2	-	83
		Totals	Total Xylenes	mg/kg	0.3	6.5	<0.3	-	-
			Total BTEX	mg/kg	0.6	13	<0.6	-	-

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE172186.001	LB135937.004		TRH C6-C10	mg/kg	25	<25	<25	24.65	67
			TRH C6-C9	mg/kg	20	<20	<20	23.2	66
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.3	4.5	-	85
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.3	5.0	-	86
			d8-toluene (Surrogate)	mg/kg	-	4.1	4.0	-	81
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.2	4.2	-	83
		VPH F	Benzene (F0)	mg/kg	0.1	1.8	<0.1	-	-
		Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	7.25	106

MATRIX SPIKE DUPLICATES

SE172186 R0

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The original result is the analyte concentration of the matrix spike. The Duplicate result is the analyte concentration of the matrix spike duplicate.

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here: http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022 QA QC Plan.pdf

*	NATA accreditation does not cover the performance of this service.
**	Indicative data, theoretical holding time exceeded.
-	Sample not analysed for this analyte.
IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
LOR	Limit of reporting.
QFH	QC result is above the upper tolerance.
QFL	QC result is below the lower tolerance.

①	At least 2 of 3 surrogates are within acceptance criteria.
②	RPD failed acceptance criteria due to sample heterogeneity.
③	Results less than 5 times LOR preclude acceptance criteria for RPD.
④	Recovery failed acceptance criteria due to matrix interference.
⑤	Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
⑥	LOR was raised due to sample matrix interference.
⑦	LOR was raised due to dilution of significantly high concentration of analyte in sample.
⑧	Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
⑨	Recovery failed acceptance criteria due to sample heterogeneity.
⑩	LOR was raised due to high conductivity of the sample (required dilution).
†	Refer to Analytical Report comments for further information.

Chain of Custody Form – Ref 7951-6

Ref:	**7951-6**
Investigator:	Envirowest Consulting 9 Cameron Place PO Box 8158 ORANGE NSW 2800
Telephone:	(02) 6361 4954
Facsimile:	(02) 6360 3960
Email:	admin@envirowest.net.au
Contact Person:	Ashleigh Pickering
Invoice:	accounts@envirowest.net.au
Laboratory:	SGS SYDNEY 16/33 Maddox Street ALEXANDRIA NSW 2015
Quotation #:	
Courier/CN:	

	Sample ID	Container*	Sampling Date/Time	Sample matrix: Water	Soil	Sludge	Sample preservation: Cool	HNO3/HCl	Unpre-served	Analysis: SGS Method Code: CL5 TRH(6-40), BTEXN				
1	601	A	2/11/2017		X		X		X	X				
2	602	A	2/11/2017		X		X		X	X				
3	603	A	2/11/2017		X		X		X	X				
4	604	A	2/11/2017		X		X		X	X				
5	605	A	2/11/2017		X		X		X	X				
6	606	A	2/11/2017		X		X		X	X				
7	DC	A	2/11/2017		X		X		X	X				

SGS EHS Alexandria Laboratory

SE172186 COC

Received: 03 – Nov – 2017

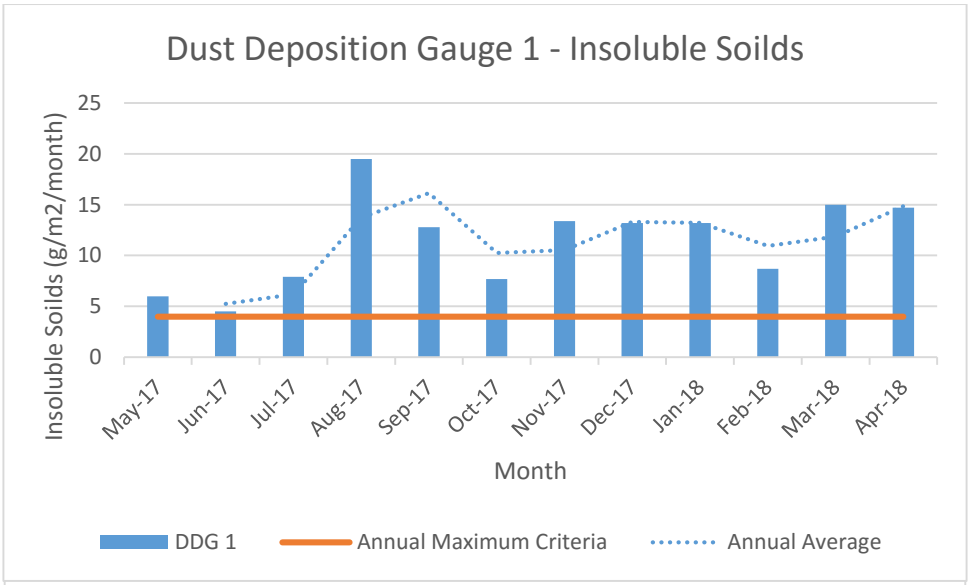
Investigator: I attest that the proper field sampling procedures were used during the collection of these samples.

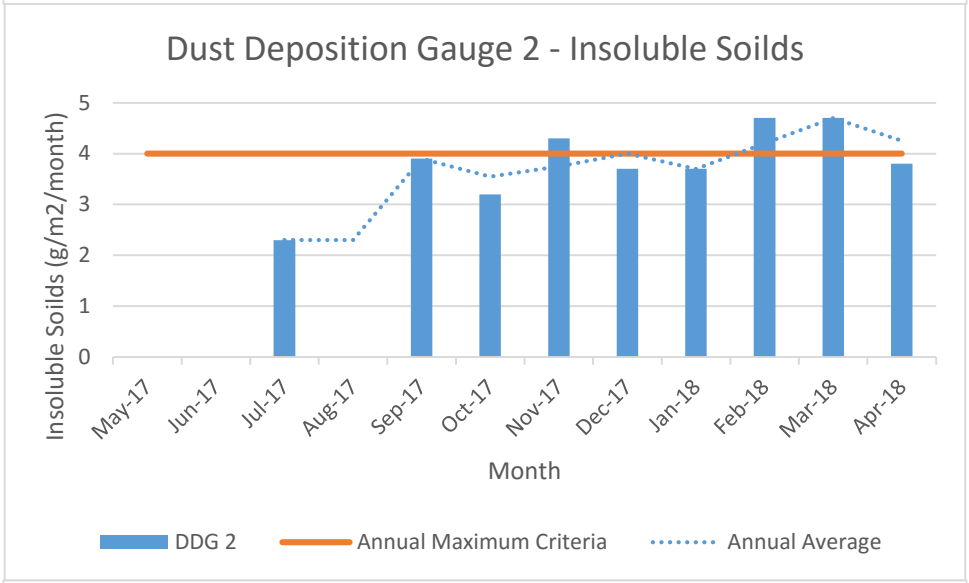
Sampler name: Ashleigh Pickering
Date : 2/11/2017 Time:

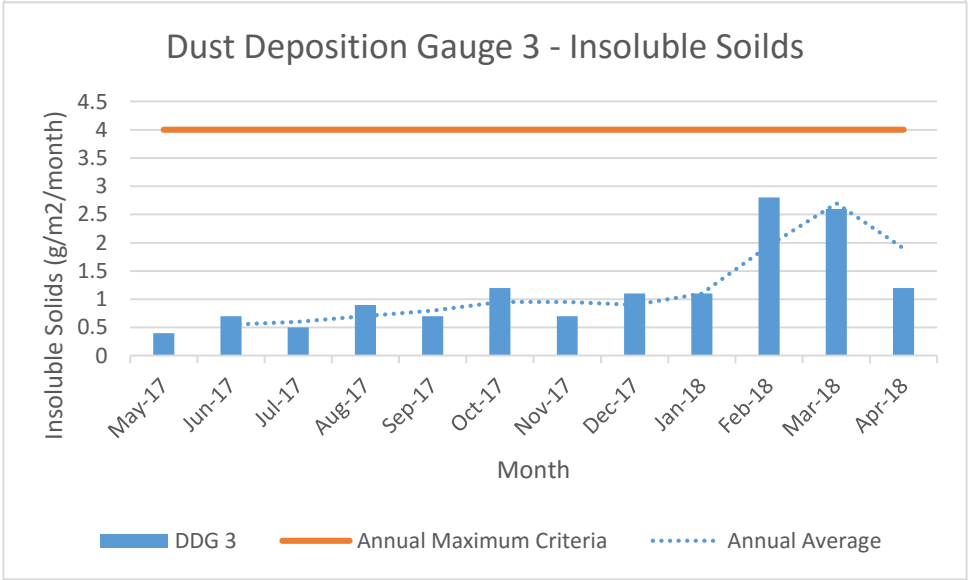
Relinquished by: (print and signature)	Date	Time	Received by: (print and signature)	Date	Time
Ashleigh Pickering	2/11/2017	17:00		3/11/17	11am

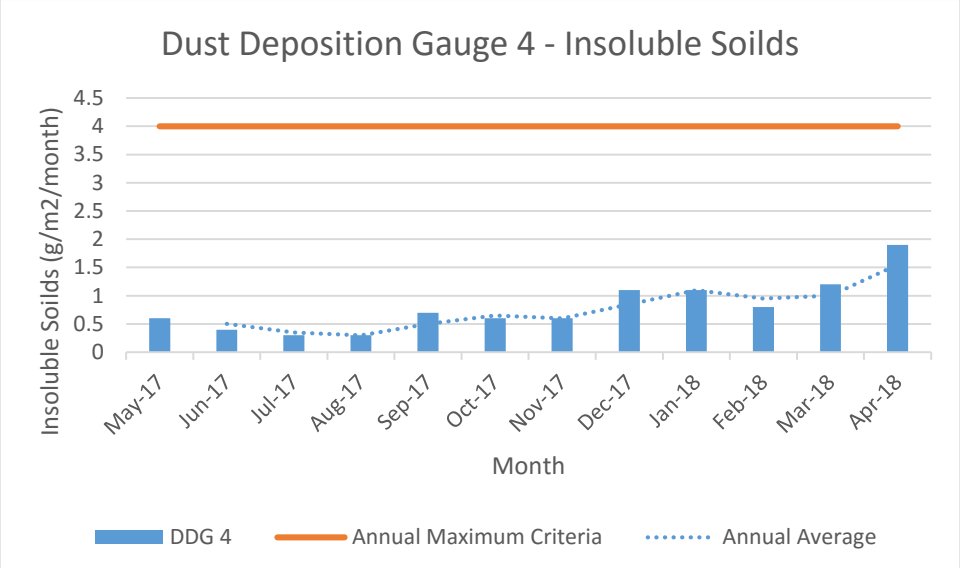
*A = Solvent rinsed glass jar with Teflon lined lid and orange label

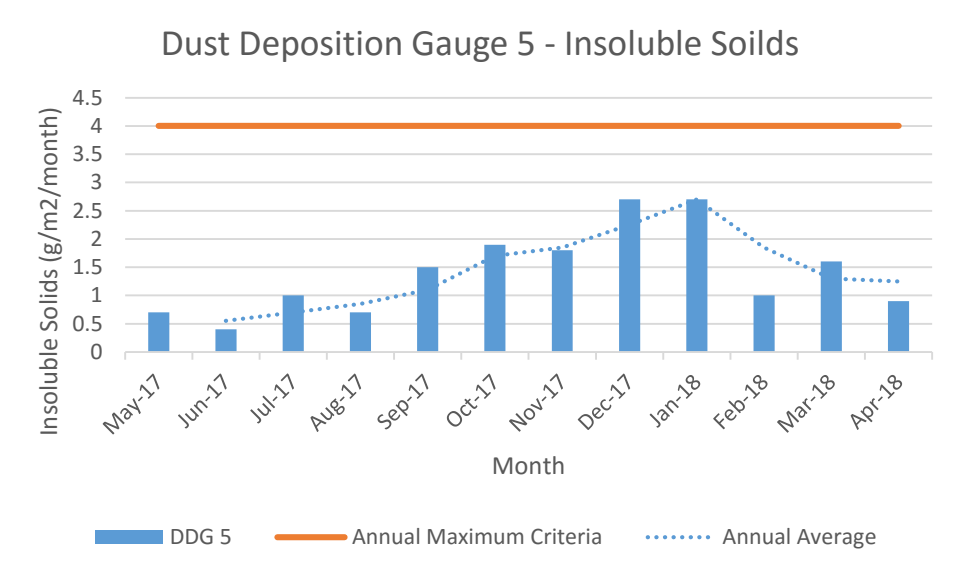
Appendix B – Depositional Dust Monitoring Data

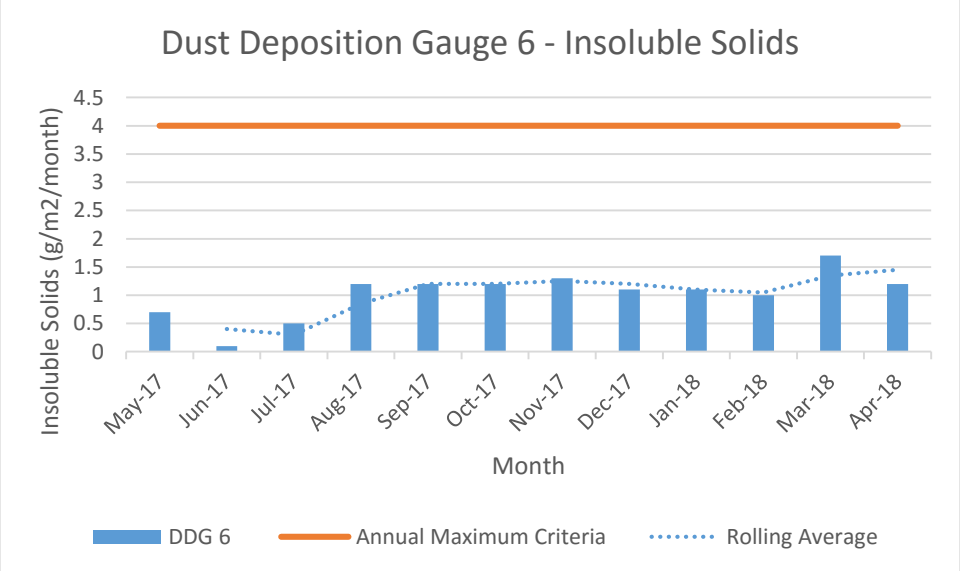

Dust Deposition Gauge 1 - Insoluble Soilds
Insoluble Soilds (g/m2/month)
25
20
15
10
5
0
May-17
Jun-17
Jul-17
Aug-17
Sep-17
Oct-17
Nov-17
Dec-17
Jan-18
Feb-18
Mar-18
Apr-18
Month
DDG 1
Annual Maximum Criteria
Annual Average


Dust Deposition Gauge 2 - Insoluble Soilds
Insoluble Soilds (g/m2/month)
5
4
3
2
1
0
May-17
Jun-17
Jul-17
Aug-17
Sep-17
Oct-17
Nov-17
Dec-17
Jan-18
Feb-18
Mar-18
Apr-18
Month
DDG 2
Annual Maximum Criteria
Annual Average


Dust Deposition Gauge 3 - Insoluble Soilds
Insoluble Solids (g/m2/month)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
May-17
Jun-17
Jul-17
Aug-17
Sep-17
Oct-17
Nov-17
Dec-17
Jan-18
Feb-18
Mar-18
Apr-18
Month
DDG 3
Annual Maximum Criteria
Annual Average


Dust Deposition Gauge 4 - Insoluble Soilds
Insoluble Soilds (g/m2/month)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
May-17
Jun-17
Jul-17
Aug-17
Sep-17
Oct-17
Nov-17
Dec-17
Jan-18
Feb-18
Mar-18
Apr-18
Month
DDG 4
Annual Maximum Criteria
Annual Average


Dust Deposition Gauge 5 - Insoluble Soilds
Insoluble Solids (g/m2/month)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
May-17
Jun-17
Jul-17
Aug-17
Sep-17
Oct-17
Nov-17
Dec-17
Jan-18
Feb-18
Mar-18
Apr-18
Month
DDG 5
Annual Maximum Criteria
Annual Average


Dust Deposition Gauge 6 - Insoluble Solids
Insoluble Solids (g/m2/month)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
May-17
Jun-17
Jul-17
Aug-17
Sep-17
Oct-17
Nov-17
Dec-17
Jan-18
Feb-18
Mar-18
Apr-18
Month
DDG 6
Annual Maximum Criteria
Rolling Average

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

ALS AIRBORNE DUST
ANALYSIS AND TESTING REPORT

REPORT TO:	Victor Bendevski
REPORT ON:	Borg Panels, Oberon Dust Results - October
REPORT NO:	24006271
PERIOD OF EXPOSURE:	Typically 30 days +/- 2 days
SAMPLED BY:	C. Roach & J. Hore
REPORTED BY:	L. Stapleton

Stephanie Thompson
Environmental Sampling Supervisor

NATA WORLD RECOGNISED ACCREDITATION

Accreditation # 15784
Site # 11436

Accredited for compliance with ISO/IEC 17025.

ACIRL Pty Ltd
ABN 41 000 513 888
Part of the ALS Laboratory Group
Unit 3, 16 Donald Street
LITHGOW NSW 2790
Phone +61 2 6350 7400 Fax +61 2 6352 3583 www.alsglobal.com
A Campbell Brothers Limited Company

ALS AIRBORNE DUST
ANALYSIS AND TESTING REPORT

BORG PANELS

Month	Oct-17
Date Replaced	18/09/2017
Date Collected	16/10/2017

DUST DEPOSITION RESULTS

(g/m².month)

GAUGE NO.	INSOLUBLE SOLIDS	COMBUSTIBLE MATTER	**ASH
#1	7.7	5.7	2.0
#2	3.2	1.7	1.5
#3	1.2	0.6	0.6
#4	0.6	0.4	0.2
#5	1.9	0.9	1.0
#6	1.2	0.5	0.7

No.of days exposed 28

** Incombustible Matter
Analysed in accordance with AS3580.10.1

ALS AIRBORNE DUST
ANALYSIS AND TESTING REPORT

BORG PANELS

DUST GAUGE OBSERVATIONS

Gauge	Analysis Observations
#1	Clear, insects, organic matter, fine brown/ black dust and coarse brown/ black dust
#2	Clear, insects, fine brown/ black dust and coarse brown/ black dust
#3	Clear, insects, fine brown dust and coarse brown/ black dust
#4	Clear, insects, fine brown dust and coarse black dust
#5	Clear, insects, organic matter, fine brown dust and coarse brown/ black dust
#6	Clear, insects, fine brown/ black dust and coarse brown/ black dust

Analysed in accordance with AS3580.10.1

ALS AIRBORNE DUST
ANALYSIS AND TESTING REPORT

METHODS OF ANALYSIS

Tests for results issued in this report have been carried out at the following NATA accredited laboratories in accordance with the methods as detailed below:-

ACIRL Report No: 24006271

DUST

TEST	METHOD	LABORATORY
		ACIRL Lithgow NATA Accreditation #11436
Dust (Deposited matter gravimetric method)	CBM508	X

In accordance with "Methods for sampling and analysis of ambient air.
Method 10.1: Determination of particulate matter- Deposited matter-Gravimetric method"
Standards Australia, 2003

Appendix C – Air Quality Monitoring Data

Ektimo

Address (Head Office)
7 Redland Drive
MITCHAM VIC 3132

Postal Address
52 Cooper Road
COCKBURN CENTRAL WA 6164

Office Locations
VIC NSW WA QLD

Freecall: 1300 364 005
www.ektimo.com.au
ABN: 86 600 381 413

Report Number R005486

Emission Testing Report
Borg Manufacturing Pty Ltd, Oberon Plant

Document Information

Client Name:	Borg Manufacturing Pty Ltd
Report Number:	R005486
Date of Issue:	16 July 2018
Attention:	Victor Bendevski
Address:	Lowes Mount Rd Oberon NSW 2787
Testing Laboratory:	Ektimo Pty Ltd, ABN 86 600 381 413

Report Status

Format	Document Number	Report Date	Prepared By	Reviewed By (1)	Reviewed By (2)
Preliminary Report	R005486p	22/03/2018	ADo		ADa
Draft Report	R005486[DRAFT]	23/03/2018	DBu/ADo	SWe	ADa
Draft Report 2	R005486[DRAFT2]	15/05/2018	DBu/ADo	SWe	ADa
Draft Report 3	R005486[DRAFT3]	25/05/2018	DBu/ADo	SWe	ADa
Final Report	R005486	16/07/2018	DBu/ADo	SWe	ADa
Amend Report	-	-	-	-	-

Template Version: 081217

Amendment Record

Document Number	Initiator	Report Date	Section	Reason
Nil	-	-	-	-

Report Authorisation

Ryan Collins
Client Manager

NATA Accredited Laboratory
No. 14601

Aaron Davis
Ektimo Signatory

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC mutual recognition arrangement for the mutual recognition of the equivalence of testing, calibration and inspection reports.

Table of Contents

1 EXECUTIVE SUMMARY

Ektimo was engaged by Borg Manufacturing to perform emissions to air monitoring as detailed below.

Monitoring was performed as follows:

Location	Test Date	Test Parameters*
EPA 4 - DC1 Baghouse	22 February 2018	Total solid particles, fine particulate matter (PM_{10}), formaldehyde, volatile organic compounds
EPA 5 - DC2 Baghouse	22 February 2018	
EPA 7 - Conti 2 Stage 1 Dryer Cyclone 1 (West)	21 February 2018	Total solid particles, fine particulate matter (PM_{10}), formaldehyde
EPA 8 - Conti 2 Stage 1 Dryer Cyclone 2 (East)	21 February 2018	
EPA 9 - Conti 1 Stage 1 Dryer Cyclone 1 (South)	21 February 2018	Total solid particles, fine particulate matter (PM_{10}), formaldehyde, nitrogen oxides, oxygen, carbon dioxide, volatile organic compounds, smoke
EPA 10 - Conti 1 Stage 1 Dryer Cyclone 2 (North)	21 February 2018	
EPA 11 - Conti 2 Heat Plant	22 February 2018	Total solid particles, fine particulate matter (PM_{10}), formaldehyde, nitrogen oxides, carbon monoxide, carbon dioxide, oxygen, volatile organic compounds, smoke, ammonia, hydrogen cyanide
EPA 12 – Conti 1 Press Vent 1	18 April 2018	Total solid particles, fine particulate matter (PM_{10}), formaldehyde, nitrogen oxides, volatile organic compounds
EPA 12 – Conti 1 Press Vent 2	18 April 2018	
EPA 12 – Conti 1 Press Vent 3	18 April 2018	
EPA 12 – Conti 1 Press Vent 4	19 April 2018	
EPA 27 - Combined Stack (C2 Press Vents)	17 April 2018	Total solid particles, fine particulate matter (PM_{10}), formaldehyde, nitrogen oxides, volatile organic compounds, smoke

* Flow rate, velocity, temperature and moisture were determined unless otherwise stated.

The sampling methodologies chosen by Ektimo are those recommended by the NSW Office of Environment and Heritage (as specified in the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales, January 2007*).

All results are reported on a dry basis at STP. Unless otherwise indicated, the methods cited in this report have been performed without deviation.

Plant operating conditions have been noted in the report.

2 LICENCE COMPARISON

The following licence comparison table shows that all analytes highlighted in green are below the licence limit set by the NSW EPA as per licence 3035 (last amended on 22 November 2017).

EPA No.	Location Description	Pollutant	Units	Licence limit	Detected values 21/02/18 - 23/02/18
9	Conti 1 Stage 1 Dryer Cyclone 1 (South)	Solid Particles	mg/m^3	200	36
		Volatile organic compounds	mg/m^3	10	8.2
10	Conti 1 Stage 1 Dryer Cyclone 2 (North)	Solid Particles	mg/m^3	200	42
		Volatile organic compounds	mg/m^3	10	2.4
11	Conti 2 Heat Plant Stack	Solid Particles	mg/m^3 @ 6.5% CO_2	200	170
		Volatile organic compounds	mg/m^3	10	0.26
		Formaldehyde	mg/m^3	5	1.9

3 RESULTS

3.1 EPA 4 - DC1 Baghouse

Date	22/02/2018	**Client**	Borg Manufacturing Pty Ltd
Report	R005486	**Stack ID**	EPA 4 - DC1 Baghouse
Licence No.	3035	**Location**	Oberon
Ektimo Staff	Ryan Collins, Steven Weekes	**State**	NSW
Process Conditions	Please refer to client records.		190219

Sampling Plane Details		
Sampling plane dimensions	1280 x 680 mm	
Sampling plane area	0.87 m²	
Sampling port size, number	4" BSP (x2)	
Access & height of ports	Elevated work platform	10 m
Duct orientation & shape	Vertical	Rectangular
Downstream disturbance	Exit	1 D
Upstream disturbance	Bend	3 D
No. traverses & points sampled	2	8
Sample plane compliance to AS4323.1	Compliant but non-ideal	

Comments

The discharge is assumed to be composed of dry air and moisture

The sampling plane is deemed to be non-ideal or non-compliant due to the following reasons:

The sampling plane is too near to the downstream disturbance but is greater than or equal to 1D

The sampling plane is too near to the upstream disturbance but is greater than or equal to 2D

Stack Parameters		
Moisture content, %v/v	5.9	
Gas molecular weight, g/g mole	28.3 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.26 (wet)	1.29 (dry)
Gas Flow Parameters		
Temperature, °C	41	
Temperature, K	314	
Velocity at sampling plane, m/s	6.2	
Volumetric flow rate, discharge, m³/s	5.4	
Volumetric flow rate (wet STP), m³/s	4.2	
Volumetric flow rate (dry STP), m³/s	3.9	
Mass flow rate (wet basis), kg/hour	19000	
Velocity difference, %	<1	

Date	22/02/2018	**Client**	Borg Manufacturing Pty Ltd
Report	R005486	**Stack ID**	EPA 4 - DC1 Baghouse
Licence No.	3035	**Location**	Oberon
Ektimo Staff	Ryan Collins, Steven Weekes	**State**	NSW
Process Conditions	Please refer to client records.		180219

Aldehydes	Results
Sampling time	0930-1030
	Concentration mg/m³ / Mass Rate g/min
Formaldehyde	1.8 / 0.42

Isokinetic Results	Results	
Sampling time	0922-1022	0922-1023 (PM10)
	Concentration mg/m³	Mass Rate g/min
Solid Particles	<2	<0.5
Fine particulates (PM10)	<3	<0.8
Isokinetic Sampling Parameters	Isokinetic	PM10
Sampling time, min	64	64
Isokinetic rate, %	101	94

Total VOCs (as n-Propane)	Results	
Sampling time	0925-1030	
	Concentration mg/m³	Mass Rate g/min
Total	18	4.2

VOC (speciated)	Results	
Sampling time	0925-1030	
	Concentration mg/m³	Mass Rate g/min
Detection limit(1)	<0.09	<0.02
Isopropanol	22	5.2
Benzene	0.18	0.043
Toluene	1.4	0.32
m + p-Xylene	0.28	0.065
alpha-Pinene	1.2	0.29
beta-Pinene	1	0.24

(1) Unless otherwise reported, the following target compounds were found to be below detection:
Ethanol, 1,1-Dichloroethene, Dichloromethane, trans-1,2-Dichloroethene, cis-1,2-Dichloroethene, Chloroform, 1,1,1-Trichloroethane, 1,2-Dichloroethane, Carbon tetrachloride, Butanol, 1-Methoxy-2-propanol, Trichloroethylene, 1,1,2-trichloroethane, Tetrachloroethene, Chlorobenzene, Ethylbenzene, Styrene, o-Xylene, 2-Butoxyethanol, 1,1,2,2-Tetrachloroethane, Isopropylbenzene, Propylbenzene, 1,3,5-trimethylbenzene, tert-Butylbenzene, 1,2,4-trimethylbenzene, 1,2,3-trimethylbenzene, Acetone, Pentane, Acrylonitrile, n-Hexane, Methyl ethyl ketone, Ethyl acetate, Cyclohexane, 2-Methylhexane, 2,3-Dimethylpentane, Isopropyl acetate, 3-Methylhexane, Ethyl acrylate, Heptane, Methyl methacrylate, Propyl acetate, Methylcyclohexane, MIBK, 2-Hexanone, Octane, Butyl acetate, 1-methoxy-2-propyl acetate, Butyl acrylate, Nonane, Cellosolve acetate, Decane, 3-Carene, D-Limonene, Undecane, Dodecane, Tridecane, Tetradecane

3.2 EPA 5 - DC2 Baghouse

Date	22/02/2018	**Client**	Borg Manufacturing Pty Ltd
Report	R005486	**Stack ID**	EPA5 - DC2 Baghouse
Licence No.	3035	**Location**	Oberon
Ektimo Staff	Ryan Collins, Steven Weekes	**State**	NSW
Process Conditions	Please refer to client records.		180219

Sampling Plane Details	
Sampling plane dimensions	2800 x 680 mm
Sampling plane area	1.9 m²
Sampling port size, number	4" BSP (x2)
Access & height of ports	Elevated work platform 10 m
Duct orientation & shape	Vertical Rectangular
Downstream disturbance	Exit 1 D
Upstream disturbance	Bend 3 D
No. traverses & points sampled	2 14
Sample plane compliance to AS4323.1	Compliant but non-ideal

Comments

The discharge is assumed to be composed of dry air and moisture

The sampling plane is deemed to be non-ideal or non-compliant due to the following reasons:

The sampling plane is too near to the downstream disturbance but is greater than or equal to 1D

The sampling plane is too near to the upstream disturbance but is greater than or equal to 2D

Stack Parameters		
Moisture content, %v/v	3.6	
Gas molecular weight, g/g mole	28.6 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.27 (wet)	1.29 (dry)
Gas Flow Parameters		
Temperature, °C	40	
Temperature, K	313	
Velocity at sampling plane, m/s	14	
Volumetric flow rate, discharge, m³/s	27	
Volumetric flow rate (wet STP), m³/s	20	
Volumetric flow rate (dry STP), m³/s	20	
Mass flow rate (wet basis), kg/hour	94000	
Velocity difference, %	<1	

Date	22/02/2018	**Client**	Borg Manufacturing Pty Ltd
Report	R005486	**Stack ID**	EPA5 - DC2 Baghouse
Licence No.	3035	**Location**	Oberon
Ektimo Staff	Ryan Collins, Steven Weekes	**State**	NSW
Process Conditions	Please refer to client records.		180219

Aldehydes	Results
Sampling time	1110-1210
	Concentration mg/m³ / Mass Rate g/min
Formaldehyde	<0.02 / <0.02

Isokinetic Results	Results	
Sampling time	1113-1226	1113-1225 (PM10)
	Concentration mg/m³	Mass Rate g/min
Solid Particles	2.2	2.6
Fine particulates (PM10)	<4	<4
D50 cut size, 10µm	9.7	
Isokinetic Sampling Parameters	Isokinetic	PM10
Sampling time, min	70	70
Isokinetic rate, %	104	105

Total VOCs **(as n-Propane)**	Results
Sampling time	1110-1210
	Concentration mg/m³ / Mass Rate g/min
Total	2.1 / 2.5

VOC (speciated)	Results
Sampling time	1110-1210
	Concentration mg/m³ / Mass Rate g/min
Detection limit(1)	<0.1 / <0.1
Benzene	0.18 / 0.22
Toluene	1.5 / 1.8
m + p-Xylene	0.3 / 0.35
Pentane	1.2 / 1.5
alpha-Pinene	0.71 / 0.83
beta-Pinene	0.64 / 0.75

(1) Unless otherwise reported, the following target compounds were found to be below detection:
Ethanol, Isopropanol, 1,1-Dichloroethene, Dichloromethane, trans-1,2-Dichloroethene, cis-1,2-Dichloroethene, Chloroform, 1,1,1-Trichloroethane, 1,2-Dichloroethane, Carbon tetrachloride, Butanol, 1-Methoxy-2-propanol, Trichloroethylene, 1,1,2-trichloroethane, Tetrachloroethene, Chlorobenzene, Ethylbenzene, Styrene, o-Xylene, 2-Butoxyethanol, 1,1,2,2-Tetrachloroethane, Isopropylbenzene, Propylbenzene, 1,3,5-trimethylbenzene, tert-Butylbenzene, 1,2,4-trimethylbenzene, 1,2,3-trimethylbenzene, Acetone, Acrylonitrile, n-Hexane, Methyl ethyl ketone, Ethyl acetate, Cyclohexane, 2-Methylhexane, 2,3-Dimethylpentane, Isopropyl acetate, 3-Methylhexane, Ethyl acrylate, Heptane, Methyl methacrylate, Propyl acetate, Methylcyclohexane, MIBK, 2-Hexanone, Octane, Butyl acetate, 1-methoxy-2-propyl acetate, Butyl acrylate, Nonane, Cellosolve acetate, Decane, 3-Carene, D-Limonene, Undecane, Dodecane, Tridecane, Tetradecane

3.3 EPA 7 - Conti 2 Stage 1 Dryer Cyclone 1 (West)

Date	21/02/2018	**Client**	Borg Manufacturing Pty Ltd
Report	R005486	**Stack ID**	EPA 7 - Conti 2 Stage 1 Dryer Cyclone 1 (West)
Licence No.	3035	**Location**	Oberon
Ektimo Staff	Ryan Collins, Steven Weekes	**State**	NSW
Process Conditions	Please refer to client records.		180219

Sampling Plane Details	
Sampling plane dimensions	2480 mm
Sampling plane area	4.83 m²
Sampling port size, number	4" BSP (x4)
Access & height of ports	Fixed ladders 35 m
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit cone 1.5 D
Upstream disturbance	Junction 0.5 D
No. traverses & points sampled	2 24
Sample plane compliance to AS4323.1	Compliant but non-ideal

Comments

Please note that in response to the cyclonic flow, Borg Manufacturing has a NSW EPA approved method deviation to AS4323.2 to conduct particulate matter sampling at this location.

The sampling plane is deemed to be non-ideal or non-compliant due to the following reasons:
The gas profile has a cyclonic component which exceeds 15°
The upstream disturbance is <2D from the sampling plane
The sampling plane is too near to the downstream disturbance but is greater than or equal to 1D

Stack Parameters		
Moisture content, %v/v	13	
Gas molecular weight, g/g mole	27.7 (wet)	29.1 (dry)
Gas density at STP, kg/m³	1.23 (wet)	1.30 (dry)
Gas Flow Parameters		
Temperature, °C	53	
Temperature, K	326	
Velocity at sampling plane, m/s	12	
Volumetric flow rate, discharge, m³/s	57	
Volumetric flow rate (wet STP), m³/s	42	
Volumetric flow rate (dry STP), m³/s	36	
Mass flow rate (wet basis), kg/hour	190000	
Velocity difference, %	<1	

Aldehydes	Results	
Sampling time	0952-1052	
	Concentration mg/m³	Mass Rate g/min
Formaldehyde	0.087	0.19

Isokinetic Results	Results	
Sampling time	0910-1113	0910-1115 (PM10)
	Concentration mg/m³	Mass Rate g/min
Solid Particles	29	64
Fine particulates (PM10)	16	34
D50 cut size, 10µm	10.3	
Isokinetic Sampling Parameters	Isokinetic	PM10
Sampling time, min	120	120
Isokinetic rate, %	105	104

3.4 EPA 8 - Conti 2 Stage 1 Dryer Cyclone 2 (East)

Date	21/02/2018	**Client**	Borg Manufacturing Pty Ltd
Report	R005486	**Stack ID**	EPA 8 - Conti 2 Stage 1 Dryer Cyclone 2 (East)
Licence No.	3035	**Location**	Oberon
Ektimo Staff	Ryan Collins, Steven Weekes	**State**	NSW
Process Conditions	Please refer to client records.		180219

Sampling Plane Details	
Sampling plane dimensions	2480 mm
Sampling plane area	4.83 m²
Sampling port size, number	4" BSP (x4)
Access & height of ports	Fixed ladders 35 m
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit cone 1.5 D
Upstream disturbance	Junction 0.5 D
No. traverses & points sampled	2 24
Sample plane compliance to AS4323.1	Compliant but non-ideal

Comments

Please note that in response to the cyclonic flow, Borg Manufacturing has a NSW EPA approved method deviation to AS4323.2 to conduct particulate matter sampling at this location.

The sampling plane is deemed to be non-ideal or non-compliant due to the following reasons:
The gas profile has a cyclonic component which exceeds 15°
The upstream disturbance is <2D from the sampling plane
The sampling plane is too near to the downstream disturbance but is greater than or equal to 1D

Stack Parameters		
Moisture content, %v/v	13	
Gas molecular weight, g/g mole	27.7 (wet)	29.1 (dry)
Gas density at STP, kg/m³	1.24 (wet)	1.30 (dry)
Gas Flow Parameters		
Temperature, °C	62	
Temperature, K	336	
Velocity at sampling plane, m/s	12	
Volumetric flow rate, discharge, m³/s	56	
Volumetric flow rate (wet STP), m³/s	40	
Volumetric flow rate (dry STP), m³/s	35	
Mass flow rate (wet basis), kg/hour	180000	
Velocity difference, %	<1	

Aldehydes	Results	
Sampling time	1126-1226	
	Concentration mg/m³	Mass Rate g/min
Formaldehyde	0.065	0.14

Isokinetic Results	Results	
Sampling time	1125-1325	1125-1325 (PM10)
	Concentration mg/m³	Mass Rate g/min
Solid Particles	26	51
Fine particulates (PM10)	23	44
D50 cut size, 10µm	9.4	
Isokinetic Sampling Parameters	Isokinetic	PM10
Sampling time, min	120	121
Isokinetic rate, %	120	103

3.5 EPA 9 - Conti 1 Stage 1 Dryer Cyclone 1 (South)

Date	21/02/2018	**Client**	Borg Manufacturing Pty Ltd
Report	R005486	**Stack ID**	EPA 9 - Conti 1 Dryer Cyclone 1 (South)
Licence No.	3035	**Location**	Oberon
Ektimo Staff	Ryan Collins, Steven Weekes	**State**	NSW
Process Conditions	Please refer to client records.		180219

Sampling Plane Details		
Sampling plane dimensions	2230 mm	
Sampling plane area	3.91 m²	
Sampling port size, number	4" BSP (x4)	
Access & height of ports	Fixed ladders	25 m
Duct orientation & shape	Vertical	Circular
Downstream disturbance	Exit	1 D
Upstream disturbance	Junction	2 D
No. traverses & points sampled	2	24
Sample plane compliance to AS4323.1	Compliant but non-ideal	

Comments

Please note that in response to the cyclonic flow, Borg Manufacturing has a NSW EPA approved method deviation to AS4323.2 to conduct particulate matter sampling at this location.

The sampling plane is deemed to be non-ideal or non-compliant due to the following reasons:

The gas profile has a cyclonic component which exceeds 15°

The sampling plane is too near to the downstream disturbance but is greater than or equal to 1D

The sampling plane is too near to the upstream disturbance but is greater than or equal to 2D

Stack Parameters		
Moisture content, %v/v	11	
Gas molecular weight, g/g mole	27.9 (wet)	29.2 (dry)
Gas density at STP, kg/m³	1.24 (wet)	1.30 (dry)
Gas Flow Parameters		
Temperature, °C	57	
Temperature, K	331	
Velocity at sampling plane, m/s	12	
Volumetric flow rate, discharge, m³/s	46	
Volumetric flow rate (wet STP), m³/s	34	
Volumetric flow rate (dry STP), m³/s	30	
Mass flow rate (wet basis), kg/hour	150000	
Velocity difference, %	<1	

Date	21/02/2018	**Client**	Borg Manufacturing Pty Ltd
Report	R005486	**Stack ID**	EPA 9 - Conti 1 Dryer Cyclone 1 (South)
Licence No.	3035	**Location**	Oberon
Ektimo Staff	Ryan Collins, Steven Weekes	**State**	NSW
Process Conditions	Please refer to client records.		180219

Gas Analyser Results	Average		Minimum		Maximum	
Sampling time	1555 - 1657		1555 - 1657		1555 - 1657	
	Concentration mg/m³	Mass Rate g/min	Concentration mg/m³	Mass Rate g/min	Concentration mg/m³	Mass Rate g/min
Combustion Gases						
Nitrogen oxides (as NO_2)	210	370	180	320	220	400
	Concentration %		Concentration %		Concentration %	
Carbon dioxide	1.6		1.5		1.8	
Oxygen	19.1		18.8		19.3	

Aldehydes	Results	
Sampling time	1550-1650	
	Concentration mg/m³	Mass Rate g/min
Formaldehyde	5.8	10

Isokinetic Results	Results	
Sampling time	1540-1740	1540-1740 (PM10)
	Concentration mg/m³	Mass Rate g/min
Solid Particles	36	61
Fine particulates (PM10)	32	54
D50 cut size, 10µm	10.1	
Isokinetic Sampling Parameters	Isokinetic	PM10
Sampling time, min	120	120
Isokinetic rate, %	103	102

Smoke Obscuration	Result
Time of assessment	1555 - 1600
Smoke Obscuration	0

Total VOCs **(as n-Propane)**	Results	
Sampling time	1655-1755	
	Concentration mg/m³	Mass Rate g/min
Total	8.2	15

VOC (speciated)	Results	
Sampling time	1655-1755	
	Concentration mg/m³	Mass Rate g/min
Detection limit(1)	<0.2	<0.4
alpha-Pinene	15	28
beta-Pinene	8.6	15
D-Limonene	1.3	2.3

(1) Unless otherwise reported, the following target compounds were found to be below detection:

Ethanol, Isopropanol, 1,1-Dichloroethene, Dichloromethane, trans-1,2-Dichloroethene, cis-1,2-Dichloroethene, Chloroform, 1,1,1-Trichloroethane, 1,2-Dichloroethane, Benzene, Carbon tetrachloride, Butanol, 1-Methoxy-2-propanol, Trichloroethylene, Toluene, 1,1,2-trichloroethane, Tetrachloroethene, Chlorobenzene, Ethylbenzene, m +p-Xylene, Styrene, o-Xylene, 2-Butoxyethanol, 1,1,2,2-Tetrachloroethane, Isopropylbenzene, Propylbenzene, 1,3,5-trimethylbenzene, tert-Butylbenzene, 1,2,4-trimethylbenzene, 1,2,3-trimethylbenzene, Acetone, Pentane, Acrylonitrile, n-Hexane, Methyl ethyl ketone, Ethyl acetate, Cyclohexane, 2-Methylhexane, 2,3-Dimethylpentane, Isopropyl acetate, 3-Methylhexane, Ethyl acrylate, Heptane, Methyl methacrylate, Propyl acetate, Methylcyclohexane, MIBK, 2-Hexanone, Octane, Butyl acetate, 1-methoxy-2-propyl acetate, Butyl acrylate, Nonane, Cellosolve acetate, Decane, 3-Carene, Undecane, Dodecane, Tridecane, Tetradecane

3.6 EPA 10 - Conti 1 Stage 1 Dryer Cyclone 2 (North)

Date	21/02/2018	**Client**	Borg Manufacturing Pty Ltd
Report	R005486	**Stack ID**	EPA 10 - Conti 1 Dryer Cyclone 2 (North)
Licence No.	3035	**Location**	Oberon
Ektimo Staff	Ryan Collins, Steven Weekes	**State**	NSW
Process Conditions	Please refer to client records.		190219

Sampling Plane Details	
Sampling plane dimensions	2230 mm
Sampling plane area	3.91 m²
Sampling port size, number	4" BSP (x4)
Access & height of ports	Fixed ladders 25 m
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit 1 D
Upstream disturbance	Junction 2 D
No. traverses & points sampled	2 24
Sample plane compliance to AS4323.1	Compliant but non-ideal

Comments

Please note that in response to the cyclonic flow, Borg Manufacturing has a NSW EPA approved method deviation to AS4323.2 to conduct particulate matter sampling at this location.

The sampling plane is deemed to be non-ideal or non-compliant due to the following reasons:

The gas profile has a cyclonic component which exceeds 15°

The sampling plane is too near to the downstream disturbance but is greater than or equal to 1D

The sampling plane is too near to the upstream disturbance but is greater than or equal to 2D

Stack Parameters		
Moisture content, %v/v	11	
Gas molecular weight, g/g mole	28.0 (wet)	29.2 (dry)
Gas density at STP, kg/m³	1.25 (wet)	1.30 (dry)
Gas Flow Parameters		
Temperature, °C	51	
Temperature, K	324	
Velocity at sampling plane, m/s	12	
Volumetric flow rate, discharge, m³/s	48	
Volumetric flow rate (wet STP), m³/s	35	
Volumetric flow rate (dry STP), m³/s	32	
Mass flow rate (wet basis), kg/hour	160000	
Velocity difference, %	<1	

Date	21/02/2018	**Client**	Borg Manufacturing Pty Ltd
Report	R005486	**Stack ID**	EPA 10 - Conti 1 Dryer Cyclone 2 (North)
Licence No.	3035	**Location**	Oberon
Ektimo Staff	Ryan Collins, Steven Weekes	**State**	NSW
Process Conditions	Please refer to client records.		180219

Gas Analyser Results	Average		Minimum		Maximum	
Sampling time	1740 - 1859		1740 - 1859		1740 - 1859	
	Concentration mg/m³	Mass Rate g/min	Concentration mg/m³	Mass Rate g/min	Concentration mg/m³	Mass Rate g/min
Combustion Gases						
Nitrogen oxides (as NO_2)	200	370	170	320	220	410
	Concentration %		Concentration %		Concentration %	
Carbon dioxide	1.8		1.6		2	
Oxygen	19.1		18.9		19.3	

Aldehydes	Results	
Sampling time	1753-1853	
	Concentration mg/m³	Mass Rate g/min
Formaldehyde	6.5	12

Isokinetic Results	Results	
Sampling time	1744-1948	1744-1944 (PM10)
	Concentration mg/m³	Mass Rate g/min
Solid Particles	42	77
Fine particulates (PM10)	36	66
D50 cut size, 10µm	10.4	
Isokinetic Sampling Parameters	Isokinetic	PM10
Sampling time, min	120	120
Isokinetic rate, %	97	95

Smoke Obscuration	Result
Time of assessment	1750 - 1755
Smoke Obscuration	0

Total VOCs **(as n-Propane)**	Results	
Sampling time	1759-1859	
	Concentration mg/m³	Mass Rate g/min
Total	2.4	4.5

VOC (speciated)	Results	
Sampling time	1759-1859	
	Concentration mg/m³	Mass Rate g/min
Detection limit(1)	<0.2	<0.4
alpha-Pinene	5.1	9.7
beta-Pinene	2.2	4.2

(1) Unless otherwise reported, the following target compounds were found to be below detection:
Ethanol, Isopropanol, 1,1-Dichloroethene, Dichloromethane, trans-1,2-Dichloroethene, cis-1,2-Dichloroethene, Chloroform, 1,1,1-Trichloroethane, 1,2-Dichloroethane, Benzene, Carbon tetrachloride, Butanol, 1-Methoxy-2-propanol, Trichloroethylene, Toluene, 1,1,2-trichloroethane, Tetrachloroethene, Chlorobenzene, Ethylbenzene, m +p-Xylene, Styrene, o-Xylene, 2-Butoxyethanol, 1,1,2,2-Tetrachloroethane, Isopropylbenzene, Propylbenzene, 1,3,5-trimethylbenzene, tert-Butylbenzene, 1,2,4-trimethylbenzene, 1,2,3-trimethylbenzene, Acetone, Pentane, Acrylonitrile, n-Hexane, Methyl ethyl ketone, Ethyl acetate, Cyclohexane, 2-Methylhexane, 2,3-Dimethylpentane, Isopropyl acetate, 3-Methylhexane, Ethyl acrylate, Heptane, Methyl methacrylate, Propyl acetate, Methylcyclohexane, MIBK, 2-Hexanone, Octane, Butyl acetate, 1-methoxy-2-propyl acetate, Butyl acrylate, Nonane, Cellosolve acetate, Decane, 3-Carene, D-Limonene, Undecane, Dodecane, Tridecane, Tetradecane

3.7 EPA 11 - Conti 2 Heat Plant

Date	22/02/2018	**Client**	Borg Manufacturing Pty Ltd
Report	R005486	**Stack ID**	EPA 11 - Conti 2 Heat Plant Stack
Licence No.	3035	**Location**	Oberon
Ektimo Staff	Ryan Collins, Steven Weekes	**State**	NSW
Process Conditions	Please refer to client records.		180219

Sampling Plane Details	
Sampling plane dimensions	1500 mm
Sampling plane area	1.77 m²
Sampling port size, number	4" BSP (x2)
Access & height of ports	Elevated work platform 20 m
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit 3 D
Upstream disturbance	Junction 3 D
No. traverses & points sampled	2 16
Sample plane compliance to AS4323.1	Compliant but non-ideal

Comments

The sampling plane is deemed to be non-ideal or non-compliant due to the following reasons:

The sampling plane is too near to the upstream disturbance but is greater than or equal to 2D

Stack Parameters		
Moisture content, %v/v	6.4	
Gas molecular weight, g/g mole	28.9 (wet)	29.6 (dry)
Gas density at STP, kg/m³	1.29 (wet)	1.32 (dry)
% Carbon dioxide correction & Factor	6.5 %	1.19
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	1340 & 1520	
Temperature, °C	339	
Temperature, K	612	
Velocity at sampling plane, m/s	16	
Volumetric flow rate, discharge, m³/s	29	
Volumetric flow rate (wet STP), m³/s	11	
Volumetric flow rate (dry STP), m³/s	10	
Mass flow rate (wet basis), kg/hour	52000	
Velocity difference, %	<1	

Gas Analyser Results	Average		Minimum		Maximum	
Sampling time	1357 - 1517		1357 - 1517		1357 - 1517	
	Concentration mg/m³	Mass Rate g/min	Concentration mg/m³	Mass Rate g/min	Concentration mg/m³	Mass Rate g/min
Combustion Gases						
Nitrogen oxides (as NO_2)	490	310	320	200	670	420
	Concentration %		Concentration %		Concentration %	
Carbon dioxide	5.5		3.6		7.4	
Oxygen	15.1		13.2		17.2	

Aldehydes	Results	
Sampling time	1516-1616	
	Concentration mg/m³	Mass Rate g/min
Formaldehyde	1.9	1.2

Hydrogen Cyanide	Results	
Sampling time	1350-1450	
	Concentration mg/m³	Mass Rate g/min
Hydrogen Cyanide	<0.5	<0.3

Ammonia	Results	
Sampling time	1350-1450	
	Concentration mg/m³	Mass Rate g/min
Ammonia	<0.2	<0.2

Date	22/02/2018	**Client**	Borg Manufacturing Pty Ltd
Report	R005486	**Stack ID**	EPA 11 - Conti 2 Heat Plant Stack
Licence No.	3035	**Location**	Oberon
Ektimo Staff	Ryan Collins, Steven Weekes	**State**	NSW
Process Conditions	Please refer to client records.		

IB0219

Isokinetic Results		Results		
	Sampling time	1356-1516		
		Concentration mg/m³	Corrected to 6.5% CO2 mg/m³	Mass Rate g/min
Solid Particles		140	170	89
Fine particulates (PM10)	(PSA)	97	120	61
Isokinetic Sampling Parameters				
Sampling time, min		80		
Isokinetic rate, %		97		

Smoke Obscuration	Result
Time of assessment	1424 - 1429
Smoke Obscuration	0

Total VOCs **(as n-Propane)**		Results	
	Sampling time	1440-1540	
		Concentration mg/m³	Mass Rate g/min
Total		0.26	0.16

VOC (speciated)		Results	
	Sampling time	1440-1540	
		Concentration mg/m³	Mass Rate g/min
Detection limit(1)		<0.2	<0.1
Toluene		0.55	0.34

(1) Unless otherwise reported, the following target compounds were found to be below detection:
Ethanol, Isopropanol, 1,1-Dichloroethene, Dichloromethane, trans-1,2-Dichloroethene, cis-1,2-Dichloroethene, Chloroform, 1,1,1-Trichloroethane, 1,2-Dichloroethane, Benzene, Carbon tetrachloride, Butanol, 1-Methoxy-2-propanol, Trichloroethylene, 1,1,2-trichloroethane, Tetrachloroethene, Chlorobenzene, Ethylbenzene, m +p-Xylene, Styrene, o-Xylene, 2-Butoxyethanol, 1,1,2,2-Tetrachloroethane, Isopropylbenzene, Propylbenzene, 1,3,5-trimethylbenzene, tert-Butylbenzene, 1,2,4-trimethylbenzene, 1,2,3-trimethylbenzene, Acetone, Pentane, Acrylonitrile, n-Hexane, Methyl ethyl ketone, Ethyl acetate, Cyclohexane, 2-Methylhexane, 2,3-Dimethylpentane, Isopropyl acetate, 3-Methylhexane, Ethyl acrylate, Heptane, Methyl methacrylate, Propyl acetate, Methylcyclohexane, MIBK, 2-Hexanone, Octane, Butyl acetate, 1-methoxy-2-propyl acetate, Butyl acrylate, Nonane, Cellosolve acetate, alpha-Pinene, beta-Pinene, Decane, 3-Carene, D-Limonene, Undecane, Dodecane, Tridecane, Tetradecane

3.8 EPA 12 Conti One Press Vent 1

Date	18/04/2018	**Client**	Borg Manufacturing Pty Ltd
Report	R005486	**Stack ID**	EPA 12 - Conti One Press Vent 1
Licence No.	3035	**Location**	Oberon
Ektimo Staff	Ryan Collins, Steven Cooper	**State**	NSW
Process Conditions	Please refer to client records.		180416

Sampling Plane Details	
Sampling plane dimensions	900 mm
Sampling plane area	0.636 m²
Sampling port size, number & depth	4" BSP (x2), 60 mm
Access & height of ports	Stairs & fixed ladder 12 m
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit 0.25 D
Upstream disturbance	Flow straightener 2 D
No. traverses & points sampled	2 20
Sample plane compliance to AS4323.1	Compliant but non-ideal

Comments

The sampling plane is deemed to be non-ideal or non-compliant due to the following reasons

The downstream disturbance is <1D from the sampling plane

The sampling plane is too near to the upstream disturbance but is greater than or equal to 2D

Stack Parameters		
Moisture content, %v/v	1.4	
Gas molecular weight, g/g mole	28.8 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.29 (wet)	1.29 (dry)
Gas Flow Parameters		
Temperature, °C	42	
Temperature, K	315	
Velocity at sampling plane, m/s	11	
Volumetric flow rate, discharge, m³/s	6.8	
Volumetric flow rate (wet STP), m³/s	5.2	
Volumetric flow rate (dry STP), m³/s	5.2	
Mass flow rate (wet basis), kg/hour	24000	
Velocity difference, %	1	

Gas Analyser Results	Average		Minimum		Maximum	
Sampling time	1245 - 1411		1245 - 1411		1245 - 1411	
	Concentration mg/m³	Mass Rate g/min	Concentration mg/m³	Mass Rate g/min	Concentration mg/m³	Mass Rate g/min
Combustion Gases						
Nitrogen oxides (as NO_2)	<3	<1	<3	<1	<3	<1

Aldehydes	Results	
Sampling time	1318-1418	
	Concentration mg/m³	Mass Rate g/min
Formaldehyde	0.91	0.28

Date	18/04/2018	**Client**	Borg Manufacturing Pty Ltd
Report	R005486	**Stack ID**	EPA 12 - Conti One Press Vent 1
Licence No.	3035	**Location**	Oberon
Ektimo Staff	Ryan Collins, Steven Cooper	**State**	NSW
Process Conditions	Please refer to client records.		180416

Isokinetic Results	Results	
Sampling time	1242-1426	1242-1426 (PM10)
	Concentration mg/m³	Mass Rate g/min
Solid Particles	2	0.63
Fine particulates (PM10)	<2	<0.6
D50 cut size, 10µm	10.1	
Isokinetic Sampling Parameters	Isokinetic	PM10
Sampling time, min	100	101
Isokinetic rate, %	100	113

Total VOCs **(as n-Propane)**	Results	
Sampling time	1253-1353	
	Concentration mg/m³	Mass Rate g/min
Total	0.078	0.024

VOC (speciated)	Results	
Sampling time	1253-1353	
	Concentration mg/m³	Mass Rate g/min
Detection limit(1)	<0.1	<0.03
alpha-Pinene	0.24	0.075

(1) Unless otherwise reported, the following target compounds were found to be below detection:
Ethanol, Isopropanol, 1,1-Dichloroethene, Dichloromethane, trans-1,2-Dichloroethene, cis-1,2-Dichloroethene, Chloroform, 1,1,1-Trichloroethane, 1,2-Dichloroethane, Benzene, Carbon tetrachloride, Butanol, 1-Methoxy-2-propanol, Trichloroethylene, Toluene, 1,1,2-trichloroethane, Tetrachloroethene, Chlorobenzene, Ethylbenzene, m + p-Xylene, Styrene, o-Xylene, 2-Butoxyethanol, 1,1,2,2-Tetrachloroethane, Isopropylbenzene, Propylbenzene, 1,3,5-trimethylbenzene, tert-Butylbenzene, 1,2,4-trimethylbenzene, 1,2,3-trimethylbenzene, Acetone, Pentane, Acrylonitrile, n-Hexane, Methyl ethyl ketone, Ethyl acetate, Cyclohexane, 2-Methylhexane, 2,3-Dimethylpentane, Isopropyl acetate, 3-Methylhexane, Ethyl acrylate, Heptane, Methyl methacrylate, Propyl acetate, Methylcyclohexane, MIBK, 2-Hexanone, Octane, Butyl acetate, 1-methoxy-2-propyl acetate, Butyl acrylate, Nonane, Cellosolve acetate, beta-Pinene, Decane, 3-Carene, D-Limonene, Undecane, Dodecane, Tridecane, Tetradecane

3.9 EPA 12 Conti One Press Vent 2

Date	19/04/2018	**Client**	Borg Manufacturing Pty Ltd
Report	R005486	**Stack ID**	EPA 12 - Conti One Press Vent 2
Licence No.	3035	**Location**	Oberon
Ektimo Staff	Ryan Collins, Steven Cooper	**State**	NSW
Process Conditions	Please refer to client records.		180416

Sampling Plane Details		
Sampling plane dimensions	900 mm	
Sampling plane area	0.636 m²	
Sampling port size, number & depth	4" BSP (x2), 60 mm	
Access & height of ports	Stairs & fixed ladder	12 m
Duct orientation & shape	Vertical	Circular
Downstream disturbance	Exit	0.25 D
Upstream disturbance	Flow straightener	2 D
No. traverses & points sampled	2	20
Sample plane compliance to AS4323.1	Compliant but non-ideal	

Comments

The sampling plane is deemed to be non-ideal or non-compliant due to the following reasons:

The downstream disturbance is <1D from the sampling plane

The sampling plane is too near to the upstream disturbance but is greater than or equal to 2D

Stack Parameters		
Moisture content, %v/v	0.95	
Gas molecular weight, g/g mole	28.9 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.29 (wet)	1.29 (dry)
Gas Flow Parameters		
Temperature, °C	40	
Temperature, K	313	
Velocity at sampling plane, m/s	12	
Volumetric flow rate, discharge, m³/s	7.9	
Volumetric flow rate (wet STP), m³/s	6.1	
Volumetric flow rate (dry STP), m³/s	6	
Mass flow rate (wet basis), kg/hour	28000	
Velocity difference, %	<1	

Gas Analyser Results	Average		Minimum		Maximum	
Sampling time	1034 - 1148		1034 - 1148		1034 - 1148	
	Concentration mg/m³	Mass Rate g/min	Concentration mg/m³	Mass Rate g/min	Concentration mg/m³	Mass Rate g/min
Combustion Gases						
Nitrogen oxides (as NO_2)	<3	<1	<3	<1	<3	<1

Aldehydes	Results	
Sampling time	1048-1148	
	Concentration mg/m³	Mass Rate g/min
Formaldehyde	1.1	0.41

Date	19/04/2018	**Client**	Borg Manufacturing Pty Ltd
Report	R005486	**Stack ID**	EPA 12 - Conti One Press Vent 2
Licence No.	3035	**Location**	Oberon
Ektimo Staff	Ryan Collins, Steven Cooper	**State**	NSW
Process Conditions	Please refer to client records.		180416

Isokinetic Results	Results	
Sampling time	1030-1218	1030-1219 (PM10)
	Concentration mg/m³	Mass Rate g/min
Solid Particles	12	4.2
Fine particulates (PM10)	<2	<0.7
D50 cut size, 10µm	10.1	
Isokinetic Sampling Parameters	Isokinetic	PM10
Sampling time, min	100	100
Isokinetic rate, %	101	95

Total VOCs **(as n-Propane)**	Results	
Sampling time	1036-1138	
	Concentration mg/m³	Mass Rate g/min
Total	0.45	0.16

VOC (speciated)	Results	
Sampling time	1036-1138	
	Concentration mg/m³	Mass Rate g/min
Detection limit(1)	<0.1	<0.04
alpha-Pinene	0.66	0.24
beta-Pinene	0.74	0.27

(1) Unless otherwise reported, the following target compounds were found to be below detection:
Ethanol, Isopropanol, 1,1-Dichloroethene, Dichloromethane, trans-1,2-Dichloroethene, cis-1,2-Dichloroethene, Chloroform, 1,1,1-Trichloroethane, 1,2-Dichloroethane, Benzene, Carbon tetrachloride, Butanol, 1-Methoxy-2-propanol, Trichloroethylene, Toluene, 1,1,2-trichloroethane, Tetrachloroethene, Chlorobenzene, Ethylbenzene, m + p-Xylene, Styrene, o-Xylene, 2-Butoxyethanol, 1,1,2,2-Tetrachloroethane, Isopropylbenzene, Propylbenzene, 1,3,5-trimethylbenzene, tert-Butylbenzene, 1,2,4-trimethylbenzene, 1,2,3-trimethylbenzene, Acetone, Pentane, Acrylonitrile, n-Hexane, Methyl ethyl ketone, Ethyl acetate, Cyclohexane, 2-Methylhexane, 2,3-Dimethylpentane, Isopropyl acetate, 3-Methylhexane, Ethyl acrylate, Heptane, Methyl methacrylate, Propyl acetate, Methylcyclohexane, MIBK, 2-Hexanone, Octane, Butyl acetate, 1-methoxy-2-propyl acetate, Butyl acrylate, Nonane, Cellosolve acetate, Decane, 3-Carene, D-Limonene, Undecane, Dodecane, Tridecane, Tetradecane

3.10 EPA 12 Conti One Press Vent 3

Date	18/04/2018	**Client**	Borg Manufacturing Pty Ltd
Report	R005486	**Stack ID**	EPA 12 - Conti One Press Vent 3
Licence No.	3035	**Location**	Oberon
Ektimo Staff	Ryan Collins, Steven Cooper	**State**	NSW
Process Conditions	Please refer to client records.		180416

Sampling Plane Details	
Sampling plane dimensions	900 mm
Sampling plane area	0.636 m²
Sampling port size, number & depth	4" BSP (x2), 60 mm
Access & height of ports	Stairs & fixed ladder 12 m
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit 0.25 D
Upstream disturbance	Flow straightener 2 D
No. traverses & points sampled	2 20
Sample plane compliance to AS4323.1	Compliant but non-ideal

Comments

The sampling plane is deemed to be non-ideal or non-compliant due to the following reasons:

The velocity difference for isokinetic testing is outside the criteria (±10%)
The gas velocity at some or all sampling points is less than 3 m/s
The downstream disturbance is <1D from the sampling plane
The sampling plane is too near to the upstream disturbance but is greater than or equal to 2D

Stack Parameters		
Moisture content, %v/v	1.4	
Gas molecular weight, g/g mole	28.8 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.29 (wet)	1.29 (dry)
Gas Flow Parameters		
Temperature, °C	43	
Temperature, K	316	
Velocity at sampling plane, m/s	3.5	
Volumetric flow rate, discharge, m³/s	2.2	
Volumetric flow rate (wet STP), m³/s	1.7	
Volumetric flow rate (dry STP), m³/s	1.7	
Mass flow rate (wet basis), kg/hour	7900	
Velocity difference, %	5	

Gas Analyser Results	Average		Minimum		Maximum	
Sampling time	1524 - 1646		1524 - 1646		1524 - 1646	
	Concentration mg/m³	Mass Rate g/min	Concentration mg/m³	Mass Rate g/min	Concentration mg/m³	Mass Rate g/min
Combustion Gases						
Nitrogen oxides (as NO_2)	<3	<0.3	<3	<0.3	<3	<0.3

Aldehydes	Results	
Sampling time	1520-1645	
	Concentration mg/m³	Mass Rate g/min
Formaldehyde	2.5	0.26

Date	18/04/2018	**Client**	Borg Manufacturing Pty Ltd
Report	R005486	**Stack ID**	EPA 12 - Conti One Press Vent 3
Licence No.	3035	**Location**	Oberon
Ektimo Staff	Ryan Collins, Steven Cooper	**State**	NSW
Process Conditions	Please refer to client records.		180416

Isokinetic Results	Results	
Sampling time	1516-1659	1516-1659 (PM10)
	Concentration mg/m³	Mass Rate g/min
Solid Particles	14	1.4
Fine particulates (PM10)	8.8	0.87
D50 cut size, 10µm	10.0	
Isokinetic Sampling Parameters	Isokinetic	PM10
Sampling time, min	100	100
Isokinetic rate, %	102	96

Total VOCs (as n-Propane)	Results	
Sampling time	1520-1620	
	Concentration mg/m³	Mass Rate g/min
Total	0.36	0.036

VOC (speciated)	Results	
Sampling time	1520-1620	
	Concentration mg/m³	Mass Rate g/min
Detection limit(1)	<0.1	<0.01
alpha-Pinene	0.59	0.059
beta-Pinene	0.52	0.052

(1) Unless otherwise reported, the following target compounds were found to be below detection:
Ethanol, Isopropanol, 1,1-Dichloroethene, Dichloromethane, trans-1,2-Dichloroethene, cis-1,2-Dichloroethene, Chloroform, 1,1,1-Trichloroethane, 1,2-Dichloroethane, Benzene, Carbon tetrachloride, Butanol, 1-Methoxy-2-propanol, Trichloroethylene, Toluene, 1,1,2-trichloroethane, Tetrachloroethene, Chlorobenzene, Ethylbenzene, m + p-Xylene, Styrene, o-Xylene, 2-Butoxyethanol, 1,1,2,2-Tetrachloroethane, Isopropylbenzene, Propylbenzene, 1,3,5-trimethylbenzene, tert-Butylbenzene, 1,2,4-trimethylbenzene, 1,2,3-trimethylbenzene, Acetone, Pentane, Acrylonitrile, n-Hexane, Methyl ethyl ketone, Ethyl acetate, Cyclohexane, 2-Methylhexane, 2,3-Dimethylpentane, Isopropyl acetate, 3-Methylhexane, Ethyl acrylate, Heptane, Methyl methacrylate, Propyl acetate, Methylcyclohexane, MIBK, 2-Hexanone, Octane, Butyl acetate, 1-methoxy-2-propyl acetate, Butyl acrylate, Nonane, Cellosolve acetate, Decane, 3-Carene, D-Limonene, Undecane, Dodecane, Tridecane, Tetradecane

3.11 EPA 12 Conti One Press Vent 4

Date	19/04/2018	**Client**	Borg Manufacturing Pty Ltd
Report	R005486	**Stack ID**	EPA 12 - Conti One Press Vent 4
Licence No.	3035	**Location**	Oberon
Ektimo Staff	Ryan Collins, Steven Cooper	**State**	NSW
Process Conditions	Please refer to client records.		180416

Sampling Plane Details		
Sampling plane dimensions	900 mm	
Sampling plane area	0.636 m²	
Sampling port size, number & depth	4" BSP (x2), 60 mm	
Access & height of ports	Stairs & fixed ladder	12 m
Duct orientation & shape	Vertical	Circular
Downstream disturbance	Exit	0.25 D
Upstream disturbance	Flow straightener	2 D
No. traverses & points sampled	2	20
Sample plane compliance to AS4323.1	Compliant but non-ideal	

Comments

The sampling plane is deemed to be non-ideal or non-compliant due to the following reasons:

The gas velocity at some or all sampling points is less than 3 m/s

The downstream disturbance is <1D from the sampling plane

The sampling plane is too near to the upstream disturbance but is greater than or equal to 2D

Stack Parameters		
Moisture content, %v/v	1	
Gas molecular weight, g/g mole	28.9 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.29 (wet)	1.29 (dry)
Gas Flow Parameters		
Temperature, °C	38	
Temperature, K	311	
Velocity at sampling plane, m/s	2.7	
Volumetric flow rate, discharge, m³/s	1.7	
Volumetric flow rate (wet STP), m³/s	1.4	
Volumetric flow rate (dry STP), m³/s	1.3	
Mass flow rate (wet basis), kg/hour	6300	
Velocity difference, %	<1	

Gas Analyser Results	Average		Minimum		Maximum	
Sampling time	0824 - 1030		0824 - 1030		0824 - 1030	
	Concentration mg/m³	Mass Rate g/min	Concentration mg/m³	Mass Rate g/min	Concentration mg/m³	Mass Rate g/min
Combustion Gases						
Nitrogen oxides (as NO_2)	<3	<0.3	<3	<0.3	<3	<0.3

Aldehydes	Results	
Sampling time	0824-0928	
	Concentration mg/m³	Mass Rate g/min
Formaldehyde	1.5	0.12

Date	19/04/2018	**Client**	Borg Manufacturing Pty Ltd
Report	R005486	**Stack ID**	EPA 12 - Conti One Press Vent 4
Licence No.	3035	**Location**	Oberon
Ektimo Staff	Ryan Collins, Steven Cooper	**State**	NSW
Process Conditions	Please refer to client records.		180416

Isokinetic Results	Results	
Sampling time	0821-1004	0821-1005 (PM10)
	Concentration mg/m³	Mass Rate g/min
Solid Particles	29	2.4
Fine particulates (PM10)	24	1.9
D50 cut size, 10µm	10.1	
Isokinetic Sampling Parameters	Isokinetic	PM10
Sampling time, min	100	101
Isokinetic rate, %	101	105

Total VOCs **(as n-Propane)**	Results	
Sampling time	0810-0910	
	Concentration mg/m³	Mass Rate g/min
Total	0.88	0.071

VOC (speciated)	Results	
Sampling time	0810-0910	
	Concentration mg/m³	Mass Rate g/min
Detection limit(1)	<0.1	<0.008
alpha-Pinene	1.3	0.11
beta-Pinene	1.4	0.11

(1) Unless otherwise reported, the following target compounds were found to be below detection:

Ethanol, Isopropanol, 1,1-Dichloroethene, Dichloromethane, trans-1,2-Dichloroethene, cis-1,2-Dichloroethene, Chloroform, 1,1,1-Trichloroethane, 1,2-Dichloroethane, Benzene, Carbon tetrachloride, Butanol, 1-Methoxy-2-propanol, Trichloroethylene, Toluene, 1,1,2-trichloroethane, Tetrachloroethene, Chlorobenzene, Ethylbenzene, m +p-Xylene, Styrene, o-Xylene, 2-Butoxyethanol, 1,1,2,2-Tetrachloroethane, Isopropylbenzene, Propylbenzene, 1,3,5-trimethylbenzene, tert-Butylbenzene, 1,2,4-trimethylbenzene, 1,2,3-trimethylbenzene, Acetone, Pentane, Acrylonitrile, n-Hexane, Methyl ethyl ketone, Ethyl acetate, Cyclohexane, 2-Methylhexane, 2,3-Dimethylpentane, Isopropyl acetate, 3-Methylhexane, Ethyl acrylate, Heptane, Methyl methacrylate, Propyl acetate, Methylcyclohexane, MIBK, 2-Hexanone, Octane, Butyl acetate, 1-methoxy-2-propyl acetate, Butyl acrylate, Nonane, Cellosolve acetate, Decane, 3-Carene, D-Limonene, Undecane, Dodecane, Tridecane, Tetradecane

3.12 EPA 27 - Combined Stack (C2 Press Vents and DC1 and two Baghouses)

Date	17/04/2018	**Client**	Borg Manufacturing Pty Ltd
Report	R005486	**Stack ID**	EPA 27 - Combined Stack (C2 Press Vents)
Licence No.	3035	**Location**	Oberon
Ektimo Staff	Ryan Collins, Steven Cooper	**State**	NSW
Process Conditions	Please refer to client records.		180416

Sampling Plane Details		
Sampling plane dimensions	2000 mm	
Sampling plane area	3.14 m²	
Sampling port size, number & depth	Sampled from exit, 0 mm	
Access & height of ports	Elevated work platform	12 m
Duct orientation & shape	Circular	
Downstream disturbance	Connection	0.25 D
Upstream disturbance	Exit	0 D
No. traverses & points sampled	2	24
Sample plane compliance to AS4323.1	Compliant but non-ideal	

Comments

DC 1 & 2 Baghouses not connected. Stack construction incomplete.

The sampling plane is deemed to be non-ideal or non-compliant due to the following reasons:

The downstream disturbance is <1D from the sampling plane

The upstream disturbance is <2D from the sampling plane

Stack Parameters		
Moisture content, %v/v	4.1	
Gas molecular weight, g/g mole	28.5 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.27 (wet)	1.29 (dry)
Gas Flow Parameters		
Temperature, °C	36	
Temperature, K	309	
Velocity at sampling plane, m/s	12	
Volumetric flow rate, discharge, m³/s	38	
Volumetric flow rate (wet STP), m³/s	30	
Volumetric flow rate (dry STP), m³/s	29	
Mass flow rate (wet basis), kg/hour	140000	
Velocity difference, %	<1	

Date	17/04/2018	**Client**	Borg Manufacturing Pty Ltd
Report	R005486	**Stack ID**	EPA 27 - Combined Stack (C2 Press Vents)
Licence No.	3035	**Location**	Oberon
Ektimo Staff	Ryan Collins, Steven Cooper	**State**	NSW
Process Conditions	Please refer to client records.		180416

Gas Analyser Results	Average		Minimum		Maximum	
Sampling time	1439 - 1627		1439 - 1627		1439 - 1627	
	Concentration mg/m³	Mass Rate g/min	Concentration mg/m³	Mass Rate g/min	Concentration mg/m³	Mass Rate g/min
Combustion Gases						
Nitrogen oxides (as NO_2)	<3	<6	<3	<6	<3	<6

Aldehydes	Results	
Sampling time	1457-1557	
	Concentration mg/m³	Mass Rate g/min
Formaldehyde	1.5	2.6

Isokinetic Results	Results	
Sampling time	1437-1639	1437-1638 (PM10)
	Concentration mg/m³	Mass Rate g/min
Solid Particles	15	26
Fine particulates (PM10)	15	27
D50 cut size, 10µm	10.0	
Isokinetic Sampling Parameters	Isokinetic	PM10
Sampling time, min	120	120
Isokinetic rate, %	99	97

Smoke Obscuration	Result
Time of assessment	1457 - 1505
Smoke Obscuration	0

Total VOCs (as n-Propane)	Results	
Sampling time	1528-1628	
	Concentration mg/m³	Mass Rate g/min
Total	0.27	0.46

VOC (speciated)	Results	
Sampling time	1528-1628	
	Concentration mg/m³	Mass Rate g/min
Detection limit(1)	<0.2	<0.4
alpha-Pinene	0.48	0.83
beta-Pinene	0.34	0.59

(1) Unless otherwise reported, the following target compounds were found to be below detection:
Ethanol, Isopropanol, 1,1-Dichloroethene, Dichloromethane, trans-1,2-Dichloroethene, cis-1,2-Dichloroethene, Chloroform, 1,1,1-Trichloroethane, 1,2-Dichloroethane, Benzene, Carbon tetrachloride, Butanol, 1-Methoxy-2-propanol, Trichloroethylene, Toluene, 1,1,2-trichloroethane, Tetrachloroethene, Chlorobenzene, Ethylbenzene, m + p-Xylene, Styrene, o-Xylene, 2-Butoxyethanol, 1,1,2,2-Tetrachloroethane, Isopropylbenzene, Propylbenzene, 1,3,5-trimethylbenzene, tert-Butylbenzene, 1,2,4-trimethylbenzene, 1,2,3-trimethylbenzene, Acetone, Pentane, Acrylonitrile, n-Hexane, Methyl ethyl ketone, Ethyl acetate, Cyclohexane, 2-Methylhexane, 2,3-Dimethylpentane, Isopropyl acetate, 3-Methylhexane, Ethyl acrylate, Heptane, Methyl methacrylate, Propyl acetate, Methylcyclohexane, MIBK, 2-Hexanone, Octane, Butyl acetate, 1-methoxy-2-propyl acetate, Butyl acrylate, Nonane, Cellosolve acetate, Decane, 3-Carene, D-Limonene, Undecane, Dodecane, Tridecane, Tetradecane

4 PLANT OPERATING CONDITIONS

Unless otherwise stated, the plant operating conditions were normal at the time of testing. See Borg Manufacturing's records for complete process conditions.

Conti One Press Vent Conditions 18/04/18 – 19/04/18:

Fan #1 operational, Fan #2 operational, Fan #3 no fan blades attached, Fan #4 motor not in operation.

5 TEST METHODS

All sampling and analysis was performed by Ektimo unless otherwise specified. Specific details of the methods are available upon request.

Parameter	Sampling Method	Analysis Method	Uncertainty*	NATA Accredited	
				Sampling	Analysis
Sample plane criteria	NSW TM-1	NA	-	✓	NA
Flow rate, temperature and velocity	NSW TM-2	NA	8%, 2%, 7%	✓	NA
Flow rate (cyclonic)	USEPA GD008	NA	not specified	×	✓
Moisture content	NSW TM-22	NSW TM-22	8%	✓	✓
Carbon dioxide	NSW TM-24	NSW TM-24	13%	✓	✓
Carbon monoxide	NSW TM-32	NSW TM-32	12%	✓	✓
Nitrogen oxides (NO_X)	NSW TM-11	NSW TM-11	12%	✓	✓
Oxygen	NSW TM-25	NSW TM-25	13%	✓	✓
Ammonia	Ektimo 260	Envirolab Inorg-093	18%	✓	✓‡
Cyanide	Ektimo 270	Envirolab Inorg-013	14%	✓	✓‡
Aldehydes	NSW TM-34	Ektimo 330	16%	✓	✓†
Speciated volatile organic compounds (VOC's)	NSW TM-34	Ektimo 344	19%	✓	✓†
Total solid particles	NSW TM-15	NSW TM-15	5%	✓	✓
Particulate matter < 10µm (PM_{10})	NSW OM-5	NSW OM-5	6%	✓	✓
Particulate matter < 10µm (PM_{10}) by particle size analysis	-	HRL In-house	-	-	×**
Smoke	NSW TM-16	NSW TM-16	not specified	✓	✓

180313

* Uncertainty values cited in this table are calculated at the 95% confidence level (coverage factor = 2)

† Analysis performed by Ektimo, NATA accreditation number 14601. Laboratory analytical results were reported on 20/03/18, 07/03/18 03/05/2018 & 10/05/2018 in report numbers R005486-Aldehydes, R005486_SVOCs, R005486_SVOCs(2) & R005486-Aldehydes(2)

‡ Analysis performed by Envirolab, NATA accreditation number 2901. Results were reported to Ektimo on 06/03/18 in report number 186163

** Analysis performed by HRL Technology using a Malvern Instruments Mastersizer laser particle size analyser. NATA Accreditation does not cover the performance of this service.

6 QUALITY ASSURANCE/ QUALITY CONTROL INFORMATION

Ektimo is accredited by the National Association of Testing Authorities (NATA) for the sampling and analysis of air pollutants from industrial sources. Unless otherwise stated test methods used are accredited with the National Association of Testing Authorities. For full details, search for Ektimo at NATA's website www.nata.com.au.

Ektimo is accredited by NATA (National Association of Testing Authorities) to ISO/IEC 17025 - Testing. ISO/IEC 17025 - Testing requires that a laboratory have adequate equipment to perform the testing, as well as laboratory personnel with the competence to perform the testing. This quality assurance system is administered and maintained by the Quality Director.

NATA is a member of APLAC (Asia Pacific Laboratory Accreditation Co-operation) and of ILAC (International Laboratory Accreditation Co-operation). Through the mutual recognition arrangements with both of these organisations, NATA accreditation is recognised world –wide.

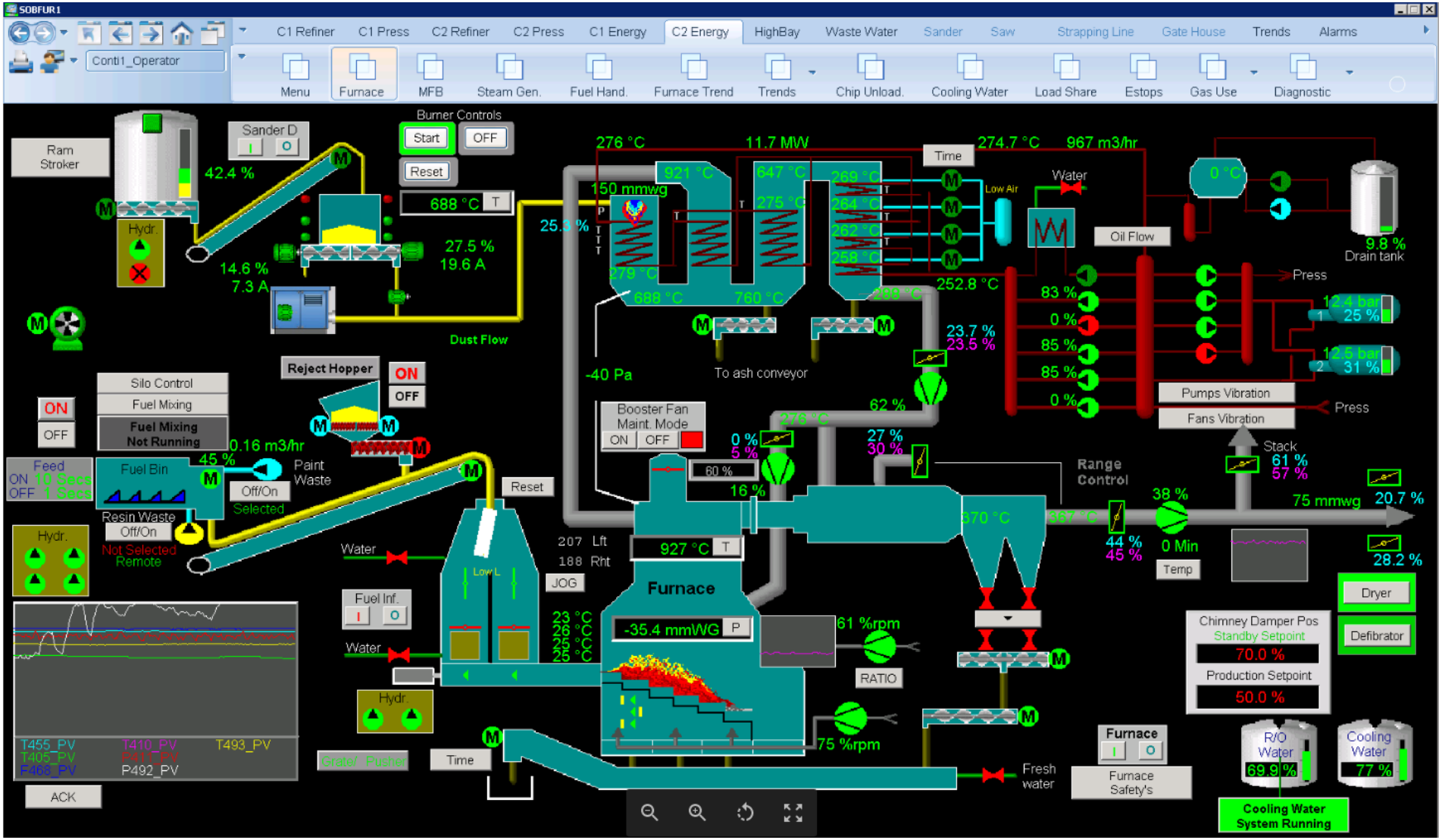
A formal Quality Control program is in place at Ektimo to monitor analyses performed in the laboratory and sampling conducted in the field. The program is designed to check where appropriate; the sampling reproducibility, analytical method, accuracy, precision and the performance of the analyst. The Laboratory Manager is responsible for the administration and maintenance of this program.

7 DEFINITIONS

The following symbols and abbreviations may be used in this test report:

~	Approximately
<	Less than
>	Greater than
≥	Greater than or equal to
APHA	American public health association, Standard Methods for the Examination of Water and Waste Water
AS	Australian Standard
BSP	British standard pipe
CARB	Californian Air Resources Board
CEM	Continuous Emission Monitoring
CEMS	Continuous Emission Monitoring System
CTM	Conditional test method
D	Duct diameter or equivalent duct diameter for rectangular ducts
D_{50}	'Cut size' of a cyclone defined as the particle diameter at which the cyclone achieves a 50% collection efficiency ie. half of the particles are retained by the cyclone and half are not and pass through it to the next stage. The D_{50} method simplifies the capture efficiency distribution by assuming that a given cyclone stage captures all of the particles with a diameter equal to or greater than the D_{50} of that cyclone and less than the D_{50} of the preceding cyclone.
DECC	Department of Environment & Climate Change (NSW)
Disturbance	A flow obstruction or instability in the direction of the flow which may impede accurate flow determination. This includes centrifugal fans, axial fans, partially closed or closed dampers, louvres, bends, connections, junctions, direction changes or changes in pipe diameter.
DWER	Department of Water and Environmental Regulation
EPA	Environment Protection Authority
FTIR	Fourier Transform Infra Red
ISC	Intersociety committee, Methods of Air Sampling and Analysis
ISO	International Organisation for Standardisation
NA	Not applicable
NATA	National Association of Testing Authorities
NIOSH	National Institute of Occupational Safety and Health
NT	Not tested or results not required
OM	Other approved method
OU	The number of odour units per unit of volume. The numerical value of the odour concentration is equal to the number of dilutions to arrive at the odour threshold (50% panel response).
PM_{10}	Atmospheric suspended particulate matter having an equivalent aerodynamic diameter of less than approximately 10 microns (µm).
$PM_{2.5}$	Atmospheric suspended particulate matter having an equivalent aerodynamic diameter of less than approximately 2.5 microns (µm).
PSA	Particle size analysis
RATA	Relative Accuracy Test Audit
STP	Standard temperature and pressure. Gas volumes and concentrations are expressed on a dry basis at 0°C, at discharge oxygen concentration and an absolute pressure of 101.325 kPa, unless otherwise specified.
TM	Test Method
TOC	The sum of all compounds of carbon which contain at least one carbon to carbon bond, plus methane and its derivatives.
USEPA	United States Environmental Protection Agency
VDI	Verein Deutscher Ingenieure (Association of German Engineers)
Vic EPA	Victorian Environment Protection Authority
VOC	Any chemical compound based on carbon with a vapour pressure of at least 0.010 kPa at 25°C or having a corresponding volatility under the particular conditions of use. These compounds may contain oxygen, nitrogen and other elements, but specifically excluded are carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonate salts.
XRD	X-ray Diffractometry

8 APPENDIX 1 - CONTI 2 HEAT PLANT - NORMAL OPERATING CONDITIONS



Appendix D – Surface Water Monitoring Data

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1719724**	Page	: 1 of 5
Client	: **BORG PANELS**	Laboratory	: Environmental Division Sydney
Contact	: MICHAEL EVANS	Contact	: Customer Services ES
Address	: PMB OBERON OBERON NSW, AUSTRALIA 2787	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 63396150	Telephone	: +61-2-8784 8555
Project	: Weekly Surface Water and RO Water	Date Samples Received	: 09-Aug-2017 13:00
Order number	: PM408860	Date Analysis Commenced	: 09-Aug-2017
C-O-C number	: ----	Issue Date	: 16-Aug-2017 10:41
Sampler	: MICHAEL EVANS		
Site	: MDF		
Quote number	: ----		
No. of samples received	: 2		
No. of samples analysed	: 2		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Raymond Commodore	Instrument Chemist	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP050: The MBAS reported is calculated as LAS, mol wt ___342____.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	080817ME	080817MEHPP	----	----	----
			Client sampling date / time	08-Aug-2017 11:00	08-Aug-2017 11:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1719724-001	ES1719724-002	--------	--------	--------
				Result	Result	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.49	7.78	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	235	179	----	----	----
EA025: Suspended Solids								
Suspended Solids (SS)	----	5	mg/L	57	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	----	31	----	----	----
EA041: Colour (True)								
Colour (True)	----	1	PCU	50	20	----	----	----
pH Colour	----	0.01	pH Unit	7.31	7.25	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	----	145	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Iron	7439-89-6	0.05	mg/L	----	2.05	----	----	----
EG020T: Total Metals by ICP-MS								
Iron	7439-89-6	0.05	mg/L	----	4.90	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	----	<0.01	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.30	0.02	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	6.9	0.4	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	7.2	0.4	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.16	0.17	----	----	----
EP010: Formaldehyde								
Formaldehyde	50-00-0	0.1	mg/L	0.5	0.2	----	----	----
EP020: Oil and Grease (O&G)								
Oil & Grease	----	5	mg/L	<5	<5	----	----	----
EP030: Biochemical Oxygen Demand (BOD)								
Biochemical Oxygen Demand	----	2	mg/L	21	4	----	----	----
EP050: Anionic Surfactants as MBAS								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	080817ME	080817MEHPP	----	----	----
			Client sampling date / time	08-Aug-2017 11:00	08-Aug-2017 11:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1719724-001	ES1719724-002	--------	--------	--------
				Result	Result	----	----	----
EP050: Anionic Surfactants as MBAS - Continued								
Anionic Surfactants as MBAS	----	0.1	mg/L	**0.2**	<0.1	----	----	----
EP131A: Organochlorine Pesticides								
Aldrin	309-00-2	0.010	µg/L	<0.010	<0.010	----	----	----
alpha-BHC	319-84-6	0.010	µg/L	<0.010	<0.010	----	----	----
beta-BHC	319-85-7	0.010	µg/L	<0.010	<0.010	----	----	----
delta-BHC	319-86-8	0.010	µg/L	<0.010	<0.010	----	----	----
4.4`-DDD	72-54-8	0.010	µg/L	<0.010	<0.010	----	----	----
4.4`-DDE	72-55-9	0.010	µg/L	<0.010	<0.010	----	----	----
4.4`-DDT	50-29-3	0.010	µg/L	<0.010	<0.010	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-29-3	0.010	µg/L	<0.010	<0.010	----	----	----
Dieldrin	60-57-1	0.010	µg/L	<0.010	<0.010	----	----	----
alpha-Endosulfan	959-98-8	0.010	µg/L	<0.010	<0.010	----	----	----
beta-Endosulfan	33213-65-9	0.010	µg/L	<0.010	<0.010	----	----	----
Endosulfan sulfate	1031-07-8	0.010	µg/L	<0.010	<0.010	----	----	----
^ Endosulfan (sum)	115-29-7	0.010	µg/L	<0.010	<0.010	----	----	----
Endrin	72-20-8	0.010	µg/L	<0.010	<0.010	----	----	----
Endrin aldehyde	7421-93-4	0.010	µg/L	<0.010	<0.010	----	----	----
Endrin ketone	53494-70-5	0.010	µg/L	<0.010	<0.010	----	----	----
Heptachlor	76-44-8	0.005	µg/L	<0.005	<0.005	----	----	----
Heptachlor epoxide	1024-57-3	0.010	µg/L	<0.010	<0.010	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.010	µg/L	<0.010	<0.010	----	----	----
gamma-BHC	58-89-9	0.010	µg/L	<0.010	<0.010	----	----	----
Methoxychlor	72-43-5	0.010	µg/L	<0.010	<0.010	----	----	----
cis-Chlordane	5103-71-9	0.010	µg/L	<0.010	<0.010	----	----	----
trans-Chlordane	5103-74-2	0.010	µg/L	<0.010	<0.010	----	----	----
^ Total Chlordane (sum)	----	0.010	µg/L	<0.010	<0.010	----	----	----
EP131S: OC Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.010	%	**88.5**	**92.1**	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP131S: OC Pesticide Surrogate			
Dibromo-DDE	21655-73-2	14	166

Appendix E – Ground Water Monitoring Data

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

ALS WATER
ANALYSIS AND TESTING REPORT

REPORT TO:	Victor Bendevski
REPORT ON:	Borg Panels, Oberon Bore Monitoring Results
REPORT NO:	24006234
SAMPLED BY:	C. Roach & J. Takahira
REPORTED BY:	S. Thompson
REPORT DATE:	27/09/2017

NATA
WORLD RECOGNISED ACCREDITATION

Accreditation # 15784
Site # 11436

Accredited for compliance with ISO/IEC 17025.

ACIRL Pty Ltd
ABN 41 000 513 888
Part of the ALS Laboratory Group
Unit 3, 16 Donald Street
LITHGOW NSW 2790
Phone +61 2 6350 7400 Fax +61 2 6352 3583 www.alsglobal.com
A Campbell Brothers Limited Company

ALS WATER
ANALYSIS AND TESTING REPORT

BORG PANELS

	Units						
ALS Sydney Report No.		ES1723376					
Date of Sample		18/09/2017	18/09/2017	18/09/2017	18/09/2017		
Site Name #1		**GW01**	**GW02**	**GW05**	**GW26**		
Site Name #2		**Woodchem**	**Pond**	**Hill**	**Paddock - River**		
General Comments/ Observations		**Cloudy**	**Slightly Cloudy**	**Clear**	**Slightly Cloudy**		
Temperature	°C	9.7	11.00	13.4	8.4		
pH	pH Units	6.8	7.20	7.6	7.1		
Electrical Conductivity	µS/cm	199	1035	358	400		
Total Suspended Solids	mg/L	415	42	10	37		
Total Dissolved Solids	mg/L	110	618	220	284		
Water Height	m	1.31	2.80	6.73	1.71		
Ammonia as N by Discrete Analyser							
Ammonia as N	mg/L	0.03	0.01	0.23	0.01		
Total Organic Carbon (TOC)							
Total Organic Carbon	mg/L	3	4	1	1		
Formaldehyde							
Formaldehyde	mg/L	<0.1	<0.1	0.2	<0.1		
Chemical Oxygen Demand (Spectrophotometric)							
Chemical Oxygen Demand	mg/L	14	18	<10	12		
Organochlorine Pesticides (OC)							
alpha-BHC	µg/L	<0.5	<0.5	<0.5	<0.5		
Hexachlorobenzene (HCB)	µg/L	<0.5	<0.5	<0.5	<0.5		
beta-BHC	µg/L	<0.5	<0.5	<0.5	<0.5		
gamma-BHC	µg/L	<0.5	<0.5	<0.5	<0.5		
delta-BHC	µg/L	<0.5	<0.5	<0.5	<0.5		
Heptachlor	µg/L	<0.5	<0.5	<0.5	<0.5		
Aldrin	µg/L	<0.5	<0.5	<0.5	<0.5		
Heptachlor epoxide	µg/L	<0.5	<0.5	<0.5	<0.5		
trans-Chlordane	µg/L	<0.5	<0.5	<0.5	<0.5		
alpha-Endosulfan	µg/L	<0.5	<0.5	<0.5	<0.5		
cis-Chlordane	µg/L	<0.5	<0.5	<0.5	<0.5		
Dieldrin	µg/L	<0.5	<0.5	<0.5	<0.5		
4.4`-DDE	µg/L	<0.5	<0.5	<0.5	<0.5		
Endrin	µg/L	<0.5	<0.5	<0.5	<0.5		
beta-Endosulfan	µg/L	<0.5	<0.5	<0.5	<0.5		
4.4`-DDD	µg/L	<0.5	<0.5	<0.5	<0.5		
Endrin aldehyde	µg/L	<0.5	<0.5	<0.5	<0.5		
Endosulfan sulfate	µg/L	<0.5	<0.5	<0.5	<0.5		
4.4`-DDT	µg/L	<2.0	<2.0	<2.0	<2.0		
Endrin ketone	µg/L	<0.5	<0.5	<0.5	<0.5		
Methoxychlor	µg/L	<2.0	<2.0	<2.0	<2.0		
Total Chlordane (sum)	µg/L	<0.5	<0.5	<0.5	<0.5		
Sum of DDD + DDE + DDT	µg/L	<0.5	<0.5	<0.5	<0.5		
Sum of Aldrin + Dieldrin	µg/L	<0.5	<0.5	<0.5	<0.5		

ALS WATER
ANALYSIS AND TESTING REPORT

BORG PANELS

	Units						
ALS Sydney Report No.		ES1723376					
Date of Sample		18/09/2017	18/09/2017	18/09/2017	18/09/2017		
Site Name #1		**GW01**	**GW02**	**GW05**	**GW26**		
Site Name #2		**Woodchem**	**Pond**	**Hill**	**Paddock - River**		
Organochlorine Pesticide Surrogate							
Dibromo-DDE	%	96.8	101	103	94.7		
Organophosphorus Pesticide Surrogate							
DEF	%	67.5	70.6	62.7	61.9		
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	<20	<20	<20	<20		
C10 - C14 Fraction	µg/L	<50	<50	<50	<50		
C15 - C28 Fraction	µg/L	<100	<100	<100	<100		
C29 - C36 Fraction	µg/L	<50	<50	<50	<50		
C10 - C36 Fraction (sum)	µg/L	<50	<50	<50	<50		
Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
C6 - C10 Fraction	µg/L	<20	<20	<20	<20		
C6 - C10 Fraction minus BTEX (F1)	µg/L	<20	<20	<20	<20		
>C10 - C16 Fraction	µg/L	<100	<100	<100	<100		
>C16 - C34 Fraction	µg/L	<100	<100	<100	<100		
>C34 - C40 Fraction	µg/L	<100	<100	<100	<100		
>C10 - C40 Fraction (sum)	µg/L	<100	<100	<100	<100		
>C10 - C16 Fraction minus Naphthalene	µg/L	<100	<100	<100	<100		
BTEXN							
Benzene	µg/L	<1	<1	<1	<1		
Toluene	µg/L	<2	<2	<2	<2		
Ethylbenzene	µg/L	<2	<2	<2	<2		
meta- & para-Xylene	µg/L	<2	<2	<2	<2		
ortho-Xylene	µg/L	<2	<2	<2	<2		
Total Xylenes	µg/L	<2	<2	<2	<2		
Sum of BTEX	µg/L	<1	<1	<1	<1		
Naphthalene	µg/L	<5	<5	<5	<5		
TPH(V)/BTEX Surrogates							
1.2-Dichloroethane-D4	%	110	108	107	112		
Toluene-D8	%	124	126	124	123		
4-Bromofluorobenzene	%	122	121	119	120		

ALS WATER
ANALYSIS AND TESTING REPORT

METHODS OF ANALYSIS

Tests for results issued in this report have been carried out at the following NATA accredited laboratories in accordance with the methods as detailed below-

ACIRL Report No 24006234

WATER

TEST	METHOD	LABORATORY	
		ACIRL Lithgow NATA Accreditation #11436	ALS Sydney NATA Accreditation # 825
pH value	CBM-E005	X	
Electrical Conductivity	CBM - E006	X	
Total Suspended Solids (mg/l)	CBM-E008	X	
Total Dissolved Solid (mg/l)	CBM-E007	X	
Ammonia as N by Discrete Analyser	EK055G		X
Total Organic Carbon (TOC)	EP005		X
Formaldehyde	EP010		X
Chemical Oxygen Demand (Spectrophotometric)	EP026SP		X
Organochlorine Pesticides (OC)	EP068A		X
Organochlorine Pesticide Surrogate	EP068S		X
Organophosphorus Pesticide Surrogate	EP068T		X
Total Petroleum Hydrocarbons	EP080/071		X
Total Recoverable Hydrocarbons - NEPM 2013 Fractions	EP080/071		X
BTEXN	EP080		X
TPH(V)/BTEX Surrogates	EP080S		X

In accordance with “Standard Methods for the Examination of Water & Wastewater” APHA, AWWA, and Water & Wastewater Examination Manual (V. Dean Adams)

Preservation procedures in accordance with AS/NZS 5667/1 when sampled by ACIRL staff unless otherwise stated.

Appendix F – Operational Noise Monitoring Data

Borg Panels Facility

Annual Operational Noise Monitoring

Reporting Year 2017 - 2018

Prepared for

Borg Construction Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

Global Acoustics Pty Ltd
PO Box 3115 | Thornton NSW 2322
Telephone +61 2 4966 4333
Email global@globalacoustics.com.au
ABN 94 094 985 734

Borg Panels Facility

Reporting Year 2017 - 2018
Annual Operational Noise Monitoring

Reference: 18037_R02_RevA
Report date: 26 April 2018

Prepared for

Borg Manufacturing Pty Ltd
124 Lowes Mount Road
Oberon 2787 NSW

Prepared by

Global Acoustics Pty Ltd
PO Box 3115
Thornton NSW 2322

Prepared:	Robert Kirwan Acoustic Consultant	QA Review:	Amanda Borserio Acoustic Consultant

Global Acoustics Pty Ltd ~ Environmental noise modelling and impact assessment ~ Sound power testing ~ Noise control advice ~ Noise and vibration monitoring ~ OHS noise monitoring and advice ~ Expert evidence in Land and Environment and Compensation Courts ~ Architectural acoustics ~ Blasting assessments and monitoring ~ Noise management plans (NMP) ~ Sound level meter and noise logger sales and hire

EXECUTIVE SUMMARY

Global Acoustics was engaged by Borg Manufacturing Pty Ltd to undertake attended noise monitoring at sites around the Borg panel manufacturing facility (Borg) at Oberon, NSW.

The survey purpose was to quantify and describe the acoustic environment around the site and compare results with limits specified in the Development Consent and Operational Noise Management Plan (ONMP).

Attended environmental noise monitoring described in this report was undertaken during the evening and night period on 26 March 2018 and the day period on 27 March 2018. There were 4 attended monitoring locations as listed in Table 1.1 and shown in Figure 1.

Attended monitoring was conducted in general accordance with the EPA 'Noise Policy for Industry' (NPfI) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'.

Operational Noise Assessment

Borg operations complied with the relevant noise limits during the annual survey at all monitoring locations.

Low Frequency Noise Assessment

A low frequency noise assessment was carried out in accordance with the EPA's NPfI. Low frequency modifying factors, where applicable, did not result in any exceedances of Borg noise limits during the survey.

Global Acoustics Pty Ltd

Table of Contents

Appendices

1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by Borg Manufacturing Pty Ltd to undertake attended noise monitoring at sites around the Borg panel manufacturing facility (Borg) at Oberon, NSW.

The survey purpose was to quantify and describe the acoustic environment around the site and compare results with limits specified in the Development Consent and Operational Noise Management Plan (ONMP).

The ONMP recommends annual noise monitoring be conducted during the winter period, as this season represents the likely worst-case season due to temperature inversions. The ONMP was approved on 21 December 2017 and as annual monitoring had not been undertaken for the 2017-18 reporting period (01 May 2017 - 30 April 2018) monitoring was conducted in March 2018. Borg will endeavour to undertake future annual noise monitoring during the winter period.

Attended environmental noise monitoring described in this report was undertaken during the evening and night period on 26 March 2018 and the day period on 27 March 2018.

1.2 Monitoring Locations

There were 4 attended monitoring locations as listed in Table 1.1 and shown in Figure 1.

Table 1.1: ATTENDED MONITORING LOCATIONS

Report Descriptor	Monitoring Location
NM1	Oberon Caravan Park
NM2	Intersection of Pine Street and Herborn Street
NM3	127 Hazelgrove Road
NM4	Intersection of Tasman Street and Earl Street

Figure 1: Attended Noise Monitoring Locations

1.3 Terminology & Abbreviations

Some definitions of terms and abbreviations, which may be used in this report, are provided in Table 1.2.

Table 1.2: TERMINOLOGY & ABBREVIATIONS

Descriptor	Definition
L_A	The A-weighted root mean squared (RMS) noise level at any instant
L_{Amax}	The maximum A-weighted noise level over a time period or for an event
L_{A1}	The noise level which is exceeded for 1 per cent of the time
L_{A10}	The noise level which is exceeded for 10 percent of the time, which is approximately the average of the maximum noise levels
L_{A50}	The noise level which is exceeded for 50 per cent of the time
L_{A90}	The level exceeded for 90 percent of the time, which is approximately the average of the minimum noise levels. The L_{A90} level is often referred to as the "background" noise level and is commonly used to determine noise criteria for assessment purposes
L_{Amin}	The minimum A-weighted noise level over a time period or for an event
L_{Aeq}	The average noise energy during a measurement period
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to describe human response to noise
SPL	Sound pressure level (SPL), fluctuations in pressure measured as 10 times a logarithmic scale, the reference pressure being 20 micropascals
Hertz (Hz)	Cycles per second, the frequency of fluctuations in pressure, sound is usually a combination of many frequencies together
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude. Estimated from wind speed and sigma theta data
IA	Inaudible. When site only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
NM	Not Measurable. If site only noise is noted as NM, this means some noise from the source of interest was audible at low-levels, but could not be quantified
Day	This is the period 7:00am to 6:00pm
Evening	This is the period 6:00pm to 10:00pm
Night	This is the period 10:00pm to 7:00am

2 CONSENT AND CRITERIA

All monitoring reported in this document has been carried out in general accordance with the Development Consent (the Consent) dated 29 May 2017 (SSD 7016) and the ONMP.

2.1 Development Consent and Project Specific Criteria

The sections of the Consent relating to noise are reproduced in Appendix A.

Table 2 in Schedule B of the Consent outlines the day, evening and night period impact assessment criteria, which have been reproduced in Table 2.1 below.

Table 2.1: IMPACT ASSESSMENT CRITERIA

Location	Day $L_{Aeq,15minute}$ dB	Evening $L_{Aeq,15minute}$ dB	Night $L_{Aeq,15minute}$ dB
All sensitive receivers	55	50	45

As described in the Consent, noise generated by Borg is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy (INP), as follows:

- during rain and wind speeds greater than 3 metres/second at 10 metres above ground level; or
- stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
- stability category G temperature inversion conditions.

2.2 Modifying Factors

The EPA 'Noise Policy for Industry' (NPfI, 2018) was approved for use in NSW in October 2018, and supersedes the EPA's Industrial Noise Policy (INP, 2000). Assessment and reporting of modifying factors is to be carried out in accordance with Fact Sheet C of the NPfI.

NPfI modifying factors, as they are applicable to mining noise, are described in more detail below.

2.2.1 Tonality and Intermittent Noise

As defined in the Noise Policy for Industry:

> *Tonal noise contains a prominent frequency and is characterised by a definite pitch.*
>
> *Intermittent noise is noise where the level suddenly drops/increases several times during the assessment period, with a noticeable change in source noise level of at least 5 dB(A); for example, equipment cycling on and off. The intermittency correction is not intended to be applied to changes in noise level due to meteorology.*

There were no intermittent noise sources from site during the survey. In addition, there is no equipment on site that is likely to generate tonal noise as defined in the NPfI.

2.2.2 Low Frequency Noise

As defined in the Noise Policy for Industry:

> *Low frequency noise is noise with an unbalanced spectrum and containing major components within the low-frequency range (10 – 160 Hz) of the frequency spectrum.*

The NPfI contains the current method of assessing low frequency noise, which is a 2 step process as detailed below:

> *Measure/assess source contribution C-weighted and A-weighted L_{eq},T levels over the same time period. The low frequency noise modifying factor correction is to be applied where the C-A level is 15 dB or more and:*
>
> • *where any of the 1/3 octave noise levels in Table C2 are exceeded by* ***up to and including*** *5 dB and cannot be mitigated, a 2 dBA positive adjustment to measured A weighted levels applies for the evening/night period; and*
>
> • *where any of the 1/3 octave noise levels in Table C2 are exceeded by* ***more than*** *5 dB and cannot be mitigated, a 5 dBA positive adjustment to measured A weighted levels applies for the evening/night period and a 2 dBA positive adjustment applies for the daytime period.*

Table C2 and associated notes from the NPfI is reproduced below:

Table C2: One-third octave low-frequency noise thresholds.

Hz/dB(Z)	One-third octave $L_{Zeq,15min}$ threshold level												
Frequency (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
dB(Z)	92	89	86	77	69	61	54	50	50	48	48	46	44

Notes:

- dB(Z) = decibel (Z frequency weighted).
- For the assessment of low-frequency noise, care should be taken to select a wind screen that can protect the microphone from wind-induced noise characteristics at least 10 dB below the threshold values in Table C2 for

wind speeds up to 5 metres per second. It is likely that high performance larger diameter wind screens (nominally 175 mm) will be required to achieve this performance (Hessler, 2008). In any case, the performance of the wind screen and wind speeds at which data will be excluded needs to be stated.

- Low-frequency noise corrections only apply under the standard and/or noise-enhancing meteorological conditions.
- Where a receiver location has had architectural acoustic treatment applied (including alternative means of mechanical ventilation satisfying the Building Code of Australia) by a proponent, as part of consent requirements or as a private negotiated agreement, alternative external low-frequency noise assessment criteria may be proposed to account for the higher transmission loss of the building façade.
- Measurements should be made between 1.2 and 1.5 metres above ground level unless otherwise approved through a planning instrument (consent/approval) or environment protection licence, and at locations nominated in the development consent or licence.

3 METHODOLOGY

3.1 Overview

All noise monitoring was conducted at locations representative of the nearest residences in accordance with EPA guidelines and Australian Standard AS1055 ' Acoustics, Description and Measurement of Environmental Noise' and the Consent and ONMP.

Meteorological data was obtained from the Borg weather station in Oberon. This data allowed correlation of atmospheric parameters and measured noise levels. Atmospheric condition measurement at ground level was also undertaken during attended monitoring.

3.2 Attended Noise Monitoring

Attended monitoring is preferred to the use of noise loggers when determining compliance with prescribed limits as it allows the most accurate determination of the contribution, if any, to measured noise levels by the source of interest, in this case Borg. The duration of each individual measurement was 15 minutes.

If the exact contribution of the source of interest cannot be established, due to masking by other noise sources in a similar frequency range, but site noise levels are observed to be well below (more than 5 dB lower than) any relevant criterion, a maximum estimate of the potential contribution of the site might be made based on other measured site-only noise levels, for example, L_{A10}, L_{A50} or L_{A90}. This is generally expressed as a 'less than' quantity, such as <20 dB or <30 dB.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may also be used in this report. When site noise is noted as IA, no site noise was audible at the monitoring location. When site noise is noted as NM, this means some noise was audible but could not be quantified. If site noise was NM due to masking but estimated to be significant in relation to a relevant criterion, we would employ methods as per the NPfI (e.g. measure closer and back calculate) to determine a value for reporting.

Therefore, all sites noted as NM in this report are due to one or more of the following reasons:

- site noise levels were extremely low and unlikely, in many cases, to be even noticed;
- site noise levels were masked by another relatively loud noise source that is characteristic of the environment (e.g. breeze in foliage or continuous road traffic noise) that cannot be eliminated by moving closer; and/or
- it was not feasible or reasonable to employ methods such as move closer and back calculate. Cases may include, but are not limited to, rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

3.3 Modifying Factors

Years of monitoring have indicated that noise levels from the facility, particularly those measured at significant distances from the source are relatively continuous and broad spectrum. Given this, noise levels from Borg at the monitoring locations are unlikely to be intermittent or tonal.

Assessment of low-frequency modifying factors is necessary when application of the maximum correction could potentially result in an exceedance of the relevant site-only L_{Aeq} criterion. Low-frequency analysis is therefore undertaken for measurements in this report where:

- meteorological conditions resulted in criteria being applicable;
- contributions from Borg were audible and directly measurable, such that the site-only L_{Aeq} was not "NM" or less than a maximum cut off value (e.g. "<20 dB" or "<30dB");
- contributions from Borg were within 5 dB of the relevant L_{Aeq} criterion, as 5 dB is the maximum penalty that can be applied by low-frequency modifying factors; and
- Borg was the dominant low-frequency noise source.

All measurements meeting these conditions were evaluated for possible low frequency penalty applicability in accordance with the NPfI.

3.4 Monitoring Equipment

The equipment used to measure environmental noise levels is detailed in Table 3.1. Calibration certificates are provided in Appendix B.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level analyser	960042	10/10/2019
ND9 acoustic calibrator	N452838	30/06/2019

4 RESULTS

4.1 Attended Noise Monitoring

Total noise levels measured at each location are provided in Table 4.1.

Table 4.1: MEASURED NOISE LEVELS – ANNUAL 2017 - 2018[1]

Location	Start Date and Time	L_{Amax} dB	L_{A1} dB	L_{A10} dB	L_{A50} dB	L_{Aeq} dB	L_{A90} dB	L_{Amin} dB
NM1	27/03/2018 10:45	64	54	49	45	47	43	42
NM2	27/03/2018 10:25	61	52	48	46	46	44	41
NM3	27/03/2018 11:45	64	57	45	39	44	36	32
NM4	27/03/2018 11:08	64	55	49	46	48	44	42
NM1	26/03/2018 21:07	58	52	49	48	48	47	45
NM2	26/03/2018 21:30	54	50	47	45	46	43	41
NM3	26/03/2018 20:25	50	NA	NA	41	42	NA	NA
NM4	26/03/2018 20:47	51	46	44	42	43	41	39
NM1	26/03/2018 23:02	53	47	46	45	45	43	42
NM2	26/03/2018 22:31	48	43	41	39	39	37	35
NM3	26/03/2018 23:47	56	44	42	40	41	38	36
NM4	26/03/2018 23:22	52	46	40	39	39	37	34

Notes: 1. *Levels in this table are not necessarily the result of activity at Borg; and*
2. *'NA' denotes data not available.*

Table 4.2 compares measured $L_{Aeq,15minute}$ levels from Borg with the Consent and ONMP noise criteria.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY BORG AGAINST CRITERIA – ANNUAL 2017 - 2018

Location	Start Date and Time	Wind Speed m/s[1]	Stability Class[1]	VTG °C per 100m[1]	Criterion dB	Criterion Applies?[2,3]	Borg $L_{Aeq,15min}$ dB[4]	Exceedance [5,6]
NM1	27/03/2018 10:45	3.0	B	-1.8	55	Yes	44	Nil
NM2	27/03/2018 10:25	4.2	D	-1.0	55	No	44	NA
NM3	27/03/2018 11:45	3.1	B	-1.8	55	No	<30	NA
NM4	27/03/2018 11:08	3.6	A	-2.0	55	No	<40	NA
NM1	26/03/2018 21:07	2.3	E	0.5	50	Yes	NM	Nil

Location	Start Date and Time	Wind Speed m/s[1]	Stability Class[1]	VTG °C per 100m[1]	Criterion dB	Criterion Applies?[2,3]	Borg $L_{Aeq,15min}$ dB[4]	Exceedance [5,6]
NM2	26/03/2018 21:30	1.9	D	-1.0	50	Yes	NM	Nil
NM3	26/03/2018 20:25	2.5	E	0.5	50	Yes	<40	Nil
NM4	26/03/2018 20:47	2.6	E	0.5	50	Yes	41	Nil
NM1	26/03/2018 23:02	1.3	F	3.0	45	Yes	<40	Nil
NM2	26/03/2018 22:31	2.0	F	3.0	45	Yes	NM	Nil
NM3	26/03/2018 23:47	0.6	F	3.0	45	Yes	38	Nil
NM4	26/03/2018 23:22	1.7	E	0.5	45	Yes	38	Nil

Notes:

1. *Atmospheric data is sourced from Borg weather station in Oberon;*
2. *In accordance with EPL and PA, the noise criteria are to apply under all meteorological conditions except the following:*
   - *Wind speeds greater than 3 m/s at 10 metres above ground level; or*
   - *Stability class F temperature inversion conditions, and wind speeds greater than 2 m/s at 10 metres above ground level; or*
   - *Stability class G temperature inversion conditions.*
3. *Criterion may or may not apply due to rounding of meteorological data values;*
4. *Estimated or measured $L_{Aeq,15minute}$ attributed to the Borg;*
5. *Bold results in red indicate exceedance of criteria (if applicable); and*
6. *NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable*

4.2 Low Frequency Noise Assessment

Measured Borg only levels were assessed for the applicability of low frequency modification factors in accordance with the EPA's NPfI.

None of the measurements satisfied the conditions outlined in Section 3.3. Therefore no further assessment was undertaken.

4.3 Atmospheric Conditions

Atmospheric condition data measured by the operator at each location using a Kestrel hand-held weather meter is shown in Table 4.3. Atmospheric condition data is routinely recorded during each measurement to show conditions during the monitoring period. The wind speed, direction and temperature were measured at 1.8 metres.

Table 4.3: MEASURED ATMOSPHERIC CONDITIONS – ANNUAL 2017 - 2018[1,2]

Location	Start Date and Time	Temperature (degrees)	Wind Speed (m/s)	Wind Direction	Cloud Cover (1/8s)
NM1	27/03/2018 10:45	20	1.1	60	0
NM2	27/03/2018 10:25	18	0.9	90	90
NM3	27/03/2018 11:45	23	0.8	40	0
NM4	27/03/2018 11:08	20	0.9	120	0
NM1	26/03/2018 21:07	8	-	-	0
NM2	26/03/2018 21:30	8	1	280	0
NM3	26/03/2018 20:25	9	-	-	0
NM4	26/03/2018 20:47	7	-	-	0
NM1	26/03/2018 23:02	6	-	-	0
NM2	26/03/2018 22:31	6	-	-	0
NM3	26/03/2018 23:47	4	-	-	0
NM4	26/03/2018 23:22	2	-	-	0

Notes:

1. *Wind speed and direction measured at 1.8 metres; and*
2. *"-" indicates calm conditions at 1.8 metres.*

5 SUMMARY

The following applies to attended noise monitoring conducted during the evening and night period on 26 March 2018 and the day period on 27 March 2018.

Operational Noise Assessment

Borg operations complied with the relevant criteria during the annual survey at all monitoring locations.

Low Frequency Noise Assessment

A low frequency noise assessment was carried out in accordance with the EPA's NPfI. Low frequency modifying factors, where applicable, did not result in any exceedances of Borg noise limits during the survey.

Global Acoustics Pty Ltd

APPENDIX

A STATUTORY REQUIREMENTS

A.1 BORG PANELS FACILITY DEVELOPMENT CONSENT

NOISE

Hours of Work

B13. The Applicant must comply with the hours detailed in **Table 1**, unless otherwise agreed in writing by the Secretary.

Table 1: Hours of Work

Activity	Day	Time
Earthworks and Construction	Monday – Friday Saturday	7 am to 7 pm 8 am to 1 pm
Operation	Monday – Sunday	24 hours

B14. Works outside of the hours identified in Condition B13 may be undertaken in the following circumstances:
(a) works that are inaudible at the nearest sensitive receivers;
(b) works agreed to in writing by the Secretary;
(c) for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; or
(d) where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm.

Construction Noise Management Plan

B15. The Applicant must prepare a Construction Noise Management Plan (CNMP) for the Project to manage construction noise. The plan must form part of the CEMP required by Condition C1 and must:
(a) be prepared by a suitably qualified and experienced noise expert;
(b) be approved by the Secretary prior to the commencement of construction of the Project;
(c) describe procedures for achieving the noise limits in **Table 2**;
(d) describe the measures to be implemented to manage noisy works such as rock/concrete breaking activities, in close proximity to sensitive receivers;
(e) include strategies that have been developed with the community for managing noisy works;
(f) describe the community consultation undertaken to develop the strategies in e) above; and
(g) include a complaints management system that would be implemented for the duration of the Project.

Operational Noise Limits

B16. The Applicant must ensure that noise generated by the Development does not exceed the noise limits in **Table 2.**

Table 2: Noise Limits dB(A)

Location	Day $L_{Aeq(15\ minute)}$	Evening $L_{Aeq(15\ minute)}$	Night $L_{Aeq(15\ minute)}$
All sensitive receivers	55	50	45

Note: *Noise generated by the Development is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy.*

Noise Mitigation

B17. The Applicant must ensure all noise attenuation measures already installed for the Existing Development are maintained in good working order for the life of the Development.

Operational Noise Management Plan

B18. Within 6 months of the date of this consent, the Applicant must prepare an Operational Noise Management Plan (ONMP) for the Existing Development, to manage operational noise to the satisfaction of the Secretary. The ONMP must form part of the OEMP required by Condition C4 and be prepared in accordance with Condition C9. The ONMP must:
- (a) be prepared by a suitably qualified and experienced noise expert;
- (b) describe the measures that will be implemented to minimise noise from the Existing Development including:
  - (i) all reasonable and feasible measures being employed on site;
  - (ii) maintain equipment to ensure it is in good order;
  - (iii) traffic noise is effectively managed;
  - (iv) the noise impacts of the Existing Development are minimised during any meteorological conditions when the noise criteria in this consent do not apply;
  - (v) compliance with the relevant conditions of this consent;
- (c) includes a noise monitoring program that:
  - (i) must be carried out until otherwise agreed to in writing by the Secretary;
  - (ii) is capable of evaluating the performance of the Existing Development; and
  - (iii) includes a protocol for determining exceedances of the relevant conditions of this consent and responding to complaints; and
- (d) include a procedure for implementing noise mitigation measures, should the Applicant be directed by the EPA or the Secretary, or should non-compliances be detected.

B19. Prior to the commencement of operation of the Project, the Applicant must update the ONMP required under Condition B18, to incorporate the Project and its management, to the satisfaction of the Secretary. The updated plan must be prepared in accordance with the requirements of Condition B18, and must incorporate the following:
- (a) description of the noise monitoring program to measure the performance of the Development against this consent and the EPL; and
- (b) description of any additional measures that would be implemented for the Development to ensure compliance with the noise limits in Condition B16 and the EPL.

Noise Verification

B20. Within 3 months of commencement of operation of the Project, the Applicant must undertake a noise verification study for the Development to the satisfaction of the Secretary. The study must:
- (a) be undertaken by a suitably qualified expert;
- (b) include an analysis of compliance with noise limits specified in Condition B16;
- (c) demonstrate achievement of the sound power levels in Table 12 of the *Borg Panels Timber Panel Processing Facility Noise and Vibration Impact Assessment*, dated May 2016 and prepared by Global Acoustics;
- (d) include an outline of management actions to be taken to address any exceedances of the limits specified in Condition B16; and
- (e) describe the contingency measures in the event management actions are not effective in reducing noise levels to an acceptable level.

Within 1 month of completing the study, the Applicant must submit a report outlining the findings of the study to the Secretary and the EPA.

B21. Should the noise verification study indicate the Development has not complied with the noise limits in Condition B16 and applicable EPL requirements, or where the verification indicates that greater impacts than predicted in the EIS may arise, a detailed investigation and an outline of any management measures necessary to prevent exceedances must be submitted to the Secretary and the EPA, as part of the study.

Borg will implement reasonable and practical measures to avoid or minimise impacts to the environment that may arise as a result of the project.

Borg will carry out the proposed works in accordance with the EIS, RTS and the approval conditions.

Noise

Attenuation, as detailed in the NIA, will be implemented as follows:

- Conti 1 Dryer Fan air intake redesigned and the fan speed reduced to minimise noise generated. A sound power reduction from LAeq 121 dB to 114 dB or better is required.
- Booster fan will receive additional insulation and a reduction in fan speed. A sound power reduction from LAeq 116 dB to 109 dB or better is required.
- Main fibre transport fan will have a concrete enclosure constructed around it. A sound power reduction from LAeq 110 dB to 104 dB or better is required.

In short, the approach taken by Borg to mitigate noise is based on a number of factors:

1. Continuation of the use of mobile chippers (that is, not to enclose the mobile chippers). However, these are backup items (only to be used when enclosed, electric chippers are not operational), and will not be used in enhancing met conditions.
2. Implementation of additional noise mitigation measures to minimise noise generated by equipment, as detailed above.
3. Provision of sound attenuation structures and enclosures to other equipment where appropriate.

Irrespective of the above, Borg undertakes to meet the existing plant sound power reductions specified in the NIA. If the proposed attenuation measures to the existing plant are found to be insufficient in achieving these reductions, additional works will be undertaken.

APPENDIX

B CALIBRATION CERTIFICATES

Acoustic Research Labs Pty Ltd
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3.2013
Calibration Certificate

Calibration Number C17510

Client Details	Acoustic Research Labs Pty Ltd Level 7, Bld 2, 423 Pennant Hills Road Pennant Hills NSW 2120
Equipment Tested/ Model Number :	Rion NA-28
Instrument Serial Number :	00960042
Microphone Serial Number :	07714
Pre-amplifier Serial Number :	60062

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	22.4°C	**Ambient Temperature :**	22.8°C
Relative Humidity :	50.7%	**Relative Humidity :**	50.1%
Barometric Pressure :	99.7kPa	**Barometric Pressure :**	99.67kPa

Calibration Technician : Jason Gomes
Secondary Check: Riley Cooper
Calibration Date : 10/10/2017
Report Issue Date : 11/10/2017

Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	*Pass*	17: Level linearity incl. the level range control	*Pass*
13: Electrical Sig. tests of frequency weightings	*Pass*	18: Toneburst response	*Pass*
14: Frequency and time weightings at 1 kHz	*Pass*	19: C Weighted Peak Sound Level	*Pass*
15: Long Term Stability	*Pass*	20: Overload Indication	*Pass*
16: Level linearity on the reference level range	*Pass*	21: High Level Stability	*Pass*

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed.

As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation test performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Least Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.16dB*	*Temperature*	*±0.05°C*
12.5kHz	*±0.2dB*	*Relative Humidity*	*±0.46%*
16kHz	*±0.29dB*	*Barometric Pressure*	*±0.017kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.12dB*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025.

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.

PAGE 1 OF 1

Acoustic Research Labs Pty Ltd
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Calibrator

IEC 60942-2004

Calibration Certificate

Calibration Number C17306

Client Details Acoustic Research Labs Pty Ltd
Level 7, Bld 2, 423 Pennant Hills Road
Pennant Hills NSW 2120

Equipment Tested/ Model Number : ARL ND9
Instrument Serial Number : N452838

Atmospheric Conditions
Ambient Temperature : 22.5°C
Relative Humidity : 37.4%
Barometric Pressure : 100.27kPa

Calibration Technician : Lucky Jaiswal
Secondary Check: Riley Cooper
Calibration Date : 30/06/2017
Report Issue Date : 03/07/2017

Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
5.2.2: Generated Sound Pressure Level	*Pass*	5.3.2: Frequency Generated	*Pass*
5.2.3: Short Term Fluctuation	*Pass*	5.5: Total Distortion	*Pass*

	Nominal Level	Nominal Frequency	Measured Level	Measured Frequency
Measured Output	94.0	1000.0	94.0	1000.12

The sound calibrator has been shown to conform to the class 1 requirements for periodic testing, described in Annex B of IEC 60942:2004 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed..

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.11dB*	*Temperature*	*±0.05°C*
Short Term Fluct.	*±0.02dB*	*Relative Humidity*	*±0.46%*
Frequency	*±0.01%*	*Barometric Pressure*	*±0.017kPa*
Distortion	*±0.5%*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025.

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.

PAGE 1 OF 1

Appendix G – Construction Noise Monitoring Data

Borg Panels Facility

Environmental Noise Monitoring

Quarter 3 2017

Prepared for

Borg Construction Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

Global Acoustics Pty Ltd
PO Box 3115 | Thornton NSW 2322
Telephone +61 2 4966 4333
Email global@globalacoustics.com.au
ABN 94 094 985 734

Borg Panels Facility

Quarter 3, 2017
Environmental Noise Monitoring

Reference: 17285_R01
Report date: 11 September 2017

Prepared for

Borg Construction Pty Ltd
124 Lowes Mount Road
Oberon 2787 NSW

Prepared by

Global Acoustics Pty Ltd
PO Box 3115
Thornton NSW 2322

Prepared:	Michael Swanson Acoustics Technician	QA Review:	Robert Kirwan Acoustic Engineer

Global Acoustics Pty Ltd ~ Environmental noise modelling and impact assessment ~ Sound power testing ~ Noise control advice ~ Noise and vibration monitoring ~ OHS noise monitoring and advice ~ Expert evidence in Land and Environment and Compensation Courts ~ Architectural acoustics ~ Blasting assessments and monitoring ~ Noise management plans (NMP) ~ Sound level meter and noise logger sales and hire

EXECUTIVE SUMMARY

Global Acoustics was engaged by Borg Construction Pty Ltd to undertake attended noise monitoring at sites around the Borg panel manufacturing facility (Borg) at Oberon, NSW.

The survey purpose was to quantify and describe the acoustic environment around the site and compare results with limits specified in the Development Consent and Construction Noise Management Plan (CNMP).

Attended environmental noise monitoring described in this report was undertaken during the day period on 27 July 2017. There were 4 attended monitoring locations as listed in Table 1.1 and shown in Figure 1.

Attended monitoring was conducted in general accordance with the EPA 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'.

Operational Noise Assessment

Borg complied with the relevant noise limits during the Quarter 3, 2017 survey at all monitoring locations.

Low Frequency Assessment

None of the four measurements occurred during which Borg was the only low frequency source, was measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion, and where meteorological conditions resulted in criteria applying (in accordance with the Consent).

Global Acoustics Pty Ltd

Table of Contents

Appendices

1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by Borg Construction Pty Ltd to undertake attended noise monitoring at sites around the Borg panel manufacturing facility (Borg) at Oberon, NSW.

The survey purpose was to quantify and describe the acoustic environment around the site and compare results with limits specified in the Development Consent and Construction Noise Management Plan (CNMP).

Attended environmental noise monitoring described in this report was undertaken during the day period on 27 July 2017.

1.2 Monitoring Locations

There were 4 attended monitoring locations as listed in Table 1.1 and shown in Figure 1.

Table 1.1: ATTENDED MONITORING LOCATIONS

Report Descriptor	Monitoring Location
NM1	Oberon Caravan Park
NM2	Intersection of Pine Street and Herborn Street
NM3	127 Hazelgrove Road
NM4	Intersection of Tasman Street and Earl Street

Figure 1: Attended Noise Monitoring Locations

1.3 Terminology & Abbreviations

Some definitions of terms and abbreviations, which may be used in this report, are provided in Table 1.2.

Table 1.2: TERMINOLOGY & ABBREVIATIONS

Descriptor	Definition
L_A	The A-weighted root mean squared (RMS) noise level at any instant
L_{Amax}	The maximum A-weighted noise level over a time period or for an event
L_{A1}	The noise level which is exceeded for 1 per cent of the time
L_{A10}	The noise level which is exceeded for 10 percent of the time, which is approximately the average of the maximum noise levels
L_{A50}	The noise level which is exceeded for 50 per cent of the time
L_{A90}	The level exceeded for 90 percent of the time, which is approximately the average of the minimum noise levels. The A90L level is often referred to as the "background" noise level and is commonly used to determine noise criteria for assessment purposes
L_{Amin}	The minimum A-weighted noise level over a time period or for an event
L_{Aeq}	The average noise energy during a measurement period
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to describe human response to noise
SPL	Sound pressure level (SPL), fluctuations in pressure measured as 10 times a logarithmic scale, the reference pressure being 20 micropascals
Hertz (Hz)	Cycles per second, the frequency of fluctuations in pressure, sound is usually a combination of many frequencies together
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude. Estimated from wind speed and sigma theta data
IA	Inaudible. When site only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
NM	Not Measurable. If site only noise is noted as NM, this means some noise from the source of interest was audible at low-levels, but could not be quantified
Day	This is the period 7:00am to 6:00pm
Evening	This is the period 6:00pm to 10:00pm
Night	This is the period 10:00pm to 7:00am

2 CONSENT AND CRITERIA

All monitoring reported in this document has been carried out in general accordance with the Development Consent (the Consent) dated 29 May 2017 (SSD 7016) and the CNMP.

2.1 Development Consent and Project Specific Criteria

The sections of the Consent relating to noise are reproduced in Appendix A.

Table 2 in Schedule B of the Consent outlines the day, evening and night period impact assessment criteria, which have been reproduced in Table 2.1 below.

Table 2.1: IMPACT ASSESSMENT CRITERIA

Location	Day $L_{Aeq,15minute}$ dB	Evening $L_{Aeq,15minute}$ dB	Night $L_{Aeq,15minute}$ dB
All sensitive receivers	55	50	45

As described in the Consent, noise generated by Borg is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy (INP), as follows:

- during rain and wind speeds greater than 3 metres/second at 10 metres above ground level; or
- stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
- stability category G temperature inversion conditions.

2.2 Project Specific Noise Limits

In accordance with the Consent and CNMP, project specific noise criteria for each monitoring location are detailed in Table 2.2 and Table 2.3.

Table 2.2: GENERAL CONSTRUCTION NOISE LIMITS

Report Descriptor	Day $L_{Aeq,15minute}$ dB	Evening $L_{Aeq,15minute}$ dB	Night $L_{Aeq,15minute}$ dB
NM1	55	50	45
NM2	55	50	45
NM3	55	50	45
NM4	55	50	45

Table 2.3: ROCK / CONCRETE BREAKING NOISE LIMITS

Report Descriptor	Day $L_{Aeq,15minute}$ dB
NM1	75
NM2	75
NM3	75
NM4	75

2.3 Modifying Factors

Noise monitoring and reporting is carried out generally in accordance with the EPA INP. Chapter 4 of the INP deals specifically with modifying factors that may apply to industrial noise. The most common modifying factors are addressed in detail below.

2.3.1 Tonality, Intermittent and Impulsive Noise

As defined in the INP:

> *Tonal noise contains a prominent frequency and is characterised by a definite pitch.*
>
> *Impulsive noise has high peaks of short duration or a sequence of such peaks.*
>
> *Intermittent noise is characterised by the level suddenly dropping to the background noise levels several times during a measurement, with a noticeable change in noise level of at least 5 dB. Intermittent noise applies to night-time only.*

During the Q3 2017 monitoring survey, tonal, impulsive or intermittent noise was not observed. These are not discussed further in this report.

2.3.2 Low Frequency Noise

INP Method

As defined in the INP:

> *Low frequency noise contains major components within the low frequency range (20 Hz to 250 Hz) of the frequency spectrum.*

As detailed in Chapter 4 of the INP, low frequency noise should be assessed by measuring the site only C-weighted and site only A-weighted level over the same time period. The correction/penalty of 5 dB is applied *if the difference between the two levels is 15 dB or more*.

Broner Method

Low frequency noise can also be assessed against criteria specified in the paper "A Simple Method for Low Frequency Noise Emission Assessment" (Broner JLFNV vol29-1 pp1-14 2010). If the total predicted site only C-weighted noise level at a receptor exceeds the relevant criterion, a 5 dB penalty (modifying factor) is added to measured levels. This method is included to provide a comparison with the INP method.

dING Method

Whilst the INP is the current document for assessment of industrial noise impact in NSW, the EPA has recently published the Draft Industrial Noise Guideline (dING), which is currently under review after a

period of public consultation. The dING contains an alternate method of assessing low frequency noise to the INP, which is:.

> *Measure/assess C-weighted and A-weighted $L_{eq,}T$ levels over the same time period. The low frequency noise modifying factor correction is to be applied where the C-A level exceeds 15 dB and:*
>
> • *where any of the 1/3 octave noise levels in Table C2 are exceeded by* ***up to*** *5 dB and cannot be mitigated, a 2 dBA positive adjustment to measured A weighted levels applies for the evening/night period; and*
>
> • *where any of the 1/3 octave noise levels in Table C2 are exceeded by* ***more than*** *5 dB and cannot be mitigated, a 5 dBA positive adjustment to measured A weighted levels applies for the evening/night period and a 2 dBA positive adjustment applies for the daytime period.*

Table C2 of the dING is reproduced below:

Table C2: One-third octave low frequency noise thresholds

Hz/dB(Z)	One-third octave $L_{Zeq,15minute}$ threshold level												
f,Hz	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
dB(Z)	92	89	86	77	69	61	54	50	50	48	48	46	44

Note: dB(z) = decibel (Z-weighted); f,Hz = frequency in Hertz; Hz/dB(Z) = hertz per decibel (Z-weighted). For the assessment of low frequency noise, care should be taken to select a wind screen that has wind-induced noise characteristics at least 10 dB below the threshold values in Table C2 for wind speeds up to 5 metres per second. It is likely that high performance larger diameter wind screens (nominally 175 mm) will be required to achieve this performance (Hessler et.al. 2008). In any case, the performance of the wind screen and wind speeds at which data will be excluded needs to be stated.

Low frequency noise shall be assessed under the meteorological conditions under which noise limits would apply.

Measurements should be made between 1.2 and 1.5 metres above ground level unless otherwise approved through a planning instrument (consent/approval) or Environment Protection Licence and at locations nominated in the development consent or license.

2.3.3 Low Frequency Assessment Methods

Low frequency assessment methods are summarised in Table 2.4.

Table 2.4: LOW FREQUENCY ASSESSMENT METHODS AND MODIFYING FACTOR TRIGGERS

Assessment Method	Calculation Method
Broner, 2010	Site only L_{Ceq}
INP	Site only L_{Ceq} minus site only L_{Aeq}
dING	1. Site only L_{Ceq} minus site only L_{Aeq} 2. One third octave low frequency noise threshold

Triggers and penalties associated with each method are outlined in Section 2.3.2.

3 METHODOLOGY

3.1 Overview

All noise monitoring was conducted at the nearest residences in accordance with the EPA INP guidelines and Australian Standard AS1055 ' Acoustics, Description and Measurement of Environmental Noise' and the Consent and CNMP.

Meteorological data was obtained from the Borg weather station in Oberon. This data allowed correlation of atmospheric parameters and measured noise levels. Atmospheric condition measurement at ground level was also undertaken during attended monitoring.

3.2 Attended Noise Monitoring

Attended monitoring is preferred to the use of noise loggers when determining compliance with prescribed limits as it allows the most accurate determination of the contribution, if any, to measured noise levels by the source of interest, in this case Borg. The duration of each individual measurement was 15 minutes.

If the exact contribution of the source of interest cannot be established, due to masking by other noise sources in a similar frequency range, but site noise levels are observed to be well below (more than 5 dB lower than) any relevant criterion, a maximum estimate of the potential contribution of the site might be made based on other measured site-only noise levels, for example, L_{A10}, L_{A50} or L_{A90}. This is generally expressed as a 'less than' quantity, such as <20 dB or <30 dB.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may also be used in this report. When site noise is noted as IA, no site noise was audible at the monitoring location. When site noise is noted as NM, this means some noise was audible but could not be quantified. If site noise was NM due to masking but estimated to be significant in relation to a relevant criterion, we would employ methods as per the Industrial Noise Policy (e.g. measure closer and back calculate) to determine a value for reporting.

Therefore, all sites noted as NM in this report are due to one or more of the following reasons:

- site noise levels were extremely low and unlikely, in many cases, to be even noticed;
- site noise levels were masked by another relatively loud noise source that is characteristic of the environment (e.g. breeze in foliage or continuous road traffic noise) that cannot be eliminated by moving closer; and/or
- it was not feasible or reasonable to employ INP methods such as move closer and back calculate. Cases may include, but are not limited to, rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

3.3 Monitoring Equipment

The equipment used to measure environmental noise levels is detailed in Table 3.1. Calibration certificates are provided in Appendix B.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level analyser	00701424	05/06/2019
Pulsar 106 acoustic calibrator	74813	05/06/2019

4 RESULTS

4.1 Attended Noise Monitoring

Total noise levels measured at each location are provided in Table 4.1.

Table 4.1: MEASURED NOISE LEVELS – QUARTER 3 2017[1]

Location	Start Date and Time	L_{Amax} dB	L_{A1} dB	L_{A10} dB	L_{A50} dB	L_{Aeq} dB	L_{A90} dB	L_{Amin} dB	L_{Ceq} dB
NM1	27/07/2017 09:59	60	55	50	45	47	43	41	62
NM2	27/07/2017 10:18	73	58	47	43	49	42	40	64
NM3	27/07/2017 09:16	72	65	54	45	53	39	31	59
NM4	27/07/2017 09:37	79	70	48	37	56	34	31	60

Notes: 1. *Levels in this table are not necessarily the result of activity at Borg.*

Table 4.2 compares measured $L_{Aeq,15minute}$ levels from Borg with the Consent and CNMP noise criteria.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY BORG AGAINST CRITERIA – QUARTER 3 2017

Location	Start Date and Time	Wind Speed m/s[1]	Stability Class[1]	VTG °C per 100m[1]	Criterion dB	Criterion Applies?[2,3]	Borg $L_{Aeq,15min}$ dB[4]	Exceedance [5,6]
NM1	27/07/2017 09:59	2.2	A	-2	55	Yes	45	Nil
NM2	27/07/2017 10:18	1.8	A	-2	55	Yes	40	Nil
NM3	27/07/2017 09:16	0.4	A	-2	55	Yes	32	Nil
NM4	27/07/2017 09:37	1.8	A	-2	55	Yes	34	Nil

Notes:

1. *Atmospheric data is sourced from Borg weather station in Oberon;*
2. *In accordance with EPL and PA, the noise criteria are to apply under all meteorological conditions except the following:*
   - *Wind speeds greater than 3 m/s at 10 metres above ground level; or*
   - *Stability class F temperature inversion conditions, and wind speeds greater than 2 m/s at 10 metres above ground level; or*
   - *Stability class G temperature inversion conditions.*
3. *Criterion may or may not apply due to rounding of meteorological data values;*
4. *Estimated or measured $L_{Aeq,15minute}$ attributed to the Borg;*
5. *Bold results in red indicate exceedance of criteria (if applicable); and*
6. *NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable*

As the construction noise limits are more stringent than the construction rock/concrete breaking noise limits, no further assessment on noise criteria is required.

4.2 Low Frequency Assessment

Table 4.3 provides statistics for attended noise monitoring undertaken around the Borg during Quarter 3, 2017.

Table 4.3: ATTENDED MEASUREMENT STATISTICS FOR BORG – QUARTER 3 2017

Conditions	Total
Number of measurements	4
Number of measurements where criteria applied	4
Number of measurements where NAR was the only low-frequency source and levels were within 5 dB of the criterion and criterion applied	0

None of the four measurements occurred during which Borg was the only low frequency source, was measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion, and where meteorological conditions resulted in criteria applying (in accordance with the Consent).

4.3 Atmospheric Conditions

Atmospheric condition data measured by the operator at each location using a Kestrel hand-held weather meter is shown in Table 4.4. Atmospheric condition data is routinely recorded on a site-by-site basis to show conditions during the monitoring period. The wind speed, direction and temperature were measured at 1.8 metres.

Table 4.4: MEASURED ATMOSPHERIC CONDITIONS – QUARTER 3 2017[1,2]

Location	Start Date and Time	Temperature (degrees)	Wind Speed (m/s)	Wind Direction	Cloud Cover (1/8s)
NM1	27/07/2017 09:59	10	0.9	50	0
NM2	27/07/2017 10:18	12	0.5	60	0
NM3	27/07/2017 09:16	10	0.3	80	0
NM4	27/07/2017 09:37	12	1.5	90	0

Notes:

1. *Wind speed and direction measured at 1.8 metres; and*
2. *"-" indicates calm conditions at 1.8 metres.*

5 SUMMARY

The following applies to attended noise monitoring conducted during the day period on 27 July 2017.

Operational Noise Assessment

Borg complied with the relevant criteria during the Quarter 3, 2017 survey at all monitoring locations.

Low Frequency Assessment

None of the four measurements occurred during which Borg was the only low frequency source, was measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion, and where meteorological conditions resulted in criteria applying (in accordance with the Consent).

Global Acoustics Pty Ltd

APPENDIX

A STATUTORY REQUIREMENTS

A.1 BORG PANELS FACILITY DEVELOPMENT CONSENT

NOISE

Hours of Work

B13. The Applicant must comply with the hours detailed in **Table 1**, unless otherwise agreed in writing by the Secretary.

Table 1: Hours of Work

Activity	Day	Time
Earthworks and Construction	Monday – Friday Saturday	7 am to 7 pm 8 am to 1 pm
Operation	Monday – Sunday	24 hours

B14. Works outside of the hours identified in Condition B13 may be undertaken in the following circumstances:
(a) works that are inaudible at the nearest sensitive receivers;
(b) works agreed to in writing by the Secretary;
(c) for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; or
(d) where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm.

Construction Noise Management Plan

B15. The Applicant must prepare a Construction Noise Management Plan (CNMP) for the Project to manage construction noise. The plan must form part of the CEMP required by Condition C1 and must:
(a) be prepared by a suitably qualified and experienced noise expert;
(b) be approved by the Secretary prior to the commencement of construction of the Project;
(c) describe procedures for achieving the noise limits in **Table 2**;
(d) describe the measures to be implemented to manage noisy works such as rock/concrete breaking activities, in close proximity to sensitive receivers;
(e) include strategies that have been developed with the community for managing noisy works;
(f) describe the community consultation undertaken to develop the strategies in e) above; and
(g) include a complaints management system that would be implemented for the duration of the Project.

Operational Noise Limits

B16. The Applicant must ensure that noise generated by the Development does not exceed the noise limits in **Table 2.**

Table 2: Noise Limits dB(A)

Location	Day $L_{Aeq(15\ minute)}$	Evening $L_{Aeq(15\ minute)}$	Night $L_{Aeq(15\ minute)}$
All sensitive receivers	55	50	45

Note: *Noise generated by the Development is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy.*

Noise Mitigation

B17. The Applicant must ensure all noise attenuation measures already installed for the Existing Development are maintained in good working order for the life of the Development.

Operational Noise Management Plan

B18. Within 6 months of the date of this consent, the Applicant must prepare an Operational Noise Management Plan (ONMP) for the Existing Development, to manage operational noise to the satisfaction of the Secretary. The ONMP must form part of the OEMP required by Condition C4 and be prepared in accordance with Condition C9. The ONMP must:
(a) be prepared by a suitably qualified and experienced noise expert;
(b) describe the measures that will be implemented to minimise noise from the Existing Development including:
(i) all reasonable and feasible measures being employed on site;
(ii) maintain equipment to ensure it is in good order;
(iii) traffic noise is effectively managed;
(iv) the noise impacts of the Existing Development are minimised during any meteorological conditions when the noise criteria in this consent do not apply;
(v) compliance with the relevant conditions of this consent;
(c) includes a noise monitoring program that:
(i) must be carried out until otherwise agreed to in writing by the Secretary;
(ii) is capable of evaluating the performance of the Existing Development; and
(iii) includes a protocol for determining exceedances of the relevant conditions of this consent and responding to complaints; and
(d) include a procedure for implementing noise mitigation measures, should the Applicant be directed by the EPA or the Secretary, or should non-compliances be detected.

B19. Prior to the commencement of operation of the Project, the Applicant must update the ONMP required under Condition B18, to incorporate the Project and its management, to the satisfaction of the Secretary. The updated plan must be prepared in accordance with the requirements of Condition B18, and must incorporate the following:
(a) description of the noise monitoring program to measure the performance of the Development against this consent and the EPL; and
(b) description of any additional measures that would be implemented for the Development to ensure compliance with the noise limits in Condition B16 and the EPL.

Noise Verification

B20. Within 3 months of commencement of operation of the Project, the Applicant must undertake a noise verification study for the Development to the satisfaction of the Secretary. The study must:
(a) be undertaken by a suitably qualified expert;
(b) include an analysis of compliance with noise limits specified in Condition B16;
(c) demonstrate achievement of the sound power levels in Table 12 of the *Borg Panels Timber Panel Processing Facility Noise and Vibration Impact Assessment*, dated May 2016 and prepared by Global Acoustics;
(d) include an outline of management actions to be taken to address any exceedances of the limits specified in Condition B16; and
(e) describe the contingency measures in the event management actions are not effective in reducing noise levels to an acceptable level.

Within 1 month of completing the study, the Applicant must submit a report outlining the findings of the study to the Secretary and the EPA.

B21. Should the noise verification study indicate the Development has not complied with the noise limits in Condition B16 and applicable EPL requirements, or where the verification indicates that greater impacts than predicted in the EIS may arise, a detailed investigation and an outline of any management measures necessary to prevent exceedances must be submitted to the Secretary and the EPA, as part of the study.

Borg will implement reasonable and practical measures to avoid or minimise impacts to the environment that may arise as a result of the project.

Borg will carry out the proposed works in accordance with the EIS, RTS and the approval conditions.

Noise

Attenuation, as detailed in the NIA, will be implemented as follows:

- Conti 1 Dryer Fan air intake redesigned and the fan speed reduced to minimise noise generated. A sound power reduction from LAeq 121 dB to 114 dB or better is required.
- Booster fan will receive additional insulation and a reduction in fan speed. A sound power reduction from LAeq 116 dB to 109 dB or better is required.
- Main fibre transport fan will have a concrete enclosure constructed around it. A sound power reduction from LAeq 110 dB to 104 dB or better is required.

In short, the approach taken by Borg to mitigate noise is based on a number of factors:

1. Continuation of the use of mobile chippers (that is, not to enclose the mobile chippers). However, these are backup items (only to be used when enclosed, electric chippers are not operational), and will not be used in enhancing met conditions.
2. Implementation of additional noise mitigation measures to minimise noise generated by equipment, as detailed above.
3. Provision of sound attenuation structures and enclosures to other equipment where appropriate.

Irrespective of the above, Borg undertakes to meet the existing plant sound power reductions specified in the NIA. If the proposed attenuation measures to the existing plant are found to be insufficient in achieving these reductions, additional works will be undertaken.

APPENDIX

B CALIBRATION CERTIFICATES

Acoustic Research Labs Pty Ltd
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3.2013
Calibration Certificate

Calibration Number C17248

Client Details	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
Equipment Tested/ Model Number :	Rion NA-28
Instrument Serial Number :	00701424
Microphone Serial Number :	01916
Pre-amplifier Serial Number :	01463

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	24.3°C	**Ambient Temperature :**	24.4°C
Relative Humidity :	40%	**Relative Humidity :**	39.5%
Barometric Pressure :	100.05kPa	**Barometric Pressure :**	100kPa

Calibration Technician : Vicky Jaiswal
Calibration Date : 05/06/2017
Secondary Check: Nick Williams
Report Issue Date : 06/06/2017

Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	*Pass*	17: Level linearity incl. the level range control	*Pass*
13: Electrical Sig. tests of frequency weightings	*Pass*	18: Toneburst response	*Pass*
14: Frequency and time weightings at 1 kHz	*Pass*	19: C Weighted Peak Sound Level	*Pass*
15: Long Term Stability	*Pass*	20: Overload Indication	*Pass*
16: Level linearity on the reference level range	*Pass*	21: High Level Stability	*Pass*

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed.

As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation test performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Least Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.16dB*	*Temperature*	*±0.05°C*
12.5kHz	*±0.2dB*	*Relative Humidity*	*±0.46%*
16kHz	*±0.29dB*	*Barometric Pressure*	*±0.017kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.12dB*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

NATA
WORLD RECOGNISED ACCREDITATION

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025.

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.

PAGE 1 OF 1

Acoustic Research Labs Pty Ltd
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Calibrator
IEC 60942-2004
Calibration Certificate

Calibration Number C17249

Client Details Global Acoustics Pty Ltd
12/16 Huntingdale Drive
Thornton NSW 2322

Equipment Tested/ Model Number : Pulsar 106
Instrument Serial Number : 74813

Atmospheric Conditions
Ambient Temperature : 24.3°C
Relative Humidity : 38.9%
Barometric Pressure : 99.96kPa

Calibration Technician : Vicky Jaiswal
Secondary Check: Nick Williams
Calibration Date : 05/06/2017
Report Issue Date : 06/06/2017

Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
5.2.2: Generated Sound Pressure Level	*Pass*	5.3.2: Frequency Generated	*Pass*
5.2.3: Short Term Fluctuation	*Pass*	5.5: Total Distortion	*Pass*

	Nominal Level	Nominal Frequency	Measured Level	Measured Frequency
Measured Output	94.0	1000.0	93.8	1000.33

The sound calibrator has been shown to conform to the class 2 requirements for periodic testing, described in Annex B of IEC 60942:2004 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed..

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.11dB*	*Temperature*	*±0.05°C*
Short Term Fluct.	*±0.02dB*	*Relative Humidity*	*±0.46%*
Frequency	*±0.01%*	*Barometric Pressure*	*±0.017kPa*
Distortion	*±0.5%*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

NATA
WORLD RECOGNISED ACCREDITATION

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025.

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.

PAGE 1 OF 1

Borg Panels Facility

Environmental Noise Monitoring

Quarter 4 2017

Prepared for

Borg Construction Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

Global Acoustics Pty Ltd
PO Box 3115 | Thornton NSW 2322
Telephone +61 2 4966 4333
Email global@globalacoustics.com.au
ABN 94 094 985 734

Borg Panels Facility

Quarter 4, 2017
Environmental Noise Monitoring

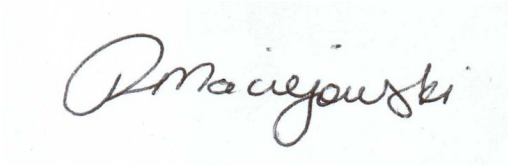
Reference: 17434_R01
Report date: 26 October 2017

Prepared for

Borg Construction Pty Ltd
124 Lowes Mount Road
Oberon 2787 NSW

Prepared by

Global Acoustics Pty Ltd
PO Box 3115
Thornton NSW 2322



Prepared:	Robert Kirwan Acoustic Engineer	QA Review:	Ronni Maciejowski Acoustic Engineer

Global Acoustics Pty Ltd ~ Environmental noise modelling and impact assessment ~ Sound power testing ~ Noise control advice ~ Noise and vibration monitoring ~ OHS noise monitoring and advice ~ Expert evidence in Land and Environment and Compensation Courts ~ Architectural acoustics ~ Blasting assessments and monitoring ~ Noise management plans (NMP) ~ Sound level meter and noise logger sales and hire

EXECUTIVE SUMMARY

Global Acoustics was engaged by Borg Construction Pty Ltd to undertake attended noise monitoring at sites around the Borg panel manufacturing facility (Borg) at Oberon, NSW.

The survey purpose was to quantify and describe the acoustic environment around the site and compare results with limits specified in the Development Consent and Construction Noise Management Plan (CNMP).

Attended environmental noise monitoring described in this report was undertaken during the day period on 18 October 2017. There were 4 attended monitoring locations as listed in Table 1.1 and shown in Figure 1.

Attended monitoring was conducted in general accordance with the EPA 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'.

Operational Noise Assessment

Borg operations complied with the relevant noise limits during the Quarter 4, 2017 survey at all monitoring locations.

Low Frequency Assessment

None of the four measurements occurred during which Borg was the only low frequency source, was measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion, and where meteorological conditions resulted in criteria applying (in accordance with the Consent).

Global Acoustics Pty Ltd

Table of Contents

Appendices

1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by Borg Construction Pty Ltd to undertake attended noise monitoring at sites around the Borg panel manufacturing facility (Borg) at Oberon, NSW.

The survey purpose was to quantify and describe the acoustic environment around the site and compare results with limits specified in the Development Consent and Construction Noise Management Plan (CNMP).

Attended environmental noise monitoring described in this report was undertaken during the day period on 18 October 2017.

1.2 Monitoring Locations

There were 4 attended monitoring locations as listed in Table 1.1 and shown in Figure 1.

Table 1.1: ATTENDED MONITORING LOCATIONS

Report Descriptor	Monitoring Location
NM1	Oberon Caravan Park
NM2	Intersection of Pine Street and Herborn Street
NM3	127 Hazelgrove Road
NM4	Intersection of Tasman Street and Earl Street

Figure 1: Attended Noise Monitoring Locations

1.3 Terminology & Abbreviations

Some definitions of terms and abbreviations, which may be used in this report, are provided in Table 1.2.

Table 1.2: TERMINOLOGY & ABBREVIATIONS

Descriptor	Definition
L_A	The A-weighted root mean squared (RMS) noise level at any instant
L_{Amax}	The maximum A-weighted noise level over a time period or for an event
L_{A1}	The noise level which is exceeded for 1 per cent of the time
L_{A10}	The noise level which is exceeded for 10 percent of the time, which is approximately the average of the maximum noise levels
L_{A50}	The noise level which is exceeded for 50 per cent of the time
L_{A90}	The level exceeded for 90 percent of the time, which is approximately the average of the minimum noise levels. The L_{A90} level is often referred to as the "background" noise level and is commonly used to determine noise criteria for assessment purposes
L_{Amin}	The minimum A-weighted noise level over a time period or for an event
L_{Aeq}	The average noise energy during a measurement period
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to describe human response to noise
SPL	Sound pressure level (SPL), fluctuations in pressure measured as 10 times a logarithmic scale, the reference pressure being 20 micropascals
Hertz (Hz)	Cycles per second, the frequency of fluctuations in pressure, sound is usually a combination of many frequencies together
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude. Estimated from wind speed and sigma theta data
IA	Inaudible. When site only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
NM	Not Measurable. If site only noise is noted as NM, this means some noise from the source of interest was audible at low-levels, but could not be quantified
Day	This is the period 7:00am to 6:00pm
Evening	This is the period 6:00pm to 10:00pm
Night	This is the period 10:00pm to 7:00am

2 CONSENT AND CRITERIA

All monitoring reported in this document has been carried out in general accordance with the Development Consent (the Consent) dated 29 May 2017 (SSD 7016) and the CNMP.

2.1 Development Consent and Project Specific Criteria

The sections of the Consent relating to noise are reproduced in Appendix A.

Table 2 in Schedule B of the Consent outlines the day, evening and night period impact assessment criteria, which have been reproduced in Table 2.1 below.

Table 2.1: IMPACT ASSESSMENT CRITERIA

Location	Day $L_{Aeq,15minute}$ dB	Evening $L_{Aeq,15minute}$ dB	Night $L_{Aeq,15minute}$ dB
All sensitive receivers	55	50	45

As described in the Consent, noise generated by Borg is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy (INP), as follows:

- during rain and wind speeds greater than 3 metres/second at 10 metres above ground level; or
- stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
- stability category G temperature inversion conditions.

2.2 Project Specific Noise Limits

In accordance with the Consent and CNMP, project specific noise criteria for each monitoring location are detailed in Table 2.2 and Table 2.3.

Table 2.2: GENERAL CONSTRUCTION NOISE LIMITS

Report Descriptor	Day $L_{Aeq,15minute}$ dB	Evening $L_{Aeq,15minute}$ dB	Night $L_{Aeq,15minute}$ dB
NM1	55	50	45
NM2	55	50	45
NM3	55	50	45
NM4	55	50	45

Table 2.3: ROCK / CONCRETE BREAKING NOISE LIMITS

Report Descriptor	Day $L_{Aeq,15minute}$ dB
NM1	75
NM2	75
NM3	75
NM4	75

2.3 Modifying Factors

Noise monitoring and reporting is carried out generally in accordance with the EPA INP. Chapter 4 of the INP deals specifically with modifying factors that may apply to industrial noise. The most common modifying factors are addressed in detail below.

2.3.1 Tonality, Intermittent and Impulsive Noise

As defined in the INP:

> *Tonal noise contains a prominent frequency and is characterised by a definite pitch.*
>
> *Impulsive noise has high peaks of short duration or a sequence of such peaks.*
>
> *Intermittent noise is characterised by the level suddenly dropping to the background noise levels several times during a measurement, with a noticeable change in noise level of at least 5 dB. Intermittent noise applies to night-time only.*

During the Q3 2017 monitoring survey, tonal, impulsive or intermittent noise was not observed. These are not discussed further in this report.

2.3.2 Low Frequency Noise

INP Method

As defined in the INP:

> *Low frequency noise contains major components within the low frequency range (20 Hz to 250 Hz) of the frequency spectrum.*

As detailed in Chapter 4 of the INP, low frequency noise should be assessed by measuring the site only C-weighted and site only A-weighted level over the same time period. The correction/penalty of 5 dB is applied *if the difference between the two levels is 15 dB or more*.

Broner Method

Low frequency noise can also be assessed against criteria specified in the paper "A Simple Method for Low Frequency Noise Emission Assessment" (Broner JLFNV vol29-1 pp1-14 2010). If the total predicted site only C-weighted noise level at a receptor exceeds the relevant criterion, a 5 dB penalty (modifying factor) is added to measured levels. This method is included to provide a comparison with the INP method.

dING Method

Whilst the INP is the current document for assessment of industrial noise impact in NSW, the EPA has recently published the Draft Industrial Noise Guideline (dING), which is expected to replace the INP in the

near furture. The dING contains an alternate method of assessing low frequency noise to the INP, which is:.

> *Measure/assess C-weighted and A-weighted $L_{eq,T}$ levels over the same time period. The low frequency noise modifying factor correction is to be applied where the C-A level exceeds 15 dB and:*
>
> • *where any of the 1/3 octave noise levels in Table C2 are exceeded by* ***up to*** *5 dB and cannot be mitigated, a 2 dBA positive adjustment to measured A weighted levels applies for the evening/night period; and*
>
> • *where any of the 1/3 octave noise levels in Table C2 are exceeded by* ***more than*** *5 dB and cannot be mitigated, a 5 dBA positive adjustment to measured A weighted levels applies for the evening/night period and a 2 dBA positive adjustment applies for the daytime period.*

Table C2 of the dING is reproduced below:

Table C2: One-third octave low frequency noise thresholds

Hz/dB(Z)	One-third octave $L_{Zeq,15minute}$ threshold level												
f,Hz	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
dB(Z)	92	89	86	77	69	61	54	50	50	48	48	46	44

Note: dB(z) = decibel (Z-weighted); f,Hz = frequency in Hertz; Hz/dB(Z) = hertz per decibel (Z-weighted). For the assessment of low frequency noise, care should be taken to select a wind screen that has wind-induced noise characteristics at least 10 dB below the threshold values in Table C2 for wind speeds up to 5 metres per second. It is likely that high performance larger diameter wind screens (nominally 175 mm) will be required to achieve this performance (Hessler et.al. 2008). In any case, the performance of the wind screen and wind speeds at which data will be excluded needs to be stated.

Low frequency noise shall be assessed under the meteorological conditions under which noise limits would apply.

Measurements should be made between 1.2 and 1.5 metres above ground level unless otherwise approved through a planning instrument (consent/approval) or Environment Protection Licence and at locations nominated in the development consent or license.

2.3.3 Low Frequency Assessment Methods

Low frequency assessment methods are summarised in Table 2.4.

Table 2.4: LOW FREQUENCY ASSESSMENT METHODS AND MODIFYING FACTOR TRIGGERS

Assessment Method	Calculation Method
Broner, 2010	Site only L_{Ceq}
INP	Site only L_{Ceq} minus site only L_{Aeq}
dING	1. Site only L_{Ceq} minus site only L_{Aeq} 2. One third octave low frequency noise threshold

Triggers and penalties associated with each method are outlined in Section 2.3.2.

3 METHODOLOGY

3.1 Overview

All noise monitoring was conducted at the nearest residences in accordance with the EPA INP guidelines and Australian Standard AS1055 ' Acoustics, Description and Measurement of Environmental Noise' and the Consent and CNMP.

Meteorological data was obtained from the Borg weather station in Oberon. This data allowed correlation of atmospheric parameters and measured noise levels. Atmospheric condition measurement at ground level was also undertaken during attended monitoring.

3.2 Attended Noise Monitoring

Attended monitoring is preferred to the use of noise loggers when determining compliance with prescribed limits as it allows the most accurate determination of the contribution, if any, to measured noise levels by the source of interest, in this case Borg. The duration of each individual measurement was 15 minutes.

If the exact contribution of the source of interest cannot be established, due to masking by other noise sources in a similar frequency range, but site noise levels are observed to be well below (more than 5 dB lower than) any relevant criterion, a maximum estimate of the potential contribution of the site might be made based on other measured site-only noise levels, for example, L_{A10}, L_{A50} or L_{A90}. This is generally expressed as a 'less than' quantity, such as <20 dB or <30 dB.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may also be used in this report. When site noise is noted as IA, no site noise was audible at the monitoring location. When site noise is noted as NM, this means some noise was audible but could not be quantified. If site noise was NM due to masking but estimated to be significant in relation to a relevant criterion, we would employ methods as per the Industrial Noise Policy (e.g. measure closer and back calculate) to determine a value for reporting.

Therefore, all sites noted as NM in this report are due to one or more of the following reasons:

- site noise levels were extremely low and unlikely, in many cases, to be even noticed;
- site noise levels were masked by another relatively loud noise source that is characteristic of the environment (e.g. breeze in foliage or continuous road traffic noise) that cannot be eliminated by moving closer; and/or
- it was not feasible or reasonable to employ INP methods such as move closer and back calculate. Cases may include, but are not limited to, rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

3.3 Monitoring Equipment

The equipment used to measure environmental noise levels is detailed in Table 3.1. Calibration certificates are provided in Appendix B.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level analyser	0370304	16/11/2018
Larson Davis acoustic calibrator	3333	30/09/2018

4 RESULTS

4.1 Attended Noise Monitoring

Total noise levels measured at each location are provided in Table 4.1.

Table 4.1: MEASURED NOISE LEVELS – QUARTER 4 2017[1]

Location	Start Date and Time	L_{Amax} dB	L_{A1} dB	L_{A10} dB	L_{A50} dB	L_{Aeq} dB	L_{A90} dB	L_{Amin} dB	L_{Ceq} dB
NM1	18/10/2017 11:16	64	56	51	48	49	46	43	64
NM2	18/10/2017 10:56	71	61	52	47	50	46	43	66
NM3	18/10/2017 11:56	73	65	50	43	52	38	34	64
NM4	18/10/2017 11:35	72	64	51	45	51	41	36	67

Notes: 1. Levels in this table are not necessarily the result of activity at Borg.

Table 4.2 compares measured $L_{Aeq,15minute}$ levels from Borg with the Consent and CNMP noise criteria.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY BORG AGAINST CRITERIA – QUARTER 4 2017

Location	Start Date and Time	Wind Speed m/s[1]	Stability Class[1]	VTG °C per 100m[1]	Criterion dB	Criterion Applies?[2,3]	Borg $L_{Aeq,15min}$ dB[4]	Exceedance [5,6]
NM1	18/10/2017 11:16	5.7	C	-1.6	55	No	43	Nil
NM2	18/10/2017 10:56	5.0	B	-1.8	55	No	NM	Nil
NM3	18/10/2017 11:56	5.0	A	-2.0	55	No	IA	Nil
NM4	18/10/2017 11:35	4.9	B	-1.8	55	No	IA	Nil

Notes:

1. *Atmospheric data is sourced from Borg weather station in Oberon;*
2. *In accordance with EPL and PA, the noise criteria are to apply under all meteorological conditions except the following:*
   - *Wind speeds greater than 3 m/s at 10 metres above ground level; or*
   - *Stability class F temperature inversion conditions, and wind speeds greater than 2 m/s at 10 metres above ground level; or*
   - *Stability class G temperature inversion conditions.*
3. *Criterion may or may not apply due to rounding of meteorological data values;*
4. *Estimated or measured $L_{Aeq,15minute}$ attributed to the Borg;*
5. *Bold results in red indicate exceedance of criteria (if applicable); and*
6. *NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable*

As the construction noise limits are more stringent than the construction rock/concrete breaking noise limits, no further assessment against noise criteria is required.

4.2 Low Frequency Assessment

Table 4.3 provides statistics for attended noise monitoring undertaken around the Borg during Quarter 4, 2017.

Table 4.3: ATTENDED MEASUREMENT STATISTICS FOR BORG – QUARTER 4 2017

Conditions	Total
Number of measurements	4
Number of measurements where criteria applied	4
Number of measurements where NAR was the only low-frequency source and levels were within 5 dB of the criterion and criterion applied	0

None of the four measurements occurred during which Borg was the only low frequency source, was measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion, and where meteorological conditions resulted in criteria applying (in accordance with the Consent).

4.3 Atmospheric Conditions

Atmospheric condition data measured by the operator at each location using a Kestrel hand-held weather meter is shown in Table 4.4. Atmospheric condition data is routinely recorded on a site-by-site basis to show conditions during the monitoring period. The wind speed, direction and temperature were measured at 1.8 metres.

Table 4.4: MEASURED ATMOSPHERIC CONDITIONS – QUARTER 4 2017[1,2]

Location	Start Date and Time	Temperature (degrees)	Wind Speed (m/s)	Wind Direction	Cloud Cover (1/8s)
NM1	18/10/2017 11:16	20	1.8	70	1
NM2	18/10/2017 10:56	20	1.7	70	3
NM3	18/10/2017 11:56	22	1.5	50	1
NM4	18/10/2017 11:35	19	2.9	90	1

Notes:

1. *Wind speed and direction measured at 1.8 metres; and*
2. *"-" indicates calm conditions at 1.8 metres.*

5 SUMMARY

The following applies to attended noise monitoring conducted during the day period on 18 October 2017.

Operational Noise Assessment

Borg operations complied with the relevant criteria during the Quarter 4, 2017 survey at all monitoring locations.

Low Frequency Assessment

None of the four measurements occurred during which Borg was the only low frequency source, was measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion, and where meteorological conditions resulted in criteria applying (in accordance with the Consent).

Global Acoustics Pty Ltd

APPENDIX

A STATUTORY REQUIREMENTS

A.1 BORG PANELS FACILITY DEVELOPMENT CONSENT

NOISE

Hours of Work

B13. The Applicant must comply with the hours detailed in **Table 1**, unless otherwise agreed in writing by the Secretary.

Table 1: Hours of Work

Activity	Day	Time
Earthworks and Construction	Monday – Friday Saturday	7 am to 7 pm 8 am to 1 pm
Operation	Monday – Sunday	24 hours

B14. Works outside of the hours identified in Condition B13 may be undertaken in the following circumstances:
(a) works that are inaudible at the nearest sensitive receivers;
(b) works agreed to in writing by the Secretary;
(c) for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; or
(d) where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm.

Construction Noise Management Plan

B15. The Applicant must prepare a Construction Noise Management Plan (CNMP) for the Project to manage construction noise. The plan must form part of the CEMP required by Condition C1 and must:
(a) be prepared by a suitably qualified and experienced noise expert;
(b) be approved by the Secretary prior to the commencement of construction of the Project;
(c) describe procedures for achieving the noise limits in **Table 2**;
(d) describe the measures to be implemented to manage noisy works such as rock/concrete breaking activities, in close proximity to sensitive receivers;
(e) include strategies that have been developed with the community for managing noisy works;
(f) describe the community consultation undertaken to develop the strategies in e) above; and
(g) include a complaints management system that would be implemented for the duration of the Project.

Operational Noise Limits

B16. The Applicant must ensure that noise generated by the Development does not exceed the noise limits in **Table 2.**

Table 2: Noise Limits dB(A)

Location	Day $L_{Aeq(15\ minute)}$	Evening $L_{Aeq(15\ minute)}$	Night $L_{Aeq(15\ minute)}$
All sensitive receivers	55	50	45

Note: *Noise generated by the Development is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy.*

Noise Mitigation

B17. The Applicant must ensure all noise attenuation measures already installed for the Existing Development are maintained in good working order for the life of the Development.

Operational Noise Management Plan

B18. Within 6 months of the date of this consent, the Applicant must prepare an Operational Noise Management Plan (ONMP) for the Existing Development, to manage operational noise to the satisfaction of the Secretary. The ONMP must form part of the OEMP required by Condition C4 and be prepared in accordance with Condition C9. The ONMP must:
(a) be prepared by a suitably qualified and experienced noise expert;
(b) describe the measures that will be implemented to minimise noise from the Existing Development including:
(i) all reasonable and feasible measures being employed on site;
(ii) maintain equipment to ensure it is in good order;
(iii) traffic noise is effectively managed;
(iv) the noise impacts of the Existing Development are minimised during any meteorological conditions when the noise criteria in this consent do not apply;
(v) compliance with the relevant conditions of this consent;
(c) includes a noise monitoring program that:
(i) must be carried out until otherwise agreed to in writing by the Secretary;
(ii) is capable of evaluating the performance of the Existing Development; and
(iii) includes a protocol for determining exceedances of the relevant conditions of this consent and responding to complaints; and
(d) include a procedure for implementing noise mitigation measures, should the Applicant be directed by the EPA or the Secretary, or should non-compliances be detected.

B19. Prior to the commencement of operation of the Project, the Applicant must update the ONMP required under Condition B18, to incorporate the Project and its management, to the satisfaction of the Secretary. The updated plan must be prepared in accordance with the requirements of Condition B18, and must incorporate the following:
(a) description of the noise monitoring program to measure the performance of the Development against this consent and the EPL; and
(b) description of any additional measures that would be implemented for the Development to ensure compliance with the noise limits in Condition B16 and the EPL.

Noise Verification

B20. Within 3 months of commencement of operation of the Project, the Applicant must undertake a noise verification study for the Development to the satisfaction of the Secretary. The study must:
(a) be undertaken by a suitably qualified expert;
(b) include an analysis of compliance with noise limits specified in Condition B16;
(c) demonstrate achievement of the sound power levels in Table 12 of the *Borg Panels Timber Panel Processing Facility Noise and Vibration Impact Assessment*, dated May 2016 and prepared by Global Acoustics;
(d) include an outline of management actions to be taken to address any exceedances of the limits specified in Condition B16; and
(e) describe the contingency measures in the event management actions are not effective in reducing noise levels to an acceptable level.

Within 1 month of completing the study, the Applicant must submit a report outlining the findings of the study to the Secretary and the EPA.

B21. Should the noise verification study indicate the Development has not complied with the noise limits in Condition B16 and applicable EPL requirements, or where the verification indicates that greater impacts than predicted in the EIS may arise, a detailed investigation and an outline of any management measures necessary to prevent exceedances must be submitted to the Secretary and the EPA, as part of the study.

Borg will implement reasonable and practical measures to avoid or minimise impacts to the environment that may arise as a result of the project.

Borg will carry out the proposed works in accordance with the EIS, RTS and the approval conditions.

Noise

Attenuation, as detailed in the NIA, will be implemented as follows:

- Conti 1 Dryer Fan air intake redesigned and the fan speed reduced to minimise noise generated. A sound power reduction from LAeq 121 dB to 114 dB or better is required.
- Booster fan will receive additional insulation and a reduction in fan speed. A sound power reduction from LAeq 116 dB to 109 dB or better is required.
- Main fibre transport fan will have a concrete enclosure constructed around it. A sound power reduction from LAeq 110 dB to 104 dB or better is required.

In short, the approach taken by Borg to mitigate noise is based on a number of factors:

1. Continuation of the use of mobile chippers (that is, not to enclose the mobile chippers). However, these are backup items (only to be used when enclosed, electric chippers are not operational), and will not be used in enhancing met conditions.
2. Implementation of additional noise mitigation measures to minimise noise generated by equipment, as detailed above.
3. Provision of sound attenuation structures and enclosures to other equipment where appropriate.

Irrespective of the above, Borg undertakes to meet the existing plant sound power reductions specified in the NIA. If the proposed attenuation measures to the existing plant are found to be insufficient in achieving these reductions, additional works will be undertaken.

APPENDIX

B CALIBRATION CERTIFICATES

Acoustic Research Labs Pty Ltd
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3.2006
Calibration Certificate

Calibration Number C16643

Client Details Global Acoustics Pty Ltd
12/16 Huntingdale Drive
Thornton NSW 2322

Equipment Tested/ Model Number : Rion NA-28
Instrument Serial Number : 00370304
Microphone Serial Number : 10421
Pre-amplifier Serial Number : 60313

Pre-Test Atmospheric Conditions
Ambient Temperature : 22.2°C
Relative Humidity : 46.6%
Barometric Pressure : 99.95kPa

Post-Test Atmospheric Conditions
Ambient Temperature : 22.4°C
Relative Humidity : 44.5%
Barometric Pressure : 99.95kPa

Calibration Technician : Vicky Jaiswal
Calibration Date : 16/11/2016
Secondary Check: Sandra Minto
Report Issue Date : 17/11/2016

Approved Signatory : Juan Aguero

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10: Self-generated noise	*Pass*	14: Level linearity on the reference level range	*Pass*
11: Acoustical tests of a frequency weighting	*Pass*	15: Level linearity incl. the level range control	*Pass*
12: Electrical tests of frequency weightings	*Pass*	16: Toneburst response	*Pass*
13: Frequency and time weightings at 1 kHz	*Pass*	17: Peak C sound level	*Pass*
		18: Overload Indication	*Pass*

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed.

As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation test performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Least Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.12dB*	*Temperature*	*±0.05°C*
12.5kHz	*±0.18dB*	*Relative Humidity*	*±0.46%*
16kHz	*±0.31dB*	*Barometric Pressure*	*±0.017kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.12dB*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

NATA WORLD RECOGNISED ACCREDITATION

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025.

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.

PAGE 1 OF 2

Acoustic Research Labs Pty Ltd
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Calibrator
IEC 60942-2004
Calibration Certificate

Calibration Number C16526

Client Details Global Acoustics Pty Ltd
12/16 Huntingdale Drive
Thornton NSW 2322

Equipment Tested/ Model Number : LarsonDavis Cal150
Instrument Serial Number : 3333

Atmospheric Conditions
Ambient Temperature : 21.8°C
Relative Humidity : 38.1%
Barometric Pressure : 97.74kPa

Calibration Technician : Vicky Jaiswal
Calibration Date : 30/09/2016
Secondary Check: Riley Cooper
Report Issue Date : 04/10/2016
Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
5.2.2: Generated Sound Pressure Level	*Pass*	5.3.2: Frequency Generated	*Pass*
5.2.3: Short Term Fluctuation	*Pass*	5.5: Total Distortion	*Pass*

	Nominal Level	Nominal Frequency	Measured Level	Measured Frequency
Measured Output	94.0	1000.0	94.1	1000.04
Measured Output	114.0	1000.0	113.9	1000.05

The sound calibrator has been shown to conform to the class 2 requirements for periodic testing, described in Annex B of IEC 60942:2004 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed.

Least Uncertainties of Measurement -

Specific Tests

Generated SPL	*±0.09dB*
Short Term Fluct.	*±0.02dB*
Frequency	*±0.01%*
Distortion	*±0.5%*

Environmental Conditions

Temperature	*±0.05°C*
Relative Humidity	*±0.46%*
Barometric Pressure	*±0.017kPa*

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

NATA WORLD RECOGNISED ACCREDITATION

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025.

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

PAGE 1 OF 1

Borg Panels Facility

Construction Noise Monitoring

Quarter 1 2018

Prepared for

Borg Construction Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

Global Acoustics Pty Ltd
PO Box 3115 | Thornton NSW 2322
Telephone +61 2 4966 4333
Email global@globalacoustics.com.au
ABN 94 094 985 734

Borg Panels Facility

Quarter 1, 2018
Construction Noise Monitoring

Reference: 18037_R01_RevA
Report date: 26 April 2018

Prepared for

Borg Construction Pty Ltd
124 Lowes Mount Road
Oberon 2787 NSW

Prepared by

Global Acoustics Pty Ltd
PO Box 3115
Thornton NSW 2322

Prepared:	Robert Kirwan Acoustic Consultant	QA Review:	Amanda Borserio Acoustic Consultant

Global Acoustics Pty Ltd ~ Environmental noise modelling and impact assessment ~ Sound power testing ~ Noise control advice ~ Noise and vibration monitoring ~ OHS noise monitoring and advice ~ Expert evidence in Land and Environment and Compensation Courts ~ Architectural acoustics ~ Blasting assessments and monitoring ~ Noise management plans (NMP) ~ Sound level meter and noise logger sales and hire

EXECUTIVE SUMMARY

Global Acoustics was engaged by Borg Construction Pty Ltd to undertake attended noise monitoring at sites around the Borg panel manufacturing facility (Borg) at Oberon, NSW.

The survey purpose was to quantify and describe the acoustic environment around the site and compare results with limits specified in the Development Consent and Construction Noise Management Plan (CNMP).

Attended environmental noise monitoring described in this report was undertaken during the day period on 27 March 2018. There were 4 attended monitoring locations as listed in Table 1.1 and shown in Figure 1.

Attended monitoring was conducted in general accordance with the EPA 'Noise Policy for Industry' (NPfI) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'.

Construction Noise Assessment

Borg operations complied with the relevant noise limits during the Quarter 1, 2018 survey at all monitoring locations.

Low Frequency Noise Assessment

A low frequency noise assessment was carried out in accordance with the EPA's NPfI. Low frequency modifying factors, where applicable, did not result in any exceedances of Borg noise limits during the survey.

Global Acoustics Pty Ltd

Table of Contents

Appendices

1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by Borg Construction Pty Ltd to undertake attended noise monitoring at sites around the Borg panel manufacturing facility (Borg) at Oberon, NSW.

The survey purpose was to quantify and describe the acoustic environment around the site and compare results with limits specified in the Development Consent and Construction Noise Management Plan (CNMP).

Attended environmental noise monitoring described in this report was undertaken during the day period on 27 March 2018.

1.2 Monitoring Locations

There were 4 attended monitoring locations as listed in Table 1.1 and shown in Figure 1.

Table 1.1: ATTENDED MONITORING LOCATIONS

Report Descriptor	Monitoring Location
NM1	Oberon Caravan Park
NM2	Intersection of Pine Street and Herborn Street
NM3	127 Hazelgrove Road
NM4	Intersection of Tasman Street and Earl Street

Figure 1: Attended Noise Monitoring Locations

1.3 Terminology & Abbreviations

Some definitions of terms and abbreviations, which may be used in this report, are provided in Table 1.2.

Table 1.2: TERMINOLOGY & ABBREVIATIONS

Descriptor	Definition
L_A	The A-weighted root mean squared (RMS) noise level at any instant
L_{Amax}	The maximum A-weighted noise level over a time period or for an event
L_{A1}	The noise level which is exceeded for 1 per cent of the time
L_{A10}	The noise level which is exceeded for 10 percent of the time, which is approximately the average of the maximum noise levels
L_{A50}	The noise level which is exceeded for 50 per cent of the time
L_{A90}	The level exceeded for 90 percent of the time, which is approximately the average of the minimum noise levels. The L_{A90} level is often referred to as the "background" noise level and is commonly used to determine noise criteria for assessment purposes
L_{Amin}	The minimum A-weighted noise level over a time period or for an event
L_{Aeq}	The average noise energy during a measurement period
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to describe human response to noise
SPL	Sound pressure level (SPL), fluctuations in pressure measured as 10 times a logarithmic scale, the reference pressure being 20 micropascals
Hertz (Hz)	Cycles per second, the frequency of fluctuations in pressure, sound is usually a combination of many frequencies together
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude. Estimated from wind speed and sigma theta data
IA	Inaudible. When site only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
NM	Not Measurable. If site only noise is noted as NM, this means some noise from the source of interest was audible at low-levels, but could not be quantified
Day	This is the period 7:00am to 6:00pm
Evening	This is the period 6:00pm to 10:00pm
Night	This is the period 10:00pm to 7:00am

2 CONSENT AND CRITERIA

All monitoring reported in this document has been carried out in general accordance with the Development Consent (the Consent) dated 29 May 2017 (SSD 7016) and the CNMP.

2.1 Development Consent and Project Specific Criteria

The sections of the Consent relating to noise are reproduced in Appendix A.

Table 2 in Schedule B of the Consent outlines the day, evening and night period impact assessment criteria, which have been reproduced in Table 2.1 below.

Table 2.1: IMPACT ASSESSMENT CRITERIA

Location	Day $L_{Aeq,15minute}$ dB	Evening $L_{Aeq,15minute}$ dB	Night $L_{Aeq,15minute}$ dB
All sensitive receivers	55	50	45

As described in the Consent, noise generated by Borg is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy (INP), as follows:

- during rain and wind speeds greater than 3 metres/second at 10 metres above ground level; or
- stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
- stability category G temperature inversion conditions.

2.2 Project Specific Noise Limits

In accordance with the Consent and CNMP, project specific noise criteria for each monitoring location are detailed in Table 2.2 and Table 2.3.

Table 2.2: GENERAL CONSTRUCTION NOISE LIMITS

Report Descriptor	Day $L_{Aeq,15minute}$ dB	Evening $L_{Aeq,15minute}$ dB	Night $L_{Aeq,15minute}$ dB
NM1	55	50	45
NM2	55	50	45
NM3	55	50	45
NM4	55	50	45

Table 2.3: ROCK / CONCRETE BREAKING NOISE LIMITS

Report Descriptor	Day $L_{Aeq,15minute}$ dB
NM1	75
NM2	75
NM3	75
NM4	75

2.3 Modifying Factors

The EPA 'Noise Policy for Industry' (NPfI, 2018) was approved for use in NSW in October 2018, and supersedes the EPA's Industrial Noise Policy (INP, 2000). Assessment and reporting of modifying factors is to be carried out in accordance with Fact Sheet C of the NPfI.

NPfI modifying factors, as they are applicable to mining noise, are described in more detail below.

2.3.1 Tonality and Intermittent Noise

As defined in the Noise Policy for Industry:

> *Tonal noise contains a prominent frequency and is characterised by a definite pitch.*
>
> *Intermittent noise is noise where the level suddenly drops/increases several times during the assessment period, with a noticeable change in source noise level of at least 5 dB(A); for example, equipment cycling on and off. The intermittency correction is not intended to be applied to changes in noise level due to meteorology.*

There were no intermittent noise sources from site during the survey. In addition, there is no equipment on site that is likely to generate tonal noise as defined in the NPfI.

2.3.2 Low Frequency Noise

As defined in the Noise Policy for Industry:

> *Low frequency noise is noise with an unbalanced spectrum and containing major components within the low-frequency range (10 – 160 Hz) of the frequency spectrum.*

The NPfI contains the current method of assessing low frequency noise, which is a 2 step process as detailed below:

> *Measure/assess source contribution C-weighted and A-weighted L_{eq},T levels over the same time period. The low frequency noise modifying factor correction is to be applied where the C-A level is 15 dB or more and:*
>
> • *where any of the 1/3 octave noise levels in Table C2 are exceeded by* ***up to and including*** *5 dB and cannot be mitigated, a 2 dBA positive adjustment to measured A weighted levels applies for the evening/night period; and*
>
> • *where any of the 1/3 octave noise levels in Table C2 are exceeded by* ***more than*** *5 dB and cannot be mitigated, a 5 dBA positive adjustment to measured A weighted levels applies for the evening/night period and a 2 dBA positive adjustment applies for the daytime period.*

Table C2 and associated notes from the NPfI is reproduced below:

Table C2: One-third octave low-frequency noise thresholds.

Hz/dB(Z)	One-third octave $L_{Zeq,15min}$ threshold level												
Frequency (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
dB(Z)	92	89	86	77	69	61	54	50	50	48	48	46	44

Notes:

- dB(Z) = decibel (Z frequency weighted).
- For the assessment of low-frequency noise, care should be taken to select a wind screen that can protect the microphone from wind-induced noise characteristics at least 10 dB below the threshold values in Table C2 for

wind speeds up to 5 metres per second. It is likely that high performance larger diameter wind screens (nominally 175 mm) will be required to achieve this performance (Hessler, 2008). In any case, the performance of the wind screen and wind speeds at which data will be excluded needs to be stated.

- Low-frequency noise corrections only apply under the standard and/or noise-enhancing meteorological conditions.
- Where a receiver location has had architectural acoustic treatment applied (including alternative means of mechanical ventilation satisfying the Building Code of Australia) by a proponent, as part of consent requirements or as a private negotiated agreement, alternative external low-frequency noise assessment criteria may be proposed to account for the higher transmission loss of the building façade.
- Measurements should be made between 1.2 and 1.5 metres above ground level unless otherwise approved through a planning instrument (consent/approval) or environment protection licence, and at locations nominated in the development consent or licence.

3 METHODOLOGY

3.1 Overview

All noise monitoring was conducted at locations representative of the nearest residences in accordance with EPA guidelines and Australian Standard AS1055 ' Acoustics, Description and Measurement of Environmental Noise' and the Consent and CNMP.

Meteorological data was obtained from the Borg weather station in Oberon. This data allowed correlation of atmospheric parameters and measured noise levels. Atmospheric condition measurement at ground level was also undertaken during attended monitoring.

3.2 Attended Noise Monitoring

Attended monitoring is preferred to the use of noise loggers when determining compliance with prescribed limits as it allows the most accurate determination of the contribution, if any, to measured noise levels by the source of interest, in this case Borg. The duration of each individual measurement was 15 minutes.

If the exact contribution of the source of interest cannot be established, due to masking by other noise sources in a similar frequency range, but site noise levels are observed to be well below (more than 5 dB lower than) any relevant criterion, a maximum estimate of the potential contribution of the site might be made based on other measured site-only noise levels, for example, L_{A10}, L_{A50} or L_{A90}. This is generally expressed as a 'less than' quantity, such as <20 dB or <30 dB.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may also be used in this report. When site noise is noted as IA, no site noise was audible at the monitoring location. When site noise is noted as NM, this means some noise was audible but could not be quantified. If site noise was NM due to masking but estimated to be significant in relation to a relevant criterion, we would employ methods as per the NPfI (e.g. measure closer and back calculate) to determine a value for reporting.

Therefore, all sites noted as NM in this report are due to one or more of the following reasons:

- site noise levels were extremely low and unlikely, in many cases, to be even noticed;
- site noise levels were masked by another relatively loud noise source that is characteristic of the environment (e.g. breeze in foliage or continuous road traffic noise) that cannot be eliminated by moving closer; and/or
- it was not feasible or reasonable to employ methods such as move closer and back calculate. Cases may include, but are not limited to, rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

3.3 Modifying Factors

Years of monitoring have indicated that noise levels from the facility, particularly those measured at significant distances from the source are relatively continuous and broad spectrum. Given this, noise levels from Borg at the monitoring locations are unlikely to be intermittent or tonal.

Assessment of low-frequency modifying factors is necessary when application of the maximum correction could potentially result in an exceedance of the relevant site-only L_{Aeq} criterion. Low-frequency analysis is therefore undertaken for measurements in this report where:

- meteorological conditions resulted in criteria being applicable;
- contributions from Borg were audible and directly measurable, such that the site-only L_{Aeq} was not "NM" or less than a maximum cut off value (e.g. "<20 dB" or "<30dB");
- contributions from Borg were within 5 dB of the relevant L_{Aeq} criterion, as 5 dB is the maximum penalty that can be applied by low-frequency modifying factors; and
- Borg was the dominant low-frequency noise source.

All measurements meeting these conditions were evaluated for possible low frequency penalty applicability in accordance with the NPfI.

3.4 Monitoring Equipment

The equipment used to measure environmental noise levels is detailed in Table 3.1. Calibration certificates are provided in Appendix B.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level analyser	960042	10/10/2019
ND9 acoustic calibrator	N452838	30/06/2019

4 RESULTS

4.1 Attended Noise Monitoring

Total noise levels measured at each location are provided in Table 4.1.

Table 4.1: MEASURED NOISE LEVELS – QUARTER 1 2018[1]

Location	Start Date and Time	L_{Amax} dB	L_{A1} dB	L_{A10} dB	L_{A50} dB	L_{Aeq} dB	L_{A90} dB	L_{Amin} dB
NM1	27/03/2018 10:45	64	54	49	45	47	43	42
NM2	27/03/2018 10:25	61	52	48	46	46	44	41
NM3	27/03/2018 11:45	64	57	45	39	44	36	32
NM4	27/03/2018 11:08	64	55	49	46	48	44	42

Notes: 1. Levels in this table are not necessarily the result of activity at Borg.

Table 4.2 compares measured $L_{Aeq,15minute}$ levels from Borg with the Consent and CNMP noise criteria.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY BORG AGAINST CRITERIA – QUARTER 1 2018

Location	Start Date and Time	Wind Speed m/s[1]	Stability Class[1]	VTG °C per 100m[1]	Criterion dB	Criterion Applies?[2,3]	Borg $L_{Aeq,15min}$ dB[4]	Exceedance[5,6]
NM1	27/03/2018 10:45	3.0	B	-1.8	55	Yes	44	Nil
NM2	27/03/2018 10:25	4.2	D	-1.0	55	No	44	NA
NM3	27/03/2018 11:45	3.1	B	-1.8	55	No	<30	NA
NM4	27/03/2018 11:08	3.6	A	-2.0	55	No	<40	NA

Notes:

1. *Atmospheric data is sourced from Borg weather station in Oberon;*
2. *In accordance with EPL and PA, the noise criteria are to apply under all meteorological conditions except the following:*
   - *Wind speeds greater than 3 m/s at 10 metres above ground level; or*
   - *Stability class F temperature inversion conditions, and wind speeds greater than 2 m/s at 10 metres above ground level; or*
   - *Stability class G temperature inversion conditions.*
3. *Criterion may or may not apply due to rounding of meteorological data values;*
4. *Estimated or measured $L_{Aeq,15minute}$ attributed to the Borg;*
5. *Bold results in red indicate exceedance of criteria (if applicable); and*
6. *NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable*

4.2 Low Frequency Noise Assessment

Measured Borg only levels were assessed for the applicability of low frequency modifying factors in accordance with the EPA's NPfI.

None of the measurements satisfied the conditions outlined in Section 3.3. Therefore no further assessment was undertaken.

4.3 Atmospheric Conditions

Atmospheric condition data measured by the operator at each location using a Kestrel hand-held weather meter is shown in Table 4.3. Atmospheric condition data is routinely recorded during each measurement to show conditions during the monitoring period. The wind speed, direction and temperature were measured at 1.8 metres.

Table 4.3: MEASURED ATMOSPHERIC CONDITIONS – QUARTER 1 2018[1,2]

Location	Start Date and Time	Temperature (degrees)	Wind Speed (m/s)	Wind Direction	Cloud Cover (1/8s)
NM1	27/03/2018 10:45	20	1.1	60	0
NM2	27/03/2018 10:25	18	0.9	90	90
NM3	27/03/2018 11:45	23	0.8	40	0
NM4	27/03/2018 11:08	20	0.9	120	0

Notes:

1. *Wind speed and direction measured at 1.8 metres; and*
2. *"-" indicates calm conditions at 1.8 metres.*

5 SUMMARY

The following applies to attended noise monitoring conducted during the day period on 27 March 2018.

Construction Noise Assessment

Borg operations complied with the relevant criteria during the Quarter 1, 2018 survey at all monitoring locations.

Low Frequency Noise Assessment

A low frequency noise assessment was carried out in accordance with the EPA's NPfI. Low frequency modifying factors, where applicable, did not result in any exceedances of Borg noise limits during the survey.

Global Acoustics Pty Ltd

APPENDIX

A STATUTORY REQUIREMENTS

A.1 BORG PANELS FACILITY DEVELOPMENT CONSENT

NOISE

Hours of Work

B13. The Applicant must comply with the hours detailed in **Table 1**, unless otherwise agreed in writing by the Secretary.

Table 1: Hours of Work

Activity	Day	Time
Earthworks and Construction	Monday – Friday Saturday	7 am to 7 pm 8 am to 1 pm
Operation	Monday – Sunday	24 hours

B14. Works outside of the hours identified in Condition B13 may be undertaken in the following circumstances:
(a) works that are inaudible at the nearest sensitive receivers;
(b) works agreed to in writing by the Secretary;
(c) for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; or
(d) where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm.

Construction Noise Management Plan

B15. The Applicant must prepare a Construction Noise Management Plan (CNMP) for the Project to manage construction noise. The plan must form part of the CEMP required by Condition C1 and must:
(a) be prepared by a suitably qualified and experienced noise expert;
(b) be approved by the Secretary prior to the commencement of construction of the Project;
(c) describe procedures for achieving the noise limits in **Table 2**;
(d) describe the measures to be implemented to manage noisy works such as rock/concrete breaking activities, in close proximity to sensitive receivers;
(e) include strategies that have been developed with the community for managing noisy works;
(f) describe the community consultation undertaken to develop the strategies in e) above; and
(g) include a complaints management system that would be implemented for the duration of the Project.

Operational Noise Limits

B16. The Applicant must ensure that noise generated by the Development does not exceed the noise limits in **Table 2.**

Table 2: Noise Limits dB(A)

Location	Day $L_{Aeq(15\ minute)}$	Evening $L_{Aeq(15\ minute)}$	Night $L_{Aeq(15\ minute)}$
All sensitive receivers	55	50	45

Note: *Noise generated by the Development is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy.*

Noise Mitigation

B17. The Applicant must ensure all noise attenuation measures already installed for the Existing Development are maintained in good working order for the life of the Development.

Operational Noise Management Plan

B18. Within 6 months of the date of this consent, the Applicant must prepare an Operational Noise Management Plan (ONMP) for the Existing Development, to manage operational noise to the satisfaction of the Secretary. The ONMP must form part of the OEMP required by Condition C4 and be prepared in accordance with Condition C9. The ONMP must:
(a) be prepared by a suitably qualified and experienced noise expert;
(b) describe the measures that will be implemented to minimise noise from the Existing Development including:
(i) all reasonable and feasible measures being employed on site;
(ii) maintain equipment to ensure it is in good order;
(iii) traffic noise is effectively managed;
(iv) the noise impacts of the Existing Development are minimised during any meteorological conditions when the noise criteria in this consent do not apply;
(v) compliance with the relevant conditions of this consent;
(c) includes a noise monitoring program that:
(i) must be carried out until otherwise agreed to in writing by the Secretary;
(ii) is capable of evaluating the performance of the Existing Development; and
(iii) includes a protocol for determining exceedances of the relevant conditions of this consent and responding to complaints; and
(d) include a procedure for implementing noise mitigation measures, should the Applicant be directed by the EPA or the Secretary, or should non-compliances be detected.

B19. Prior to the commencement of operation of the Project, the Applicant must update the ONMP required under Condition B18, to incorporate the Project and its management, to the satisfaction of the Secretary. The updated plan must be prepared in accordance with the requirements of Condition B18, and must incorporate the following:
(a) description of the noise monitoring program to measure the performance of the Development against this consent and the EPL; and
(b) description of any additional measures that would be implemented for the Development to ensure compliance with the noise limits in Condition B16 and the EPL.

Noise Verification

B20. Within 3 months of commencement of operation of the Project, the Applicant must undertake a noise verification study for the Development to the satisfaction of the Secretary. The study must:
(a) be undertaken by a suitably qualified expert;
(b) include an analysis of compliance with noise limits specified in Condition B16;
(c) demonstrate achievement of the sound power levels in Table 12 of the *Borg Panels Timber Panel Processing Facility Noise and Vibration Impact Assessment*, dated May 2016 and prepared by Global Acoustics;
(d) include an outline of management actions to be taken to address any exceedances of the limits specified in Condition B16; and
(e) describe the contingency measures in the event management actions are not effective in reducing noise levels to an acceptable level.

Within 1 month of completing the study, the Applicant must submit a report outlining the findings of the study to the Secretary and the EPA.

B21. Should the noise verification study indicate the Development has not complied with the noise limits in Condition B16 and applicable EPL requirements, or where the verification indicates that greater impacts than predicted in the EIS may arise, a detailed investigation and an outline of any management measures necessary to prevent exceedances must be submitted to the Secretary and the EPA, as part of the study.

Borg will implement reasonable and practical measures to avoid or minimise impacts to the environment that may arise as a result of the project.

Borg will carry out the proposed works in accordance with the EIS, RTS and the approval conditions.

Noise

Attenuation, as detailed in the NIA, will be implemented as follows:

- Conti 1 Dryer Fan air intake redesigned and the fan speed reduced to minimise noise generated. A sound power reduction from LAeq 121 dB to 114 dB or better is required.
- Booster fan will receive additional insulation and a reduction in fan speed. A sound power reduction from LAeq 116 dB to 109 dB or better is required.
- Main fibre transport fan will have a concrete enclosure constructed around it. A sound power reduction from LAeq 110 dB to 104 dB or better is required.

In short, the approach taken by Borg to mitigate noise is based on a number of factors:

1. Continuation of the use of mobile chippers (that is, not to enclose the mobile chippers). However, these are backup items (only to be used when enclosed, electric chippers are not operational), and will not be used in enhancing met conditions.
2. Implementation of additional noise mitigation measures to minimise noise generated by equipment, as detailed above.
3. Provision of sound attenuation structures and enclosures to other equipment where appropriate.

Irrespective of the above, Borg undertakes to meet the existing plant sound power reductions specified in the NIA. If the proposed attenuation measures to the existing plant are found to be insufficient in achieving these reductions, additional works will be undertaken.

APPENDIX

B CALIBRATION CERTIFICATES

Acoustic Research Labs Pty Ltd
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3.2013
Calibration Certificate

Calibration Number C17510

Client Details Acoustic Research Labs Pty Ltd
Level 7, Bld 2, 423 Pennant Hills Road
Pennant Hills NSW 2120

Equipment Tested/ Model Number : Rion NA-28
Instrument Serial Number : 00960042
Microphone Serial Number : 07714
Pre-amplifier Serial Number : 60062

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	22.4°C	**Ambient Temperature :**	22.8°C
Relative Humidity :	50.7%	**Relative Humidity :**	50.1%
Barometric Pressure :	99.7kPa	**Barometric Pressure :**	99.67kPa

Calibration Technician : Jason Gomes
Calibration Date : 10/10/2017
Secondary Check: Riley Cooper
Report Issue Date : 11/10/2017

Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	*Pass*	17: Level linearity incl. the level range control	*Pass*
13: Electrical Sig. tests of frequency weightings	*Pass*	18: Toneburst response	*Pass*
14: Frequency and time weightings at 1 kHz	*Pass*	19: C Weighted Peak Sound Level	*Pass*
15: Long Term Stability	*Pass*	20: Overload Indication	*Pass*
16: Level linearity on the reference level range	*Pass*	21: High Level Stability	*Pass*

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed.

As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation test performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Least Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.16dB*	*Temperature*	*±0.05°C*
12.5kHz	*±0.2dB*	*Relative Humidity*	*±0.46%*
16kHz	*±0.29dB*	*Barometric Pressure*	*±0.017kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.12dB*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025.

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.

PAGE 1 OF 1

Acoustic Research Labs Pty Ltd
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Calibrator
IEC 60942-2004
Calibration Certificate

Calibration Number C17306

Client Details Acoustic Research Labs Pty Ltd
Level 7, Bld 2, 423 Pennant Hills Road
Pennant Hills NSW 2120

Equipment Tested/ Model Number : ARL ND9
Instrument Serial Number : N452838

Atmospheric Conditions
Ambient Temperature : 22.5°C
Relative Humidity : 37.4%
Barometric Pressure : 100.27kPa

Calibration Technician : Lucky Jaiswal
Secondary Check: Riley Cooper
Calibration Date : 30/06/2017
Report Issue Date : 03/07/2017

Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
5.2.2: Generated Sound Pressure Level	*Pass*	5.3.2: Frequency Generated	*Pass*
5.2.3: Short Term Fluctuation	*Pass*	5.5: Total Distortion	*Pass*

	Nominal Level	Nominal Frequency	Measured Level	Measured Frequency
Measured Output	94.0	1000.0	94.0	1000.12

The sound calibrator has been shown to conform to the class 1 requirements for periodic testing, described in Annex B of IEC 60942:2004 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed..

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.11dB*	*Temperature*	*±0.05°C*
Short Term Fluct.	*±0.02dB*	*Relative Humidity*	*±0.46%*
Frequency	*±0.01%*	*Barometric Pressure*	*±0.017kPa*
Distortion	*±0.5%*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025.

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.

PAGE 1 OF 1

Borg Panels Facility

Construction Noise Monitoring

Quarter 2 2018

Prepared for

Borg Construction Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

Global Acoustics Pty Ltd
PO Box 3115 | Thornton NSW 2322
Telephone +61 2 4966 4333
Email global@globalacoustics.com.au
ABN 94 094 985 734

Borg Panels Facility

Quarter 2 2018
Construction Noise Monitoring

Reference: 18192_R01
Report date: 21 June 2018

Prepared for

Borg Construction Pty Ltd
124 Lowes Mount Road
Oberon 2787 NSW

Prepared by

Global Acoustics Pty Ltd
PO Box 3115
Thornton NSW 2322

Prepared:	Jesse Tribby Consultant	QA Review:	Robert Kirwan Consultant

Global Acoustics Pty Ltd ~ Environmental noise modelling and impact assessment ~ Sound power testing ~ Noise control advice ~ Noise and vibration monitoring ~ OHS noise monitoring and advice ~ Expert evidence in Land and Environment and Compensation Courts ~ Architectural acoustics ~ Blasting assessments and monitoring ~ Noise management plans (NMP) ~ Sound level meter and noise logger sales and hire

EXECUTIVE SUMMARY

Global Acoustics was engaged by Borg Construction Pty Ltd to undertake attended noise monitoring at sites around the Borg panel manufacturing facility (Borg) at Oberon, NSW.

The survey purpose was to quantify and describe the acoustic environment around the site and compare results with limits specified in the Development Consent and Construction Noise Management Plan (CNMP).

Attended environmental noise monitoring described in this report was undertaken during the day period on 24 May 2018. There were 4 attended monitoring locations as listed in Table 1.1 and shown in Figure 1.

Attended monitoring was conducted in general accordance with Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA requirements.

Borg operations complied with the relevant noise limits during the Quarter 2 2018 survey at all monitoring locations. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

Global Acoustics Pty Ltd

Table of Contents

Appendices

1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by Borg Construction Pty Ltd to undertake attended noise monitoring at sites around the Borg panel manufacturing facility (Borg) at Oberon, NSW.

The survey purpose was to quantify and describe the acoustic environment around the site and compare results with limits specified in the Development Consent and Construction Noise Management Plan (CNMP).

Attended environmental noise monitoring described in this report was undertaken during the day period on 24 May 2018.

1.2 Monitoring Locations

There were 4 attended monitoring locations as listed in Table 1.1 and shown in Figure 1.

Table 1.1: ATTENDED MONITORING LOCATIONS

Report Descriptor	Monitoring Location
NM1	Oberon Caravan Park
NM2	Intersection of Pine Street and Herborn Street
NM3	127 Hazelgrove Road
NM4	Intersection of Tasman Street and Earl Street

Figure 1: Attended Noise Monitoring Locations

1.3 Terminology & Abbreviations

Some definitions of terms and abbreviations, which may be used in this report, are provided in Table 1.2.

Table 1.2: TERMINOLOGY & ABBREVIATIONS

Descriptor	Definition
L_A	The A-weighted root mean squared (RMS) noise level at any instant
L_{Amax}	The maximum A-weighted noise level over a time period or for an event
L_{A1}	The noise level which is exceeded for 1 per cent of the time
L_{A10}	The noise level which is exceeded for 10 percent of the time, which is approximately the average of the maximum noise levels
L_{A50}	The noise level which is exceeded for 50 per cent of the time
L_{A90}	The level exceeded for 90 percent of the time, which is approximately the average of the minimum noise levels. The L_{A90} level is often referred to as the "background" noise level and is commonly used to determine noise criteria for assessment purposes
L_{Amin}	The minimum A-weighted noise level over a time period or for an event
L_{Aeq}	The average noise energy during a measurement period
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to describe human response to noise
SPL	Sound pressure level (SPL), fluctuations in pressure measured as 10 times a logarithmic scale, the reference pressure being 20 micropascals
Hertz (Hz)	Cycles per second, the frequency of fluctuations in pressure, sound is usually a combination of many frequencies together
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude. Estimated from wind speed and sigma theta data
IA	Inaudible. When site only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
NM	Not Measurable. If site only noise is noted as NM, this means some noise from the source of interest was audible at low-levels, but could not be quantified
Day	This is the period 7:00am to 6:00pm
Evening	This is the period 6:00pm to 10:00pm
Night	This is the period 10:00pm to 7:00am

2 CONSENT AND CRITERIA

All monitoring reported in this document has been carried out in general accordance with the Development Consent (the Consent) dated 29 May 2017 (SSD 7016) and the CNMP.

2.1 Development Consent and Project Specific Criteria

The sections of the Consent relating to noise are reproduced in Appendix A.

Table 2 in Schedule B of the Consent outlines the day, evening and night period impact assessment criteria, which have been reproduced in Table 2.1 below.

Table 2.1: IMPACT ASSESSMENT CRITERIA

Location	Day $L_{Aeq,15minute}$ dB	Evening $L_{Aeq,15minute}$ dB	Night $L_{Aeq,15minute}$ dB
All sensitive receivers	55	50	45

As described in the Consent, noise generated by Borg is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy (INP), as follows:

- during rain and wind speeds greater than 3 metres/second at 10 metres above ground level; or
- stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
- stability category G temperature inversion conditions.

2.2 Project Specific Noise Limits

In accordance with the Consent and CNMP, project specific noise criteria for each monitoring location are detailed in Table 2.2 and Table 2.3.

Table 2.2: GENERAL CONSTRUCTION NOISE LIMITS

Report Descriptor	Day $L_{Aeq,15minute}$ dB	Evening $L_{Aeq,15minute}$ dB	Night $L_{Aeq,15minute}$ dB
NM1	55	50	45
NM2	55	50	45
NM3	55	50	45
NM4	55	50	45

Table 2.3: ROCK / CONCRETE BREAKING NOISE LIMITS

Report Descriptor	Day $L_{Aeq,15minute}$ dB
NM1	75
NM2	75
NM3	75
NM4	75

2.3 Modifying Factors

The EPA 'Noise Policy for Industry' (NPfI, 2017) was approved for use in NSW in October 2017, and supersedes the EPA's Industrial Noise Policy (INP, 2000). Assessment and reporting of modifying factors is to be carried out in accordance with Fact Sheet C of the NPfI.

NPfI modifying factors, as they are applicable to mining noise, are described in more detail below.

2.3.1 Tonality and Intermittent Noise

As defined in the Noise Policy for Industry:

> *Tonal noise contains a prominent frequency and is characterised by a definite pitch.*
>
> *Intermittent noise is noise where the level suddenly drops/increases several times during the assessment period, with a noticeable change in source noise level of at least 5 dB(A); for example, equipment cycling on and off. The intermittency correction is not intended to be applied to changes in noise level due to meteorology.*

2.3.2 Low Frequency Noise

As defined in the Noise Policy for Industry:

> *Low frequency noise is noise with an unbalanced spectrum and containing major components within the low-frequency range (10 – 160 Hz) of the frequency spectrum.*

The NPfI contains the current method of assessing low frequency noise, which is a 2 step process as detailed below:

> *Measure/assess source contribution C-weighted and A-weighted L_{eq},T levels over the same time period. The low frequency noise modifying factor correction is to be applied where the C-A level is 15 dB or more and:*
>
> - *where any of the 1/3 octave noise levels in Table C2 are exceeded by **up to and including** 5 dB and cannot be mitigated, a 2 dBA positive adjustment to measured A weighted levels applies for the evening/night period; and*
>
> - *where any of the 1/3 octave noise levels in Table C2 are exceeded by **more than** 5 dB and cannot be mitigated, a 5 dBA positive adjustment to measured A weighted levels applies for the evening/night period and a 2 dBA positive adjustment applies for the daytime period.*

Table C2 and associated notes from the NPfI is reproduced below:

Table C2: One-third octave low-frequency noise thresholds.

Hz/dB(Z)	One-third octave $L_{Zeq,15min}$ threshold level												
Frequency (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
dB(Z)	92	89	86	77	69	61	54	50	50	48	48	46	44

Notes:

- dB(Z) = decibel (Z frequency weighted).
- For the assessment of low-frequency noise, care should be taken to select a wind screen that can protect the microphone from wind-induced noise characteristics at least 10 dB below the threshold values in Table C2 for

wind speeds up to 5 metres per second. It is likely that high performance larger diameter wind screens (nominally 175 mm) will be required to achieve this performance (Hessler, 2008). In any case, the performance of the wind screen and wind speeds at which data will be excluded needs to be stated.

- Low-frequency noise corrections only apply under the standard and/or noise-enhancing meteorological conditions.
- Where a receiver location has had architectural acoustic treatment applied (including alternative means of mechanical ventilation satisfying the Building Code of Australia) by a proponent, as part of consent requirements or as a private negotiated agreement, alternative external low-frequency noise assessment criteria may be proposed to account for the higher transmission loss of the building façade.
- Measurements should be made between 1.2 and 1.5 metres above ground level unless otherwise approved through a planning instrument (consent/approval) or environment protection licence, and at locations nominated in the development consent or licence.

3 METHODOLOGY

3.1 Overview

All noise monitoring was conducted at locations representative of the nearest residences in accordance with Australian Standard AS1055 ' Acoustics, Description and Measurement of Environmental Noise', relevant NSW EPA requirements, the Consent and CNMP.

Meteorological data was obtained from the Borg weather station in Oberon. This data allowed correlation of atmospheric parameters and measured noise levels. Atmospheric condition measurement at ground level was also undertaken during attended monitoring.

3.2 Attended Noise Monitoring

Attended monitoring is preferred to the use of noise loggers when determining compliance with prescribed limits as it allows the most accurate determination of the contribution, if any, to measured noise levels by the source of interest, in this case Borg. The duration of each individual measurement was 15 minutes.

If the exact contribution of the source of interest cannot be established, due to masking by other noise sources in a similar frequency range, but site noise levels are observed to be well below (more than 5 dB lower than) any relevant criterion, a maximum estimate of the potential contribution of the site might be made based on other measured site-only noise levels, for example, L_{A10}, L_{A50} or L_{A90}. This is generally expressed as a 'less than' quantity, such as <20 dB or <30 dB.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may also be used in this report. When site noise is noted as IA, no site noise was audible at the monitoring location. When site noise is noted as NM, this means some noise was audible but could not be quantified. If site noise was NM due to masking but estimated to be significant in relation to a relevant criterion, we would employ methods as per the NPfI (e.g. measure closer and back calculate) to determine a value for reporting.

Therefore, all sites noted as NM in this report are due to one or more of the following reasons:

- site noise levels were extremely low and unlikely, in many cases, to be even noticed;
- site noise levels were masked by another relatively loud noise source that is characteristic of the environment (e.g. breeze in foliage or continuous road traffic noise) that cannot be eliminated by moving closer; and/or
- it was not feasible or reasonable to employ methods such as move closer and back calculate. Cases may include, but are not limited to, rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

3.3 Modifying Factors

Years of monitoring have indicated that noise levels from the facility, particularly those measured at significant distances from the source are relatively continuous and broad spectrum. Given this, noise levels from Borg at the monitoring locations are unlikely to be intermittent or tonal.

Assessment of low-frequency modifying factors is necessary when application of the maximum correction could potentially result in an exceedance of the relevant site-only L_{Aeq} criterion. Low-frequency analysis is therefore undertaken for measurements in this report where:

- meteorological conditions resulted in criteria being applicable;
- contributions from Borg were audible and directly measurable, such that the site-only L_{Aeq} was not "NM" or less than a maximum cut off value (e.g. "<20 dB" or "<30dB");
- contributions from Borg were within 5 dB of the relevant L_{Aeq} criterion, as 5 dB is the maximum penalty that can be applied by low-frequency modifying factors; and
- Borg was the dominant low-frequency noise source.

All measurements meeting these conditions were evaluated for possible low frequency penalty applicability in accordance with the NPfI.

3.4 Monitoring Equipment

The equipment used to measure environmental noise levels is detailed in Table 3.1. Calibration certificates are provided in Appendix B.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level analyser	01070590	28/06/2018
Pulsar Model 106 acoustic calibrator	79631	30/03/2019

4 RESULTS

4.1 Modifying Factors

Measured BCM only levels were assessed for the applicability of modifying factors in accordance with the EPA's NPfI.

There were no intermittent noise sources from site during the survey. In addition, there is no equipment on site that is likely to generate tonal noise as defined in the NPfI. None of the measurements satisfied the conditions outlined in Section 3.3 when assessing low frequency noise.

Therefore no further assessment of modifying factors was undertaken.

4.2 Attended Noise Monitoring

Total noise levels measured at each location are provided in Table 4.1.

Table 4.1: MEASURED NOISE LEVELS – QUARTER 2 2018[1]

Location	Start Date and Time	L_{Amax} dB	L_{A1} dB	L_{A10} dB	L_{A50} dB	L_{Aeq} dB	L_{A90} dB	L_{Amin} dB	L_{Ceq} dB
NM1	24/05/2018 11:49	60	53	48	45	46	43	41	63
NM2	24/05/2018 11:29	53	47	43	41	41	39	36	60
NM3	24/05/2018 12:35	53	49	45	42	43	40	38	58
NM4	24/05/2018 12:12	57	46	42	41	42	40	38	58

Notes: 1. Levels in this table are not necessarily the result of activity at Borg.

Table 4.2 compares measured $L_{Aeq,15minute}$ levels from Borg with the Consent and CNMP noise criteria.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY BORG AGAINST CRITERIA – QUARTER 2 2018

Location	Start Date and Time	Wind Speed m/s[1]	Stability Class[1]	VTG °C per 100m[1]	Criterion dB	Criterion Applies?[2,3]	Borg $L_{Aeq,15min}$ dB[4]	Exceedance [5,6]
NM1	24/05/2018 11:49	2.6	A	-2.0	55	Yes	NM	Nil
NM2	24/05/2018 11:29	3.1	B	-1.8	55	No	IA	NA
NM3	24/05/2018 12:35	3.1	B	-1.8	55	No	43	NA
NM4	24/05/2018 12:12	3.2	B	-1.8	55	No	<40	NA

Notes:

1. *Atmospheric data is sourced from Borg weather station in Oberon;*
2. *In accordance with EPL and PA, the noise criteria are to apply under all meteorological conditions except the following:*
   - Wind speeds greater than 3 m/s at 10 metres above ground level; or
   - Stability class F temperature inversion conditions, and wind speeds greater than 2 m/s at 10 metres above ground level; or
   - Stability class G temperature inversion conditions.
3. *Criterion may or may not apply due to rounding of meteorological data values;*
4. *Estimated or measured $L_{Aeq,15minute}$ attributed to the Borg;*
5. *Bold results in red indicate exceedance of criteria (if applicable); and*
6. *NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable*

4.3 Atmospheric Conditions

Atmospheric condition data measured by the operator during each measurement using a Kestrel hand-held weather meter is shown in Table 4.3. The wind speed, direction and temperature were measured at approximately 1.8 metres. Attended noise monitoring is not undertaken during rain or hail.

Table 4.3: MEASURED ATMOSPHERIC CONDITIONS – QUARTER 2 2018

Location	Start Date and Time	Temperature (degrees)	Wind Speed (m/s)	Wind Direction[1]	Cloud Cover (1/8s)
NM1	24/05/2018 11:49	17	1.1	250	0
NM2	24/05/2018 11:29	18	0.9	310	0
NM3	24/05/2018 12:35	20	1.9	240	0
NM4	24/05/2018 12:12	20	1.2	210	0

Notes:

1. *"-" indicates calm conditions at 1.8 metres.*

5 SUMMARY

Global Acoustics was engaged by Borg Construction Pty Ltd to undertake attended noise monitoring at sites around the Borg panel manufacturing facility at Oberon, NSW.

The survey purpose was to quantify and describe the acoustic environment around the site and compare results with limits specified in the Development Consent and Construction Noise Management Plan.

Attended environmental noise monitoring described in this report was undertaken during the day period on 24 May 2018.

Borg operations complied with the relevant criteria during the Quarter 2 2018 survey at all monitoring locations. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

Global Acoustics Pty Ltd

APPENDIX

A STATUTORY REQUIREMENTS

A.1 BORG PANELS FACILITY DEVELOPMENT CONSENT

NOISE

Hours of Work

B13. The Applicant must comply with the hours detailed in **Table 1**, unless otherwise agreed in writing by the Secretary.

Table 1: Hours of Work

Activity	Day	Time
Earthworks and Construction	Monday – Friday Saturday	7 am to 7 pm 8 am to 1 pm
Operation	Monday – Sunday	24 hours

B14. Works outside of the hours identified in Condition B13 may be undertaken in the following circumstances:
(a) works that are inaudible at the nearest sensitive receivers;
(b) works agreed to in writing by the Secretary;
(c) for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; or
(d) where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm.

Construction Noise Management Plan

B15. The Applicant must prepare a Construction Noise Management Plan (CNMP) for the Project to manage construction noise. The plan must form part of the CEMP required by Condition C1 and must:
(a) be prepared by a suitably qualified and experienced noise expert;
(b) be approved by the Secretary prior to the commencement of construction of the Project;
(c) describe procedures for achieving the noise limits in **Table 2**;
(d) describe the measures to be implemented to manage noisy works such as rock/concrete breaking activities, in close proximity to sensitive receivers;
(e) include strategies that have been developed with the community for managing noisy works;
(f) describe the community consultation undertaken to develop the strategies in e) above; and
(g) include a complaints management system that would be implemented for the duration of the Project.

Operational Noise Limits

B16. The Applicant must ensure that noise generated by the Development does not exceed the noise limits in **Table 2.**

Table 2: Noise Limits dB(A)

Location	Day $L_{Aeq(15\ minute)}$	Evening $L_{Aeq(15\ minute)}$	Night $L_{Aeq(15\ minute)}$
All sensitive receivers	55	50	45

Note: *Noise generated by the Development is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy.*

Noise Mitigation

B17. The Applicant must ensure all noise attenuation measures already installed for the Existing Development are maintained in good working order for the life of the Development.

Operational Noise Management Plan

B18. Within 6 months of the date of this consent, the Applicant must prepare an Operational Noise Management Plan (ONMP) for the Existing Development, to manage operational noise to the satisfaction of the Secretary. The ONMP must form part of the OEMP required by Condition C4 and be prepared in accordance with Condition C9. The ONMP must:
- (a) be prepared by a suitably qualified and experienced noise expert;
- (b) describe the measures that will be implemented to minimise noise from the Existing Development including:
  - (i) all reasonable and feasible measures being employed on site;
  - (ii) maintain equipment to ensure it is in good order;
  - (iii) traffic noise is effectively managed;
  - (iv) the noise impacts of the Existing Development are minimised during any meteorological conditions when the noise criteria in this consent do not apply;
  - (v) compliance with the relevant conditions of this consent;
- (c) includes a noise monitoring program that:
  - (i) must be carried out until otherwise agreed to in writing by the Secretary;
  - (ii) is capable of evaluating the performance of the Existing Development; and
  - (iii) includes a protocol for determining exceedances of the relevant conditions of this consent and responding to complaints; and
- (d) include a procedure for implementing noise mitigation measures, should the Applicant be directed by the EPA or the Secretary, or should non-compliances be detected.

B19. Prior to the commencement of operation of the Project, the Applicant must update the ONMP required under Condition B18, to incorporate the Project and its management, to the satisfaction of the Secretary. The updated plan must be prepared in accordance with the requirements of Condition B18, and must incorporate the following:
- (a) description of the noise monitoring program to measure the performance of the Development against this consent and the EPL; and
- (b) description of any additional measures that would be implemented for the Development to ensure compliance with the noise limits in Condition B16 and the EPL.

Noise Verification

B20. Within 3 months of commencement of operation of the Project, the Applicant must undertake a noise verification study for the Development to the satisfaction of the Secretary. The study must:
- (a) be undertaken by a suitably qualified expert;
- (b) include an analysis of compliance with noise limits specified in Condition B16;
- (c) demonstrate achievement of the sound power levels in Table 12 of the *Borg Panels Timber Panel Processing Facility Noise and Vibration Impact Assessment*, dated May 2016 and prepared by Global Acoustics;
- (d) include an outline of management actions to be taken to address any exceedances of the limits specified in Condition B16; and
- (e) describe the contingency measures in the event management actions are not effective in reducing noise levels to an acceptable level.

Within 1 month of completing the study, the Applicant must submit a report outlining the findings of the study to the Secretary and the EPA.

B21. Should the noise verification study indicate the Development has not complied with the noise limits in Condition B16 and applicable EPL requirements, or where the verification indicates that greater impacts than predicted in the EIS may arise, a detailed investigation and an outline of any management measures necessary to prevent exceedances must be submitted to the Secretary and the EPA, as part of the study.

Borg will implement reasonable and practical measures to avoid or minimise impacts to the environment that may arise as a result of the project.

Borg will carry out the proposed works in accordance with the EIS, RTS and the approval conditions.

Noise

Attenuation, as detailed in the NIA, will be implemented as follows:

- Conti 1 Dryer Fan air intake redesigned and the fan speed reduced to minimise noise generated. A sound power reduction from LAeq 121 dB to 114 dB or better is required.
- Booster fan will receive additional insulation and a reduction in fan speed. A sound power reduction from LAeq 116 dB to 109 dB or better is required.
- Main fibre transport fan will have a concrete enclosure constructed around it. A sound power reduction from LAeq 110 dB to 104 dB or better is required.

In short, the approach taken by Borg to mitigate noise is based on a number of factors:

1. Continuation of the use of mobile chippers (that is, not to enclose the mobile chippers). However, these are backup items (only to be used when enclosed, electric chippers are not operational), and will not be used in enhancing met conditions.
2. Implementation of additional noise mitigation measures to minimise noise generated by equipment, as detailed above.
3. Provision of sound attenuation structures and enclosures to other equipment where appropriate.

Irrespective of the above, Borg undertakes to meet the existing plant sound power reductions specified in the NIA. If the proposed attenuation measures to the existing plant are found to be insufficient in achieving these reductions, additional works will be undertaken.

APPENDIX

B CALIBRATION CERTIFICATES

Acoustic Research Labs Pty Ltd
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3.2006

Calibration Certificate

Calibration Number C16323

Client Details Global Acoustics Pty Ltd
12/16 Huntingdale Drive
Thorton NSW 2322

Equipment Tested/ Model Number : Rion NA-28
Instrument Serial Number : 01070590
Microphone Serial Number : 08184
Pre-amplifier Serial Number : 52329

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	21.4°C	**Ambient Temperature :**	21.4°C
Relative Humidity :	37.5%	**Relative Humidity :**	37.5%
Barometric Pressure :	100.19kPa	**Barometric Pressure :**	100.23kPa

Calibration Technician : Calvin Simpfendorfer
Secondary Check: Riley Cooper
Calibration Date : 28/06/2016
Report Issue Date : 30/06/2016
Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10: Self-generated noise	*Pass*	14: Level linearity on the reference level range	*Pass*
11: Acoustical tests of a frequency weighting	*Pass*	15: Level linearity incl. the level range control	*Pass*
12: Electrical tests of frequency weightings	*Pass*	16: Toneburst response	*Pass*
13: Frequency and time weightings at 1 kHz	*Pass*	17: Peak C sound level	*Pass*
		18: Overload Indication	*Pass*

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed.

As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation test performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Least Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.12dB*	*Temperature*	*±0.05°C*
12.5kHz	*±0.18dB*	*Relative Humidity*	*±0.46%*
16kHz	*±0.31dB*	*Barometric Pressure*	*±0.017kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.12dB*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

NATA
WORLD RECOGNISED ACCREDITATION

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025.

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

PAGE 1 OF 1

Acoustic Research Labs Pty Ltd
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Calibrator
IEC 60942-2004

Calibration Certificate

Calibration Number C17149

Client Details Global Acoustics Pty Ltd
12/16 Huntingdale Drive
Thornton NSW 2322

Equipment Tested/ Model Number : Pulsar 106
Instrument Serial Number : 79631

Atmospheric Conditions
Ambient Temperature : 21.9°C
Relative Humidity : 54.6%
Barometric Pressure : 98.84kPa

Calibration Technician : Vicky Jaiswal
Secondary Check: Riley Cooper
Calibration Date : 30/03/2017
Report Issue Date : 31/03/2017

Approved Signatory : Juan Aguero

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
5.2.2: Generated Sound Pressure Level	*Pass*	5.3.2: Frequency Generated	*Pass*
5.2.3: Short Term Fluctuation	*Pass*	5.5: Total Distortion	*Pass*

	Nominal Level	Nominal Frequency	Measured Level	Measured Frequency
Measured Output	94.0	1000.0	94.1	1000.38

The sound calibrator has been shown to conform to the class 2 requirements for periodic testing, described in Annex B of IEC 60942:2004 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed..

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.11dB*	*Temperature*	*±0.05°C*
Short Term Fluct.	*±0.02dB*	*Relative Humidity*	*±0.46%*
Frequency	*±0.01%*	*Barometric Pressure*	*±0.017kPa*
Distortion	*±0.5%*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025.

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.

PAGE 1 OF 1

Appendix H – Community Complaints

Borg Panels Community Complaints Register 2017-18

Complaint No	Category	Date	Property	Detail	Follow Up Actions
1	Noise	05/07/2017	Clover Lane, Oberon	Noise complaint by resident. Said noise had increased recently and requested Borg Panels investigate.	Located noise logger at resident's house on 18 August 2017 for 4 weeks to survey noise and cause.
2	Water	25/10/2017	Highland Motor Inn	Town water supply dirty at Highland Motor Inn. Borg Panels ruptured the town water supply pipeline onsite causing Council lines to flush in an uncontrolled manner mobilising sediment in the lines.	Water main isolated and line repaired.
3	Air	26/03/2018	Oberon resident via EPA Central West	Car covered in wood fibres	Contaminant found on car 1200m from plant, location and time details were not specific. Wind direction from north west complaint from south. Plant conditions were normal, Conti 1 fibre bin had some issues on that the 26th specific time unknown. Fibre bin is having blockage detection installed.
4	Noise	26/04/21018	Clover Lane resident	Noise complaint	Discussion indicated sporadic noise issues, with a distinct noise increase since January 2018. Investigation ongoing, noise logger installed.

Appendix I – Community Consultation Minutes

Oberon Timber Complex

Community Consultative Committee

Minutes

Meeting:	Community Consultative Committee Meeting
Venue:	Borg Panels Conference Room – Chaired by Greg Muir
Date:	21st June 2017
Time:	4.00pm
Present:	Julie Booth, Greg Muir, Ian Doney, Ian Gordon, Trish Gordon, Jim Snelson, Craig Luccarda
Apologies:	Brian Dellow, Gary Wallace, Fran Charge, Tim Charge

---

Meeting opened.

Apologies submitted, previous minutes reviewed and accepted.

Site Updates

Borg Panels

Safety

- Incidents lower at this time considering the major works on site.

Environment

- No complaints lately. Noise was always an issue previously but seems to have improved over the past few months.

Performance

- Upgrade of the Conti 11 press line should see a major increase in plant efficiencies.
- Sales and orders remain strong.
- Laminating line going strong but have had some issues with board purchased and brought to site
- Woodchem still performing strongly.
- The major shut of the Conti 11 press will be completed by the end of July

Structaflor No Report

HPP No Report

General Business

Ian Doney asked as to the impact of the new plant on CHH economics.

Jim Snelson replied that there would be economic change for both Companies but investment and upgrade of business for sustainability was essential.

Jim Snelson addressed the meeting in regards to the raw board project.

The Company has received formal approval for the raw board site. The next step would be the construction certificate approval.

The Company has very clear stage plans to ensure all is in line with the approval requirements.

The stages are:

- Building and development
- Removal of buildings
- Automated storage – warehouse system
- The debarker and chipper

The key steps around Construction are:

- Construction of the first flush basin to prevent run off into water.
- Demolition of the main administration building
- Access to sight also power and energy
- Construction of buildings South/West and North/West of site
- Installation of new plant and equipment
- Project length approximately 18-24 months

Strategies have been developed to avoid noise and the Company will be in continual discussion with the school around the work taking place on site. The Company also has time constraints as activities on site have time limits such as the cement work required on site.

The Company will be involved in continual meetings with Oberon Council, the Oberon Community, Schools and major stake holders with forums to be held to supply information.

Construction will start within the next three weeks and will be ongoing for approximately 2 years.

Roads and Maritime also Council have been notified of major loads and escorted machinery coming to site.

The Company Noise Management plan was handed out to ECC members who were asked if they had any questions or feedback to contact the Company.

(Noise Management plan attached)

Next Meeting : 20th September 2017

Appendix J – Environmental Incidents (PRIMP Documents)

Borg Panels Pty Ltd
ABN: 54 139 584 900

2 Wella Way
Somersby NSW 2250
Australia

Ph: 02 4340 9800
Fax: 02 4340 5841

Andrew Helms
Regional Operations Officer – Central West
NSW Environment Protection Authority – South Branch

24th May 2017

Dear Andrew,

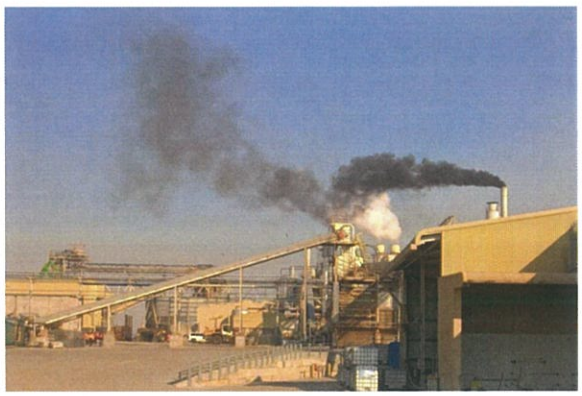
RE Conti One Energy Centre Smoke Emission

At approximately 1700 hrs on Tuesday the 16th of May 2017 an alarm for oil level drop in the heat transfer oil system on Conti 1 Press at Borg Panels tripped. Operators investigated the system and found no indication of an oil leak, including any fire in the convection area of the energy centre, or any black smoke being emitted. This was continually monitored during the night. This alarm was installed after the previous incident and was still being tuned to avoid false alarms from expansion and contraction of the oil. The operators continued to monitor but took no other action at this stage as the alarm could have well been a false alarm.

Around 0600 hrs on Wednesday the 17th of May 2017, some black smoke was seen exiting the stack on the energy centre, this confirmed that there was indeed a heat transfer oil leak in the convection area of the energy centre. Operator's commenced the shutdown process.

The shutdown process takes several hours as the oil needs to be cooled to less than 80°C before the recirculation pumps can be turned off, otherwise the oil in the system is damaged and can no longer be used, there are also other safety issues including boiling the oil and the release of vapours from the system. The oil is normally at 285°C during operation, with the convection area temperature being approximately 800°C. To enact the emergency shut down procedure, all fuel is stopped and the air is restricted to the furnace, due to the oil leak the fire continues for some time afterwards as it continues to burn and supply heat. The Energy centre soot blowers operate on steam rather than air and are also used in emergencies to inject steam into the furnace which reduces temperature and attempts to smoother the flame. Once this is extinguished due to lack of oxygen the air supply can then be returned to the furnace which aids cooling. In this case the process took almost 24 hours before the smoke stopped, and the furnace and convection area inspection hatches could be opened.

Smoke during incident. Taken from North

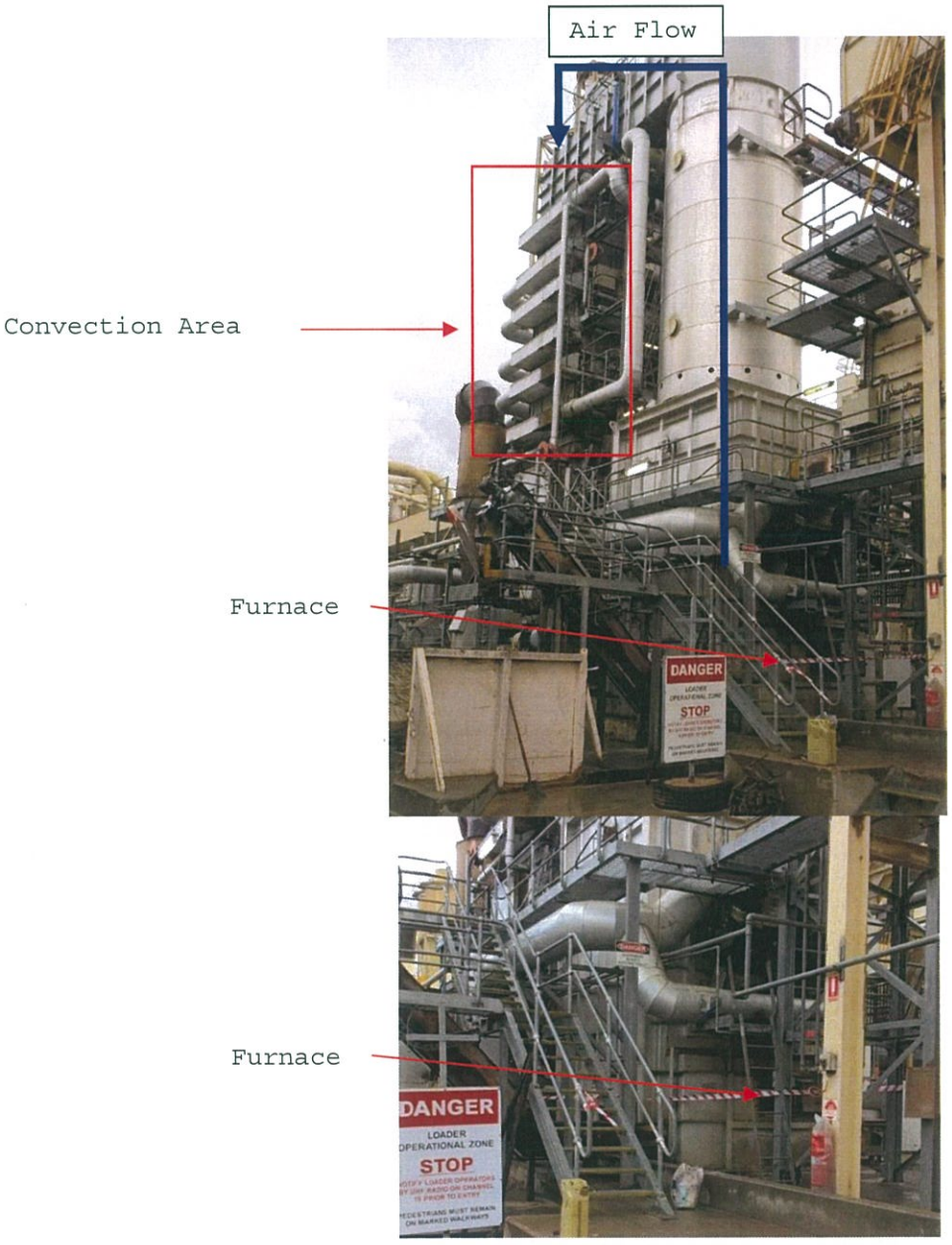


Borg Panels Pty Ltd
ABN: 54 139 584 900

2 Wella Way
Somersby NSW 2250
Australia

Ph: 02 4340 9800
Fax: 02 4340 5841

During normal operation the heat transfer oil is pumped through a series of pipe bundles (heat exchangers) in the convection area of the energy centre. Heat is supplied via the furnace to heat the oil up to operating temperature before it is used in the board press. Below are images of the energy centre showing these areas.



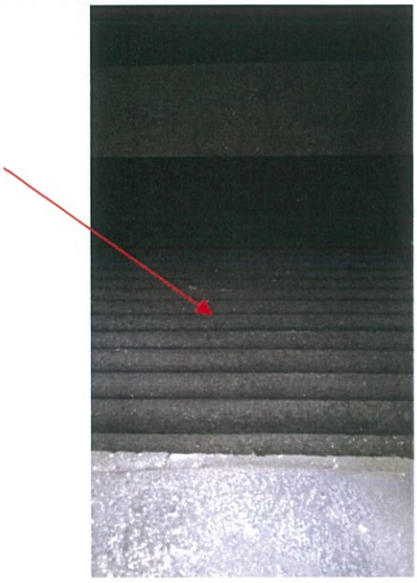
Borg Panels Pty Ltd
ABN: 54 139 584 900

2 Wella Way
Somersby NSW 2250
Australia

Ph: 02 4340 9800
Fax: 02 4340 5841

Section of Pipe Bundle inside Convection Area

Heat Transfer Oil Pipes (~50mm OD)



Immediately after the event it was deemed likely that the cause of this incident was the same as the previous incident in March 2016, which were fatigue fractures caused by poor design of the bundle. (Supports do not allow expansion and contraction of pipes). As a result of the last event a replacement bundle has been purchased and is to be installed during the December 2017 shutdown period. The task is quite considerable and includes removal of the top of the convention centre by crane, disconnecting the pipes in the bundle from the piping external to the convection area, removing one or more of the bundles and installing the new bundle. The Convection centre is approximately 20 metres tall and below is a photo of the new bundle (still in crate).

It is expected that the task will take up to 4 weeks and it is not feasible at this stage to conduct the change, given the loss of production is several hundreds of thousands of dollars' worth. This is further complicated by the Conti 2 scheduled major shut down which is occurring shortly for the next 3 months. The site could not absorb the financial loss with both lines to be out of production for such a long time.

New Pipe Bundle

BORG
PANELS
Borg Panels Pty Ltd
ABN: 54 139 584 900
2 Wella Way
Somersby NSW 2250
Australia
Ph: 02 4340 9800
Fax: 02 4340 5841

It has now been determined that the cause was wear on a pipe. The wear is caused by ash and grit in the air stream and is known to occur. The wall thicknesses of pipes is periodically checked, and on this occasion the thickness of surrounding pipes will be checked extensively and preventative action taken if any are found to be thin before restarting the plant.

During the incident, it is believed that approximately 5000 – 10000 litres of oil was burnt in the energy centre. The total volume of the oil system is 90,000 litres, there was no loss of liquid oil out of containment.

The smoke was visually monitored on and off site and its impact was checked on the surrounding area (to east of plant). No complaints were made to the hotline during the time and the smoke was dissipating over agricultural land prior to reaching any residences. There was no evidence of particles from the smoke and no burning oil smell could be detected at the nearest residence. The area did have a background smell of wood smoke from local burn offs being conducted. We also considered notifying other sensitive areas if the conditions changed, from the inspections however it was deemed unnecessary during this incident. (Smoke not heading towards or reaching sensitive areas)

The alarm which was installed after the previous incident has now been validated and will mean that response to any future incidents will include shutting down the energy centre at a much earlier stage. This combined with a comprehensive thickness survey should ensure that there are no more incidents between now and the proposed replacement date at the end of the year.

Regards,

Aaron Evans
Process Development Manager

Incident ID: 91298 **Created:** 22/05/2017 @ 08:06 **Status:** Open

Incident Type: [Environmental]

- Damage
- Environmental

Where did the incident happen?

Location Type: Company Premises
Site: O:PRD
Address: O:PRD - Oberon: Production
On Site Location:

Reported By

Reported Date/Time: 17/05/2017 @ 08:03
First Name: Paul
Last Name: Sericchi

Who is logging the incident?

Name: Aaron Evans
Email: evansa@borgs.com.au
Your Ref: 39393

When did the incident happen?

Incident Date/Time: 17/05/2017 @ 06:00

Detailed description of what happened.

ENV: Heat Transfer Oil leaking into Conti One Energy Centre causing black smoke to be emitted from stack

Immediate control measures put in place.

Shutdown process for Conti One energy centre started.

Environmental

1)

Name: Paul Sericchi
Gender: Male
Age:
Occupation: Machine Operator
Employment Status:
Telephone:
Email:
Company:
Address:
Town:
Postcode:
Country:

Receiving Environment: Air
State Of Receiving Environment: Still-Day
Type Of Incident: Spill/ Uncontrolled discharge
Form Of Incident: Hydrocarbon
Extent of Incident/ Volume/ number or area affected:
Units:
Description: Nil damage evident

Additional Notes:

On the **22/05/2017 08:10 Aaron EVANS** wrote:
Shutdown process started once smoke was detected however process quite long due requirement to cool oil to <80 degrees before oil recirculation pumps can be turned off,

Investigated By

Assigned To: Pieter Sweeney
Start Date: 22/11/2017
Completed Date:

Potential Risk Rating

Risk Rating: 13
Likelihood: Possible
Consequence: Significant

Is the incident investigation complete?

No