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Shoalhaven Starches, Independent Odour Audit (2019-2020)

Addressee(s): Shoalhaven Starches Pty Ltd

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Final Authority

This report must be regarded as draft until the above study components have been each marked as final, and the document has been signed and dated below.



G. Graham

21st September 2020

This revised final report (*ref: 21.1002.FR1V2, dated 10th November 2020*) is identical to the final report (*ref: 21.1002.FR1V1, dated 21st September 2020*) with the exception of the redaction of personal information on page 23 and within Appendix F, and the revision information presented above.



G. Graham

10th November 2020

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Units Used in the Report

All units presented in the report follow the International System of Units (SI) conventions, unless derived from references using non-SI units. In this report, units formed by the division of SI and non-SI units are expressed as a negative exponent, and do not use the solidus (/) symbol.

For example, 20 odour units normal cubic metres per second would be presented as $20 \text{ OU}\cdot\text{Nm}^3\cdot\text{s}^{-1}$ and not $20 \text{ OU}\cdot\text{Nm}^3/\text{s}$

1. INTRODUCTION

Shoalhaven Starches Pty Ltd (on behalf of the Manildra Group) has engaged Gary Graham, Director of Northstar Air Quality Pty Ltd (Northstar Air Quality) to perform the independent odour audit (2019-2020) of the Shoalhaven Starches Facility (the facility) which operates at Bolong Road, Bomaderry, NSW.

As stipulated in the NSW Government (June 2018) *Independent Audit – Post Approval Requirements*, I confirm that I am independent of Shoalhaven Starches as determined under Section 3.1.2 of the above guidance. I have completed an Independent Audit Declaration Form, and this is attached in **Appendix A** of this report.

The requirement for an Independent Odour Audit is prescribed within Schedule 3 of the consolidated conditions of Project Approval 06_0228. For clarity, the consolidated conditions are reproduced in their entirety in **Table 2 (Section 2.2)**, with a reference to the sections of the report that provide evidence and commentary on the compliance (or otherwise) with each condition related to odour.

1.1. Auditing Period

This odour audit covers the period from Q1 2019/20 to Q4 2019/20, aligned to the EPL reporting period. With reference to the NSW EPA website¹, it is noted that anniversary date for EPL 883 (version 23 October 2018) is stated as 30 April. Correspondingly, this report covers the period from **1 May 2019 to 30 April 2020**.

The quarters of the reporting year covered by this audit are therefore:

- Quarter 1 (Q1): May 2019 to July 2019;
- Quarter 2 (Q2): August 2019 to October 2019;
- Quarter 3 (Q3): November 2019 to January 2020; and
- Quarter 4 (Q4): February 2020 to April 2020.

1.2. Consultation

As required under Condition 5, consultation with the relevant regulatory bodies (EPA and DPI&E) was performed as part of this odour audit.

1.2.1. Environment Protection Authority (EPA)

The EPA was contacted by email on 9 September 2020 and a telephone conversation was held with Janine Goodwin and Amanda Fletcher on 16 September 2020. Confirmation of that discussion was received from Amanda Fletcher on 16 September 2020:

¹ <http://www.epa.nsw.gov.au/prpoeoapp/>

“As discussed, EPA has not received any odour complaints that can be attributed to Shoalhaven Starches in the timeframe that the odour audit is covering. We received an odour complaint in Bomaderry during February this year, however it was determined that the odour source was due to rotting vegetation in the area from the recent floods.

We have also had two other odour complaints this year, however we received them during July and August, and both times the odour was not able to be traced back to Shoalhaven Starches.

EPA has had no other issues with odour from Shoalhaven Starches.”

1.2.2. Department of Planning, Industry and Environment (DPI&E)

Shaun Williams was contacted by email on 9 September 2020 and the following response is noted:

“I have recently assessed two modifications to the Shoalhaven Starches Ethanol Expansion Project (06_0228) being MOD 17 and MOD 18.

MOD 18 was approved by the IPC on Friday 4 September 2020 and related to the production of hand sanitiser ethanol and hand sanitiser.

MOD 17 is likely to be recommended to the IPC by the end of the week for determination. MOD 17 involves additions to building footprints, relocation of some site infrastructure and the use of woodchips as an alternate boiler fuel source.

In the Air Quality Impact Assessment (AQIA) supporting the MOD 17 application, it noted there had been an increase in odour levels in the quarterly monitoring results across the last four quarters. The AQIA notes the increase in odour levels is particularly associated to the pellet plant stack (PPES).

The Department has interest in understanding the increased odour levels attributed to the PPES and if the implemented odour controls are adequate or if new controls are required.”

With regard to the DDG pellet plant stack (EPA ID 46), the measured odour emission rates are reproduced in **Appendix D**, and summarised in **Section 2.9**.

Section 2.9.3 and **Section 2.9.4** and specifically **Table 11** and **Table 12** address the relative contribution and variation of odour emission rates by source including the DDG pellet plant stack.

1.3. Site Inspection

A site inspection was performed by Gary Graham on Monday 31 August 2020. The site inspection included the following:

- Introduction and site familiarisation with Mr John Studdert (Quality Assurance & Environmental Coordinator, Manildra Group).
- Discussion of the required reporting documentation, including operational data, recent odour monitoring data, odour modelling, complaints history, operational matters, updates to the various management plans, etcetera.
- A site inspection audit, guided by Mr John Studdert, including:
 - the biofilters;

- the dried distillers' grain (DDG) plant;
- the ethanol plant.

During the site visit the facility was understood to be operating normally, with the exception of the biofilters. Biofilter B was observed to be off-line whilst being refitted, including replacement of eroded media supports and a routine replacement of the biofilter bed media. It is understood that the replacement of the biofilter bed media is performed routinely every couple of years. John Studdert reported a slight delay in the replacement of the biofilter media due to delay in shipping of the supports. Reference should be made to **Appendix B** for photographs of the biofilters taken during the site inspection.

1.4. Site Inspection Observations

1.4.1. Biofilters

The biofilters were noted to be operating sub-optimally. Biofilter B was not operational during a periodic replacement of the biofilter media and replacement of the media supports which were noted to be eroded once the spent media had been excavated. The flow normally serviced by Biofilter B had been redirected to Biofilter A, which was therefore servicing the flow typically serviced by both biofilters.

Odour was detectable in close proximity to the biofilters, but was noted to be reasonably neutral in character, and not unpleasant. The odour was not observed at a distance of more than 10 metres (m) from the biofilter. Photographs taken during the site inspection of the biofilters are presented in **Appendix B**.

1.4.2. DDG plant

Odour was detectable during the inspection of the DDG plant, although this was noted to be generally inoffensive and (anecdotally) not considered to be at an intensity that would give rise to off-site impacts.

1.4.3. Ethanol Plant

Odour was detectable during the inspection of the ethanol plant, although this was not considered to be at an intensity that would give rise to off-site impacts (anecdotally).

1.4.4. Wastewater Treatment Works

The wastewater treatment lagoons and the batch treatment works were not inspected during the site visit. Given the heavy rainfall in the two weeks prior to the site visit, the lagoons were noted to be full of rainwater and the potential for observations relating to odour control was considered to be low.

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2. ODOUR AUDIT

2.1. Audit Compliance Criteria

As presented in NSW Government (June 2018) *Independent Audit – Post Approval Requirements*, the criteria outlined in **Table 1** have been adopted for the independent odour audit:

Table 1 Odour audit compliance criteria

Status	Description
Compliant	The auditor has collected sufficient verifiable evidence to demonstrate that all elements of the requirement have been complied with, within the scope of the audit
Non-compliant	The auditor has determined that one or more specific elements of the conditions or requirements have not been complied with, within the scope of the audit
Not triggered	A requirement has an activation or timing trigger that has not been met at the time when the audit is undertaken, therefore an assessment of compliance is not relevant

2.2. Consolidated Odour Conditions and Summary of Compliance

Table 2 below presents a list of odour conditions, as prescribed in Schedule 3 of the Consolidated Conditions of Project Approval (MOD 16).

These conditions have been repeated *verbatim* and are accompanied with a summary of the sections of this report that provide additional evidence and commentary, and a summary of compliance (or otherwise) with that specific condition.

Table 2 Consolidated odour conditions and summary of compliance

Condition	Requirement	Evidence & Independent Audit Findings and Recommendations	Compliance Status
Offensive Odour			
1	The Proponent shall not cause or permit the emission of offensive odours from the site, as defined under Section 129 of the POEO Act.	Section 2.6 provides a summary of the odour complaints, and these are replicated in full in Appendix F . The number of odour complaints received in this period is one (1).	Compliant
Implementation of Mandatory Odour Controls			
2	Prior to increasing ethanol production rates on site above 126 million litres a year or within 12 months of this approval, whichever is sooner, the Proponent shall implement all the mandatory odour controls listed in Appendix 3 and described in detail in the Odour Management Plan (see condition 4 below), to the satisfaction of the Secretary.	Controls implemented.	Compliant
3	The Proponent shall implement additional mandatory odour controls as may be directed by the Secretary, arising from the Department's assessment of any: a) Independent Odour Audit (see condition 5 below); b) Independent Environmental Audit (see condition 4 of schedule 4); or c) any monitoring results, incidents or complaints related to the project.	None required. -- -- --	-- Not triggered Not triggered Not triggered

Condition	Requirement	Evidence & Independent Audit Findings and Recommendations	Compliance Status
3A	Prior to commissioning the duct work that directs additional emissions from the evaporator plant area and load-out chute to the bio-filter (as identified in the amended modification proposal) the Proponent must demonstrate to the satisfaction of the Secretary and the EPA that the bio-filter can accommodate the additional load while maintaining acceptable treatment performance.	Completed.	Compliant
3B	Should the Proponent opt to install a DDG pelletising plant as identified in the additional odour controls in Appendix 3 the plant must comply with all regulatory requirements including air and odour emissions standards that are in force at the time of installation. Compliance must be demonstrated to the satisfaction of the Secretary and EPA before installation work begins.	Completed.	Compliant
3C	Deleted	None required.	--
3D	Prior to construction of any part of MOD 11 and MOD 12 as described in Schedule 2, Condition 2, the Proponent shall implement odour mitigation controls on the gluten dryers 3 and 4. The controls shall include re-orienting the discharge vents and increasing the velocity of discharges to improve odour dispersion, as described in MOD 11 and MOD 12. The Proponent shall provide evidence to the satisfaction of the Secretary to demonstrate that the odour mitigation controls have been successfully implemented.	The plant modifications, including the re-orientation of the discharge vents have been implemented, although it is noted that neither of the modified discharges are vertical. A letter from DPI&E (ref: 10/06422-11, dated 24/10/17) provides evidence of DPI&E satisfaction on the installation of the odour controls on gluten dryers 3 and 4.	Compliant
Odour Management Plan			

Condition	Requirement	Evidence & Independent Audit Findings and Recommendations	Compliance Status
4	<p>The Proponent shall prepare an Odour Management Plan for the project to the satisfaction of the Secretary. This plan must:</p> <ul style="list-style-type: none"> a) be prepared in consultation with EPA by a suitably independent, qualified and experienced expert whose appointment has been endorsed by the Secretary, and submitted to the Secretary for approval within 3 months of the date of this approval; b) describe in detail the measures that would be implemented on site to control the odour impacts of the project, and to ensure that these controls remain effective over time; c) identify triggers for remedial action; and d) include a program for monitoring the odour impacts of the project. 	<p>The OMP is discussed in Section 2.7.1. It has been completed by The Odour Unit, who are a suitably qualified and experienced expert in odour management. It is noted that the OMP has received DPI&E review.</p> <p>The OMP adequately addresses odour control.</p> <p>Section 3 of the OMP addresses upset conditions that would prompt remedial actions to assist reduce the resultant potential impacts.</p> <p>Section 4 of the OMP presents details of the system monitoring program.</p> <p>Completed.</p>	Compliant
4A	<p>Prior to increasing ethanol production the Odour Management Plan for the project must be updated to the satisfaction of the Secretary to include the additional Appendix 3 mandatory odour controls specified in the modification approval MOD 1 – Deletion of DDG Pelletiser.</p>	Completed.	Compliant
Independent Odour Audit			

Condition	Requirement	Evidence & Independent Audit Findings and Recommendations	Compliance Status
5	<p>Within 3 months of the implementation of the mandatory odour controls (see Appendix 3), and annually thereafter unless the Secretary directs otherwise, the Proponent shall commission and pay the full cost of an Independent Odour Audit of the project. This audit must be conducted by a suitably qualified, experienced and independent expert whose appointment has been endorsed by the Secretary. During the audit, this expert must:</p> <ul style="list-style-type: none"> a) consult with the EPA and the Department b) audit the effectiveness of the odour controls on site in regard to protecting receivers against offensive odour; c) review the Proponent's production data (that are relevant to the odour audit) and complaint records; d) review the Odour Management Plan for the project; e) measure all key odour sources on site, and compare the results of these measurements against the predictions in the EA; 	<p>The Letter of Endorsement from the Director General is provided in Appendix A.</p> <p>Section 1.2 presents a summary of the consultation with the EPA and DP&E.</p> <p>Section 2 is the audit of the odour controls.</p> <p>Section 2.5 presents a summary of the production data corresponding to the monitoring program dates.</p> <p>Section 2.6 presents a summary of the odour complaints for the audit period.</p> <p>Section 2.7.1 provides a summary of any relevant updates to the OMP. During this audit period, there are no relevant updates relevant to this odour audit.</p> <p>Note: no measurements taken as part of this audit.</p> <p>Audit of monitoring data presented in Sections 2.3 and 2.9. The comparison against modelling assessment provided in Section 2.10</p>	Compliant

Condition	Requirement	Evidence & Independent Audit Findings and Recommendations	Compliance Status
	f) determine whether the project is complying with the requirements in this approval; and	Reference should be made to the rest of the document.	--
	g) if necessary, recommend and prioritise measures to either improve the odour controls on site and/or the Odour Management Plan, such that receivers would be protected against offensive odour from the site.	Section 3.	Compliant
	Note: The Secretary may vary the frequency of the audit depending on the performance of the project.	None.	--
6	Within 6 weeks of the completion of this audit, the Proponent shall submit a copy of the audit report to both EPA and the Secretary with a response to any recommendations contained in the audit report.	Outside the scope of the Independent Odour Audit.	--
Odour verification (MP 06_0228 MOD 2)			
6A	The Proponent shall ensure that any Independent Odour Audit submitted to the Secretary in accordance with Condition 5 of this Schedule includes: a) 3 monthly (quarterly) odour monitoring with samples taken from the carbon dioxide/ethanol recovery scrubber inlet/s and outlet/s; and b) quarterly odour monitoring with samples taken of single vent stack (direct to atmosphere) emissions from a filling fermenter tank.	The quarterly odour monitoring reports are discussed in Section 2.9 , and attached as Appendix D to this audit report.	Compliant
6B	Deleted	The quarterly odour monitoring reports are discussed in Section 2.9 , and attached as Appendix D to this audit report. None required	Compliant --

Condition	Requirement	Evidence & Independent Audit Findings and Recommendations	Compliance Status
6C	The Proponent shall conduct quarterly odour monitoring from the DDG exhaust stack and report the results in the independent odour audit required under Condition 5 of Schedule 3.	The quarterly odour monitoring reports are discussed in Section 2.9 , and attached as Appendix D to this audit report. Section 2.9.1 details the "process conditions" during each monitoring campaign, including which processes were not available for testing. It is noted that the Quarter 4 monitoring was not performed on the DDG exhaust stack.	Non-compliant
6D	The Proponent shall conduct odour monitoring on the relocated starch dryer described in MOD 7 in accordance with the requirements of the EPL and report the results in the independent odour audit required under Condition 5 of Schedule 3.	The quarterly odour monitoring reports are discussed in Section 2.9 , and attached as Appendix D to this audit report. MOD7 relates to the No5 Starch Dryer (as captured in the EPL variation dated June 2018).	Compliant
6E	If the results of odour monitoring show any odour impact greater than that predicted by the odour dispersion modelling in the EA and the modification proposals referred to in Condition 2 of Schedule 2, the Proponent shall investigate and implement further odour treatment options as directed by the Secretary or the EPA.	The sequential process modifications have been modelled and assessed, up to MOD19, including further odour treatment options.	Compliant
6F	The Proponent shall conduct odour validation monitoring on the gluten dryers 3 and 4, following implementation of the mitigation controls required by Condition 3D. Results of the odour validation monitoring shall be included in the independent odour audit required under Condition 5 of Schedule 3.	The quarterly odour monitoring reports are discussed in Section 2.9 , and attached as Appendix D to this audit report.	Compliant

2.3. Adoption of Previous Recommendations

Table 3 presents a summary of outstanding recommendations identified during the performance of previous odour audits.

Presented in the column 'Response' are responses by Manildra and Northstar.

Table 3 Implementation of previous outstanding recommendations

Reference	Recommendation	Response(s)	Implementation
2018-19-IOA-A	As identified at Section 2.4 and stated in the Biofilter Capacity and Condition Assessment report #22 (June 2019), the reason for the high inlet odour loading into the biofilters (173 000 OU) should be investigated.	<p>Manildra: Investigation has revealed issues with the odour recovery scrubber may have contributed to high inlet odour loading into the Biofilters. These issues have been rectified and the last 3 quarters of odour testing have revealed odour treatment efficiency of > 90%. Additional scrubber cooling water to be trialled and tested during the next quarterly odour monitoring.</p> <p>Northstar: See Section 2.4</p>	Resolved
2018-19-IOA-B	As identified at Section 2.4, Section 2.9.3 and stated in the Biofilter Capacity and Condition Assessment report #22 (June 2019), the biofilters are not achieving the <i>de facto</i> 500 OU standard. This should be flagged for ongoing observation and remedial action as required.	<p>Manildra: Noted, ongoing observation will continue and remedial action undertaken as required. Odour treatment efficiency of the biofilter is used to assess its operational effectiveness in treating odorous air as opposed to setting a <i>de facto</i> odour concentration standard. The last 3 quarters of odour testing have revealed odour treatment efficiency of > 90%.</p> <p>Northstar: It is considered that the odour treatment efficiency and emission standard are both objectives for assessing biofilter performance. It is acknowledged that the odour treatment efficiencies are high.</p>	Ongoing
2018-19-IOA-C	As identified at Section 2.4 and stated in the Biofilter Capacity and Condition Assessment report #22 (June 2019), the frequency of biofilter assessments is not a Condition of Consent, but it is recommended that justification in the reduction in frequency from biannual to annual should be provided	<p>Manildra: The six-monthly assessment due around December 2018 was missed however the frequency will remain at biannual. The next assessment is due in December 2019.</p>	Resolved

Reference	Recommendation	Response(s)	Implementation
2018-19-IOA-D	As identified in Section 2.9.3, there are identified a number of reporting inconsistencies between data presented in the quarterly reports. It is recommended that this is resolved.	Manildra: Shoalhaven Starches to follow-up with the testing consultant to rectify the reporting inconsistencies. Northstar: Noted. See also Section 2.9.3 and Table 10 .	Ongoing
2018-19-IOA-E	As identified in Section 2.9.4 (and Table 12), there appears to be an overall increase in odour emissions from a number of sources, as compared to the corresponding data presented in the 2018-19 and 2017-18 odour audit reports. Section 2.5 identifies a general reduction in production rates between the two reporting periods. It is recommended that the reason for the general increase in odour emission against reducing production rates is explored.	Manildra: For the odour sources listed in section 2.9.4 (Tables 12 & 13) there are only 4 to 5 odour sources that are scalable to ethanol production rates. The other odour sources are independent of ethanol production rates i.e. Starch & Gluten Dryers, Boilers, where emissions will vary due to factors such as the numbers of dryers operating and variation in production conditions on the days of testing. Northstar: Noted: See also Section 2.9.4 and Table 12	Ongoing
2018-19-IOA-F	As identified in Section 2.11, the resolution of the sampling plane non-conformity with AS 4323.1 at No 3 Gluten Dryer should be provided and rectified where feasible.	Manildra: Gluten Dryer #3 investigation revealed a vertical plate inside the ductwork. It is not feasible to remove the plate or relocate the sampling points. Testing consultant advised they are able to locate the probe to reproduce consistent flow measurements and additional sample points are used in compliance with AS4323.1. No further action required.	Resolved

The 2019-20 biofilter capacity and condition report (#23) (see **Section 2.4**) presents a flow-weighted odour inlet concentration of 10 770 OU, which is significantly reduced from the 173 000 OU presented in the 2018-19 report (#22). The high inlet odour loading to the biofilters is considered to be resolved.

2.4. Biofilter Capacity and Condition Assessments

A copy of the DDG Biofilter Capacity and Condition Assessment Reports performed by The Odour Unit over the audit period are presented in **Appendix C**, namely:

- DDG Biofilter Capacity and Condition Assessment #22 – 9 March 2020 (report dated 11 June 2019)
- DDG Biofilter Capacity and Condition Assessment #23 – 9 March 2020 (report dated 3 April 2020)

Note: DDG Biofilter Capacity and Condition Assessment #23 has been previously reported in the 2018-19 independent odour audit report (ref: 19.1113.FR1V2, dated 24 Oct 2019), but is part of this audit period. The tables are reproduced below.

The reports presented in **Appendix C** have not been replicated in the main body of this audit report but presented below is a summary of the key observations and measurements.

The design airflow of the installed biofilter system is stated as 15 000 m³·hr⁻¹.

The operating conditions of the biofilters are summarised in **Table 4**, and the odour measurements are summarised in **Table 5**.

Table 4 Biofilter capacity and condition report – operating parameters

Date	Position	Airflow (m ³ ·hr ⁻¹)	RH (%)	Observation	Air Temp (°C)	Surface Temp (°C)	UB Pressure (Pa)
11 Jun 19 (#22)	Main duct	21 500	100 %	NR	53.3	NR	+210
	DDG bf #1	15 100	100 %	saturated	53.3	36.1	+165
	DDG bf#2	6 400	100 %	saturated	52.5	38.2	+120 to +135
9-Mar-20 (#23)	Inlet (DDG1-3)	16 100	100 %	saturated	42.6	NR	+411
	DDG bf#2	9 350	100 %	saturated	39.7	38.7	+85 to +141
	Inlet (DDG4)	2 000	100 %	NR	29.5	NR	+481
	DDG bf#1	8 750	100 %	saturated	39.2	36.5	+400

Notes: bf – biofilter

UB – under bed pressure

NR – not reported

Table 5 Biofilter capacity and condition reports – odour measurements

Date	Inlet (OU)	DDG bf#1 (OU)		DDG bf#2 (OU)		Flow weighted (OU)	Efficiency (%)
		South cell	North cell	South cell	North cell		
11 June 2019 (#22)	173 000	776	891	74	588	683	99.6
9-Mar-20 (#23)	10 770	675	388	588	675	582	94.6

With reference to **Table 5**, flow weighted average odour concentrations 683 OU and 582 OU were measured which exceeds the *de facto* standard of 500 OU.

It is additionally noted that the flow-weighted inlet odour concentration of 10 770 OU measured in report #23 is significantly reduced from the measured odour concentration of 173 000 OU reported #22.

Whilst it is acknowledged that the biofilters are achieving a high degree of odour control (i.e. >90 %), the flow-weighted average odour concentration is not achieving the *de-facto* 500 OU standard.

2.5. Review of Production Data

As required, a review of the facility's production data at the times of the monitoring has been performed.

The production data correspond to the periods of emission testing, as reported in:

- Manildra Ethanol Process Control Sheet 2019-2020 (measurements taken between 16 May 2019 and 3 March 2020).

Copies of the monitoring reports are presented in **Appendix D** of this report.

The production volumes relevant to the odour monitoring events is presented below in **Table 6**.

Table 6 Odour monitoring and production rates

Period	Dates	Daily Ethanol Production (L)	Annual Production Rate Equivalent (ML-year ⁻¹)
Q1	15-May-19	603 846	220
	20-May-19	510 889	186
Q2	07-Aug-19	566 847	207
	19-Aug-19	434 192	158
Q3	01-Nov-19	267 461	98
	04-Nov-19	476 155	174
Q4	21-Feb-20	605 935	221
	27-Feb-20	409,559	149
	02-Mar-20	618,289	226
Minimum		267,461	98
Maximum		618,289	226
Mean		499,241	182
Range (Maximum / Minimum)		2.31	2.31

For comparison purposes only, the production rates reported in the 2018-19 independent odour audit report were in the range of 458 717 L-day⁻¹ (167 ML-y⁻¹) to 748 920 L-day⁻¹ (273 ML-y⁻¹) with a mean of 610 117 L-day⁻¹ (223 ML-y⁻¹). The production rates during the testing periods during the 2019-20 period were lower than those in the previous year by a factor of around 19 % as a comparison of the calculated mean values.

2.6. Odour Complaints

Odour complaints may be reported through two principal routes: (i) directly as a telephone call to Shoalhaven Starches; or (ii) indirectly through the EPA.

Table 7 below presents a summary of the odour complaints received over the reporting period. Details of the complaints recorded from direct calls and response and follow-up are presented in **Appendix F**.

Table 7 Odour complaints

Date / Time	Route	Complaint	Description	Action	Complaint Status
14 Jun 2019	Direct	Odour (052)	Odour complaint received via phone message from [REDACTED] on 14-6-2019 at 12:59pm located at [REDACTED]. Spoke to complainant on the day of the complaint. Odour described as pungent, which comes and goes and appears to be coming from the Manildra Farm.	Called the complainant on 14-6-19 to discuss details of the complaint. A survey of the complainant's location ~ 2:00pm on 14-6-19 could not identify any odour as described by the complainant. Winds were still light westerly, with the location downwind of Shoalhaven Starches Environmental Farm. An inspection of the Environmental Farm did not reveal any unusual or abnormal odours. Advised the complainant we would continue to monitor odours at the Farm and call if there were any more odour issues.	No further correspondence received from the complainant. No other complaints received of this nature. No further action taken. Closed

2.7. Review of Management Plans (Updated 2019)

As required to comply with Condition 5d of PA_06_0228, the odour management plan has been reviewed, including:

- Shoalhaven Starches (2019) Shoalhaven Starches Ethanol Upgrade Odour Management Plan (ref: EN-P-247 1.0.F. 30 August 2019); and
- Shoalhaven Starches (2020) Pollution Incident Response Management Plan (ref: EN-P-248 1.0.J. 23-Jun-2020).

2.7.1. Odour Management Plan (Updated 2019)

Subsequent to the last odour audit it is noted that there have been no updates to the Odour Management Plan.

2.7.2. Pollution Incident Response Management Plan (Updated 2019)

Subsequent to the last odour audit it is noted that there has been one update of the PIRMP:

- Version 1.0.J: 23/06/20. *"Update of Figure 2; update of Tables 7.1 and 7.2; update of Table 3; update of site plan s.15.2."*

The updates have been reviewed and are not considered to be significant in terms of the Odour Audit.

2.8. Independent Environmental Audit

Whilst some developments documented in the independent environmental audit report (Malo Sustainability Consulting (2019) *Independent Environmental Audit*) have a direct implication on the management of odour from the Site, most of the content in the audit report is outside of the scope of the Independent Odour Audit, and no comment is offered. A search of the document did not identify any incomplete recommendations relating to odour control.

2.9. Odour Monitoring Results

The results of the monitoring programs performed over the monitoring period are presented in **Table 8**, **Table 9** and **Table 11**. Copies of the monitoring reports are presented in **Appendix D** of this report.

These data are taken from:

- SEMA (2019) EPL Odour Emission Survey Quarter 1, 2019-2020 (measurements taken on 15 and 20 May 2019);
- SEMA (2019) EPL Odour Emission Survey Quarter 2 2019-2020 (measurements taken on 7 and 19 August 2019);
- SEMA (2019) EPL Odour Emission Survey Quarter 3 2019-2020 (measurements taken on 1 and 4 November 2019);

- SEMA (2019) EPL Odour Emission Survey Annual & Quarter 4 2019-2020 (measurements taken on 21 and 27 February and 2 March 2020).

2.9.1. Process Conditions during the Monitoring

As detailed in the monitoring reports, the following derogations from the requisite monitoring are noted:

SEMA (2018) EPL Odour Emission Survey Quarter 1, 2019-2020

Shoalhaven Starches personnel considered the factory and the ethanol distillery were operating under typical conditions on the days of testing.

Points 13, 42 and 45 (Starch Dryer 3, Boiler No.4 and Boiler No.2) were unavailable for odour emission monitoring on the days that the Quarter 1 odour emission survey was undertaken.

SEMA (2018) EPL Odour Emission Survey Quarter 2 2019-2020

Shoalhaven Starches personnel considered the factory and the ethanol distillery were operating under typical conditions on the days of testing.

Regarding Gluten Dryer No.2 (EPA ID 9), odour measurements were able to be taken. However, due to structural issues with the roof, resulting in access to the duct no longer being available, flow measurements were unable to be taken. To enable calculation of the MOER, flow measurements have been estimated, based on the Quarter 1, 2019 results. Refer to Table A1, Appendix A for details.

SEMA (2019) EPL Odour Emission Survey Quarter 3 2019-2020

Shoalhaven Starches personnel considered the factory and the ethanol distillery were operating under typical conditions on the days of testing.

SEMA (2019) EPL Odour Emission Survey Annual & Quarter 4 2019-2020

Shoalhaven Starches personnel considered the factory, ethanol distillery and farm were operating under typical conditions on the days of testing.

EPA ID No.46 DDG Pellet plant exhaust was not available for odour emission monitoring during the period of days that the odour emission survey was undertaken.

All other sources were monitored as per the EPL including the emission from the new DDG Dryer No. 4 which is an additional inlet stream to the Biofilter.

2.9.2. Summary of Measurements – Annual Testing

Table 8 presents a summary of the annual odour tests over the reporting period, conducted on the effluent storage dams (EPA ID nos 1, 2, 3, 5 & 6) and the sulphur oxidation pond (EPA ID 25).

Table 8 Summary of annual odour monitoring results

EPA Ref	Location	Frequency	Q4 and Annual (OU)
19	Effluent Storage Dam 1	Annual	560
20	Effluent Storage Dam 2	Annual	510
21	Effluent Storage Dam 3	Annual	510
23	Effluent Storage Dam 5	Annual	330
24	Effluent Storage Dam 6	Annual	82
25	Sulphur Oxidation Pond	Annual	250

2.9.3. Summary of Measurements – Quarterly Testing

Table 9 presents a summary of the quarterly monitoring results measured over the reporting period. The table has been presented by source (EPA source ref) and by testing quarter (Q1 to Q4, with the corresponding dates). The data is presented as odour concentrations (OU) and as mass odour emission rates (MOER) ($\text{OU}\cdot\text{Nm}^3\cdot\text{s}^{-1}$).

Note: It is noted that the MOER stated in the quarterly monitoring reports are presented at standard temperature and pressure (STP) as stated in Appendix A of the test reports.

It is noted that biofilter odour concentration measurements taken during the Q1, Q2, Q3 and Q4 tests exceed the *de facto* emission standard of 500 OU. These data are highlighted in **Table 9**.

Where the quarterly testing reports having no data ('nd'), these are similarly highlighted in **Table 9** for clarity.

Table 9 Summary of quarterly odour monitoring results

EPA Ref	Location	Frequency	Q1		Q2		Q3		Q4	
			OU	OU·Nm ³ ·s ⁻¹	OU	OU·Nm ³ ·s ⁻¹	OU	OU·Nm ³ ·s ⁻¹	OU	OU·Nm ³ ·s ⁻¹
8	No 1 Gluten Dryer	Quarterly	400	5 800	310	4 700	670	9 800	360	5 200
9	No 2 Gluten / Starch Dryer	Quarterly	430	5 600	330	4 300	560	7 200	600	7 800
10	No 3 Gluten Dryer	Quarterly	660	21 600	330	10 400	430	12 700	560	18 000
11	No 4 Gluten Dryer	Quarterly	470	14 000	430	12 800	305	9 100	360	10 500
12	No 1 Starch Dryer	Quarterly	280	4 100	310	4 200	220	2 800	116	1 421
13	No 3 Starch Dryer	Quarterly	nd	nd	860	15 800	200	3 800	510	8 938
14	No 4 Starch Dryer	Quarterly	300	5 200	150	2 800	200	3 600	783	13 538
16	CO ₂ Scrubber Outlet	Quarterly	6 800	18 600	10 300	28 400	10 300	20 100	8 700	12 700
--	CO ₂ Scrubber Inlet	Quarterly	5 300	nd	12 200	nd	8 700	nd	7 400	nd
35	Combined Stack Boilers No5&6	Quarterly	2 200	65 800	1 200	32 700	1 800	54 000	2 000	58 500
39	Inlet Pipe Biofilters A&B (DDG#1-3)	Quarterly	24 300	79 400	15 500	50 200	5 000	16 000	25 300	82 000
39A	Inlet Pipe Biofilters A&B (DDG#4)	Quarterly	nd	nd	nd	nd	nd	nd	23 200	8 500
40	Outlet of Biofilter A (east)	Quarterly	860	760	1 400	1 300	300	230	790	720
	Outlet of Biofilter A (west)	Quarterly	2 400	1 600	1 200	900	340	270	1 240	1 100
41	Outlet of Biofilter B (east)	Quarterly	2 600	2 200	1 500	1 200	520	450	850	790
	Outlet of Biofilter B (west)	Quarterly	2 000	1 800	1 500	1 200	1 500	1 200	2 400	2 000
42	Boiler 4	Quarterly	nd	nd	2 600	29 900	1 700	17 000	2 000	24 000
44	Fermenters	Quarterly	5 700	5 700	7 200	4 900	7 300	2 500	5 200	548
45	Boiler No2 Outlet	Quarterly	nd	nd	1 200	6 700	1 500	7 700	1 500	7 100
46	DDG Pellet Plant Stack	Quarterly	1 200	25 600	1 300	27 900	3 100	67 000	nd	nd
47	No 5 Starch Dryer	Quarterly	180	9 500	460	25 700	610	30 200	430	21 083

Note: (a) nd = no data.

(b) No data relating to odour volumetric flow rate provided in the relevant reports.

As part of the audit, the monitoring reports have been reviewed and summarised in **Table 9**. This is part of general due diligence required as part of the audit. As part of that audit task, a number of apparent reporting discrepancies have been identified in the various quarterly monitoring reports and these are summarised in **Table 10**. For clarity, the reporting discrepancies are not considered to be an “error”, but specifically relate to occasional inconsistent reporting of those data between the various locations in the monitoring report, generally as a consequence of rounding data for significance.

As presented in **Table 10**, the values presented in Table 4-1 (of the monitoring report) should be numerically identical to the values presented in Appendix A as “Final” odour concentrations, and it is understood that Appendix A should present both the actual (i.e. “as received”) and rounded (i.e. “final”) odour concentrations. For most data reviewed as part of this audit this is true, but for the results presented in **Table 10** there are minor discrepancies which are highlighted for due diligence purposes.

Table 10 Identified reporting inconsistencies

Period	EPA ID No	Description	Reported Concentration (OU)		
			Table 4-1	Appendix A	
				“As received”	“Final”
Q1	40	Biofilter A (east)	850	854	860
Q3	8	No1 Gluten Dryer	665	665	670
	35	Boilers 5&6	1 830	1 800	1 800
	40	Biofilter A (east)	305	300	300
		Biofilter A (west)	335	340	340
		Biofilter B (east)	515	520	520
	42	Boiler 4	1 660	1 700	1 700
	44	Fermenter 10	7 350	7 349	7 300
45	Boiler 2	1 540	1 500	1 500	
Q4	9	No2 Gluten Dryer	610	600	600
	12	No1 Starch Dryer	120	116	116
	39	Inlet Pipe to Biofilters A&B DDG Dryers #1,2 & 3	25 000	25 300	25 300
	39A	Inlet Pipe to Biofilters A&B DDG Dryers #4	23 000	23 200	23 200
	40	Biofilter A (west)	1 200	1 240	1 240

Note: For clarity, it is acknowledged that odour concentrations may, and should, be rounded for significance, and the uncertainty associated with odour quantification is acknowledged. Neither of these factors are disputed.

2.9.4. Variability of Measurements

It is noted that EPA letter DOC16574291-21 dated 27 July 2017 confirms satisfaction that the matter of emission variability has been resolved, but for ongoing review and transparency, the variability of the measured odour emission rates (MOER) during this reporting period has been reviewed.

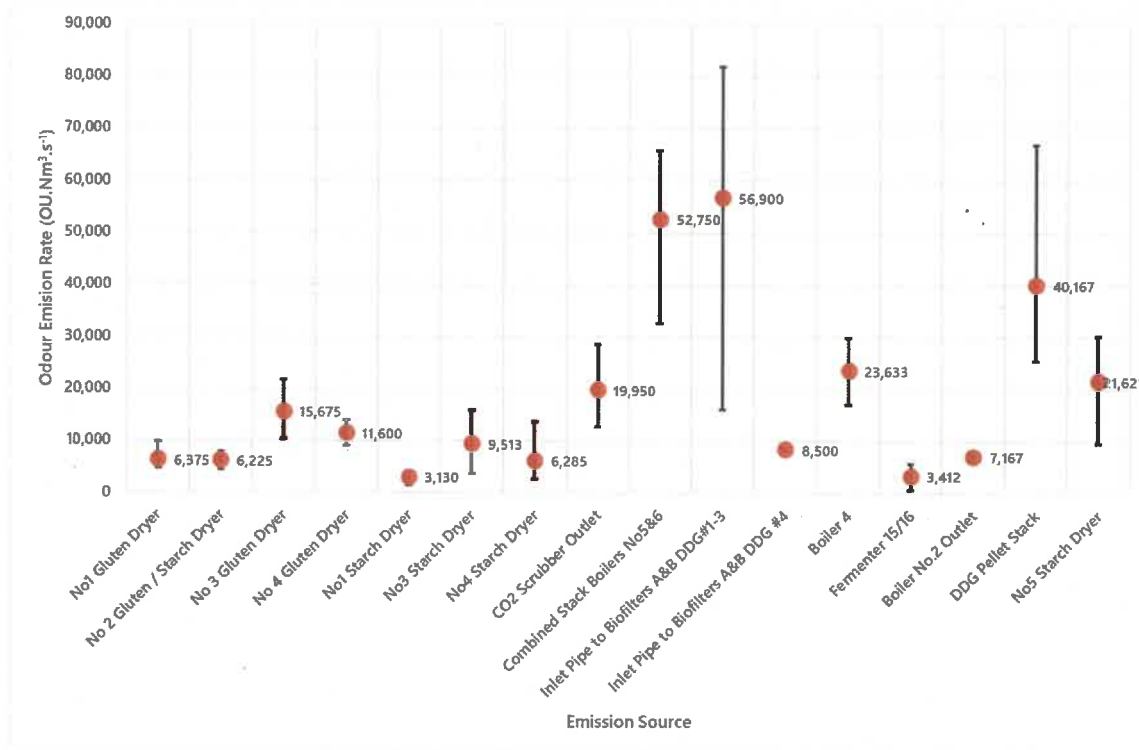
In terms of assessing the odour emission variability, the MOER (as $\text{OU}\cdot\text{Nm}^3\cdot\text{s}^{-1}$) is the critical metric and is the product of the measured odour concentration (OU) and the measured volumetric discharge rate ($\text{Nm}^3\cdot\text{s}^{-1}$). The variability in the MOER is presented in **Table 11**.

Table 11 Observed variability in the measured odour emission rate (by quarter)

EPA Ref	Location	MOER ($\text{OU}\cdot\text{Nm}^3\cdot\text{s}^{-1}$)					
		Count	Min.	Max.	Mean	$\pm\text{STDev}$	Max/ Min
8	No 1 Gluten Dryer	4	4 700	9 800	6 375	2 327	2.1
9	No 2 Gluten / Starch Dryer	4	4 300	7 800	6 225	1 584	1.8
10	No 3 Gluten Dryer	4	10 400	21 600	15 675	5 072	2.1
11	No 4 Gluten Dryer	4	9 100	14 000	11 600	2 211	1.5
12	No 1 Starch Dryer	4	1 421	4 200	3 130	1 306	3.0
13	No 3 Starch Dryer	3	3 800	15 800	9 513	6 021	4.2
14	No 4 Starch Dryer	4	2 800	13 538	6 285	4 938	4.8
16	CO ₂ Scrubber Outlet	4	12 700	28 400	19 950	6 476	2.2
35	Combined Stack Boilers No5&6	4	32 700	65 800	52 750	14 224	2.0
39	Inlet Pipe to Biofilters A&B (DDG1-3)	4	16 000	82 000	56 900	30 843	5.1
39A	Inlet Pipe to Biofilters A&B (DDG4)	1	8 500	8 500	8 500	nd	1.0
42	Boiler 4	3	17 000	29 900	23 633	6 458	1.8
44	Fermenter 15/16	4	548	5 700	3 412	2 344	10.4
45	Boiler No2 Outlet	3	6 700	7 700	7 167	503	1.1
46	DDG Pellet Stack	3	25 600	67 000	40 167	23 267	2.6
47	No 5 Starch Dryer	4	9 500	30 200	21 621	8 897	3.2

The variation in odour emission rates, as range (represented by the observed minimum and maximum) and the arithmetic mean are illustrated in **Figure 1**.

Figure 1 Variation in measured emission rates (range and mean)



It is noted that for a number of emission points there is a noted variation in the rate of odour emissions (as $\text{OU}\cdot\text{Nm}^3\cdot\text{s}^{-1}$). Notably the measured odour emission rates from EPA 44 (Fermenter 15/16) varies by a factor of $\times 10.4$ (although the quantum of emissions is relatively low) and EPA 39 (Inlet Pipe to Biofilters A&B [DDG1-3]) varies by a factor of $\times 5.1$.

As noted in the previous independent odour audit reports, the atypical odour emission profile highlights an inherent potential variability in the emission rate subject to process operations. It is further noted that the odour measurement uncertainty, as performed in accordance with AS4323.3 and AS4323.4 is (generally) 3 times the determined value (as stated in Table 6-1 of SEMA (2018) EPL Odour Emission Survey Annual & Quarter 4 2018-2019).

The data comparing the mean measured odour concentration as compared to the previous two odour audit periods is presented in **Table 12** below:

Table 12 Observed variability in the measured odour emission rate (by audit year)

EPA Ref	Source	MOER ($\text{OU}\cdot\text{Nm}^3\cdot\text{s}^{-1}$)		
		2019-20	2018-19	2017-18
8	No1 Gluten Dryer	6 375	7 152	6 758
9	No2 Gluten / Starch Dryer	6 225	4 915	4 792
10	No3 Gluten Dryer	15 675	19 411	14 315
11	No4 Gluten Dryer	11 600	14 355	9 831

EPA Ref	Source	MOER (OU·Nm ³ ·s ⁻¹)		
		2019-20	2018-19	2017-18
12	No1 Starch Dryer	3 130	6 068	3 262
13	No3 Starch Dryer	9 513	5 376	3 504
14	No4 Starch Dryer	6 285	3 824	4 172
16	CO2 Scrubber Outlet	19 950	18 171	9 409
35	Combined Stack Boilers No5&6	52 750	43 831	35 532
39	Inlet Pipe to Biofilters A&B DDG#1-3	56 900	31 757	24 396
39A	Inlet Pipe to Biofilters A&B DDG#4	8 500	#N/A	#N/A
42	Boiler 4	23 633	18 926	3 453
44	Fermenter 15/16 ^(A)	3 412	1 303	2 137
45	Boiler No.2 Outlet	7 167	#N/A	#N/A
46	DDG Pellet Plant Stack	40 167	46 073	47 900
47	No5 Starch Dryer	21 621	#N/A	#N/A
aggregate (OU·Nm³·s⁻¹)		292 902	221 160	169 460
mean ethanol production rate (ML·yr⁻¹)		182	223	237
odour emission intensity (OU·ML⁻¹)		1 607	993	715

Note: (A) As compared to Fermenter 11 in 2017-18

The mean ethanol production rates (as ML·year⁻¹) have been referenced from **Section 2.5**. It is noted that the production rates relate to the mean daily production rates averaged across all days during the Q1-Q4 testing, expressed as an annualised production volume only, and is not the total measured ethanol production rate. The aggregated MOER has been divided by the annual ethanol production rates to derive a “odour emission intensity” to provide a benchmark of emissions against the production rates. As may be observed, the odour emission intensity is increasing.

The MOER is the product of the measured odour concentration (OU) and the volumetric discharge rate (Nm³·s⁻¹) expressed as OU·Nm³·s⁻¹. **Table 13** below presents a breakdown of the two component factors to the MOER, to add some light on whether the odour concentration and/or the volumetric discharge rate is overly influencing the variability in the MOER.

Table 13 Observed variability in the measured odour concentration and volumetric discharge rate

EPA Ref	Location	Odour Concentration (OU)				Volumetric Discharge Rate (Nm ³ ·s ⁻¹)			
		Max	Mean	Min	Max/Min	Max	Mean	Min	Max/Min
8	No1 Gluten Dryer	670	435	310	2.2	15.16	14.68	14.44	1.0
9	No2 Gluten / Starch Dryer	600	480	330	1.8	13.03	12.98	12.86	1.0
10	No3 Gluten Dryer	660	495	330	2.0	32.73	31.48	29.53	1.1
11	No4 Gluten Dryer	470	391	305	1.5	29.84	29.64	29.17	1.0
12	No1 Starch Dryer	310	232	116	2.7	14.64	13.29	12.25	1.2
13	No3 Starch Dryer	860	523	200	4.3	19.00	18.30	17.53	1.1

EPA Ref	Location	Odour Concentration (OU)				Volumetric Discharge Rate (Nm ³ ·s ⁻¹)			
		Max	Mean	Min	Max/Min	Max	Mean	Min	Max/Min
14	No4 Starch Dryer	783	358	150	5.2	18.67	17.82	17.29	1.1
16	CO2 Scrubber Outlet	10 300	9 025	6 800	1.5	2.76	2.23	1.46	1.9
35	Combined Stack Boilers No5&6	2 200	1 800	1 200	1.8	30.00	29.10	27.25	1.1
39	Inlet Pipe to Biofilters A&B DDG#1-3	25 300	17 525	5 000	5.1	3.24	3.23	3.20	1.0
39A	Inlet Pipe to Biofilters A&B DDG #4	23 200	23 200	23 200	1.0	0.37	0.37	0.37	1.0
42	Boiler 4	2 600	2 087	1 660	1.6	12.00	11.25	10.24	1.2
44	Fermenter 15/16	7 300	6 350	5 200	1.4	1.00	0.53	0.11	9.5
45	Boiler No.2 Outlet	1 500	1 400	1 200	1.3	2.50	2.14	1.78	1.4
46	DDG Pellet Stack	3 100	1 867	1 200	2.6	21.61	21.54	21.46	1.0
47	No5 Starch Dryer	610	420	180	3.4	55.87	51.80	49.03	1.1

Further to the variability in the MOER from EPA 44 Fermenter 14/15 by a factor of $\times 10.4$ (see **Table 11**), **Table 13** shows that the measured odour concentration is relatively constant (a factor of 1.4) and the measured volumetric discharge rate, with a factor of 9.5 is the driver for increasing odour emissions.

2.10. Odour Modelling

The GHD odour modelling assessment *Manildra Group – Manildra Modification 19 Air Quality Assessment* (ref: 12534209, dated August 2020) (GHD, 2020) is reproduced in **Appendix E**.

MOD 19 Modelling - Emissions Inventory

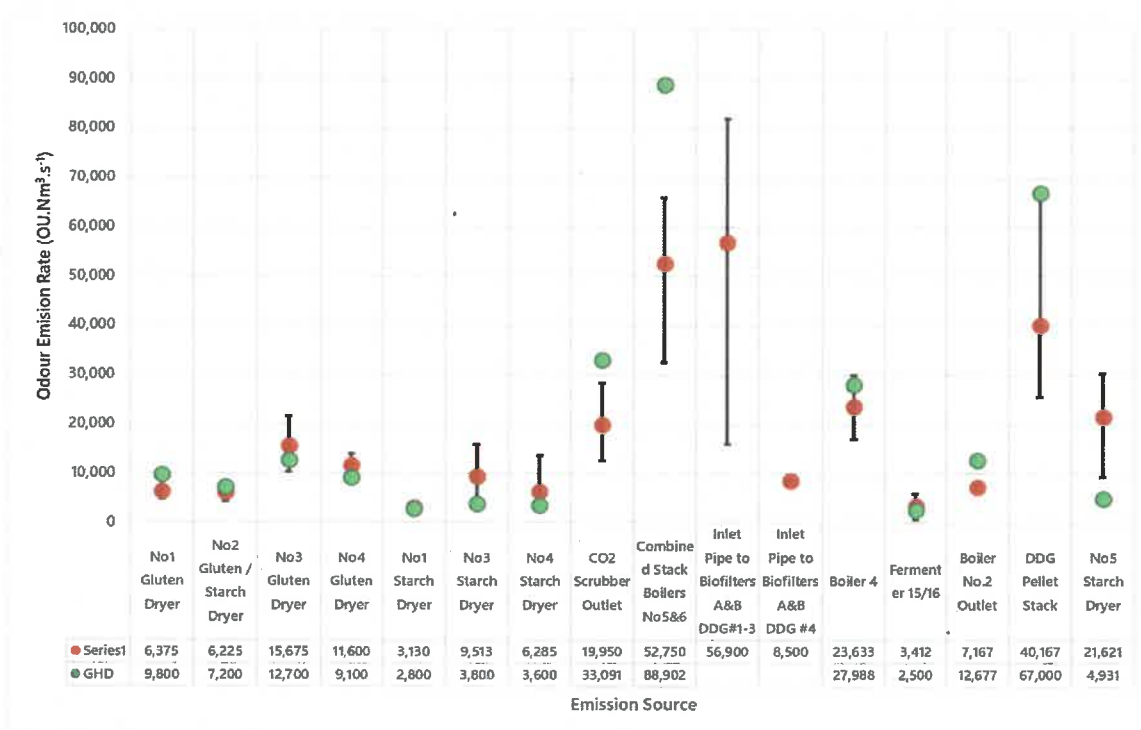
The assumptions and changes to the MOD 13, 16 & 17 odour modelling for MOD 19 are presented in section 7.1.3 of (GHD, 2020) and are reproduced below:

- *Peak odour emission rates were sourced from the odour monitoring conducted by SEMA in the previous four quarters for EPA ID sources. The sources were scaled to a 300 ML per year production. The quarter with the maximum measured total OER was selected for use in the assessment and is consistent with guidance in the Approved Methods and the recommendation from EPA (16 February 2017) that peak emissions should be assessed. The peak period was found to be quarter 3, 2019 (November 2019)*
- *The exit velocities and temperatures for EPA ID sources were adjusted to the modelled quarter. These measurements include the mitigation modifications made to No. 3 and No. 4 gluten dryer exhausts as part of the Mod 11 and 12 air quality assessment recommendations*
- *No. 1 and No. 2 gluten dryers were proposed to be modified to starch dryers as part of Mod 16 assessment. Therefore, the emission rates assigned to these dryers remains unchanged from the Mod 16 assessment as the dryers have not been modified yet*

- *Mod 16 assessed the addition of a new gluten dryer (GD8). The emission rates assumed in Mod 16 remain unchanged as the dryer has not been constructed yet.*
- *Mod 17 assessed the addition of a new product dryer (No. 9) (PD9) is planned to be installed within the speciality products building. The product dryer will comprise about 20% of the size and production capacity of the approved (but not yet constructed) Gluten Dryer 8. It is envisaged that Product Dryer 9 will be used on an interim basis to process gluten allowing for an incremental increase in processing of gluten until the approved product dryer building is constructed and gluten dryer 8 is operational.*
- *Once gluten dryer 8 is operational, it is envisaged that product dryer 9 will revert to processing starch. PD9 will not result in any increase in production above the current approval limit for flour processing under Mod 16 of 25,400 tonnes per week.*
- *For the purposes of odour modelling, as part of Mod 17, PD9 was modelled as processing gluten with odour emission rates conservatively modelled as per gluten dryer 1 (which is of a similar size). The stack from the dryer will rise above and through the roof of the speciality product building at a height of 35.6 m. The diameter of the stack is proposed to be 0.85 m. The flow rates were calculated based on 20% of the proposed gluten dryer 8.*
- *As part of the current proposal, a new distillation plant (with columns and associated processing equipment) is proposed to be installed immediately to the west of the existing Ethanol Distillery Plant. One additional emission source associated with this change is the new Distillation plant Column Washing Vent (CWV2), which is a duplication of the existing source (CWV). The stack height of the new source as provided by Manildra, is 55 metres tall. Stack diameter, exit velocity and temperature were sourced from the sampling report for the similar existing source (Odour Research Laboratories Australia (2020) Olfactometry Test Report for Beverage Ethanol D500 Vent Report No. 7091/ORLA/01).*
- *Cooling tower odours are not included in the MOD19 emissions inventory based on improvements at the site and subsequently being removed as a EPL odour sampling point*
- *Odour emission rates were assumed to be unchanged for the other emission sources.*

The odour emissions inventory presents assumptions for a range of sources not covered by this odour audit. However, a simple comparison of the aggregated odour emission rates measured and modelled shows a total measured odour emission rate of 292 902 OU·Nm³·s⁻¹ and a modelled odour emission rate of 286 089 OU·Nm³·s⁻¹, accounting for 97.7 % of that measured during the period. The distribution of the measured and modelled odour emission rates is presented in **Figure 2**.

Figure 2 Comparison of measured and modelled odour emission rates



Mod16 Modelling - Odour Modelling Results

The odour modelling results presented in (GHD, 2020) are presented in table 7-2 on page 35 of that report. These data have been extracted and reproduced below in Table 14.

Table 14 Summary of odour modelling results (99th percentile 1-second OU)

Receptor	Range (m)	To nearest odour source	Direction	Odour criterion	Odour impact, OU, 99th percentile, nose-response time			
					MOD13	MOD16	MOD17	MOD19
R1 Bomaderry	150	Packing plant	W	6	3.3	3.5	4	4
R2 North Nowra	1 300	Factory	SW	3	2.5	2.6	3	3
R3 Nowra	700	Factory	S	5	4	4.6	5	5
R4 Terara	1 300	Factory	SE	5	3.7	3.7	4	4
C1	45	Factory	N	n/a	n/a	10.3	12	12
C2	20	Factory	N	n/a	n/a	5.8	8	10
C3	30	Factory	N	n/a	n/a	5.3	7	9
C4	75	Factory	NW	n/a	n/a	4.4	6	7
C5	125	Factory	NW	n/a	n/a	6.1	7	7
C6	30	Factory	NW	n/a	n/a	5.4	7	10
C7	55	Factory	NW	n/a	n/a	4.8	7	8

Note: Predicted exceedances of the relevant criterion are highlighted

It may be noted that for MOD19 the modelling predicts compliance with stated NSW EPA criteria. The isopleth plot for the predicted odour footprints are replicated in **Figure 3** (figure 7 of (GHD, 2019)).

3. SUMMARY

Based upon the information reviewed the following recommendations are proposed.

3.1. Independent Odour Audit Non-Compliances

Table 15 below presents the observed non-compliances against the consolidated odour conditions (see Table 2).

Table 15 Independent odour audit non-compliances

Condition	Requirement	Evidence & Independent Audit Findings and Recommendations	Compliance Status
6C	The Proponent shall conduct quarterly odour monitoring from the DDG exhaust stack and report the results in the independent odour audit required under Condition 5 of Schedule 3.	The quarterly odour monitoring reports are discussed in Section 2.9, and attached as Appendix D to this audit report. Section 2.9.1 details the “process conditions” during each monitoring campaign, including which processes were not available for testing. It is noted that the Quarter 4 monitoring was not performed on the DDG exhaust stack.	Non-compliant

3.2. Recommendations

Table 16 Independent odour audit recommendations

Reference	Recommendation	Implementation
2019-20 Odour Audit Recommendations		
2019-20-IOA-A	As identified at Section 2.4 and Section 2.9, and as stated in the Biofilter Capacity and Condition Assessment report #23, the biofilters are not achieving the <i>de facto</i> 500 OU standard. This should be flagged for ongoing observation and remedial action as required.	Ongoing
2019-20-IOA-B	As identified in Section 2.9.3 and Table 10, there are identified a number of reporting inconsistencies between data presented in the quarterly reports.	Ongoing
2018-19 Odour Audit Recommendations		
2018-19-IOA-B	As identified at Section 2.4, Section 2.9.3 (of the 2018-19 audit) and stated in the Biofilter Capacity and Condition Assessment report #22 (June 2019), the biofilters are not achieving the <i>de facto</i> 500 OU	Ongoing

Reference	Recommendation	Implementation
	standard. This should be flagged for ongoing observation and remedial action as required.	
2018-19-IOA-D	As identified in Section 2.9.3 (of the 2018-19 audit), there are identified a number of reporting inconsistencies between data presented in the quarterly reports. It is recommended that this is resolved.	Ongoing
2018-19-IOA-E	As identified in Section 2.9.4 (and Table 12) (of the 2018-19 audit), there appears to be an overall increase in odour emissions from a number of sources, as compared to the corresponding data presented in the 2018-19 and 2017-18 odour audit reports. Section 2.5 identifies a general reduction in production rates between the two reporting periods. It is recommended that the reason for the general increase in odour emission against reducing production rates is explored.	Ongoing
2017-18 Odour Audit Recommendations		
2017-18-IOA-C	As identified at Section 2.3 (of the 2017-18 audit) and stated in the Biofilter Capacity and Condition Assessment report #21 (April 2018), the biofilters are not achieving the <i>de facto</i> 500 OU standard. This should be flagged for ongoing observation and remedial action as required.	Ongoing

APPENDIX A – DIRECTOR GENERAL’S LETTER OF APPOINTMENT

Planning &
InfrastructureContact: Deana Burn
Phone: (02) 9228 6453
Email: deana.burn@planning.nsw.gov.auMr John Studdert
Quality Assurance & Environmental Coordinator
Manildra Group
PO Box 123
NOWRA NSW 2541

Ref. 10/06422-9

**Shoalhaven Starches Ethanol Expansion Project (06_0228)
Independent Environmental Audit and Independent Odour Audit 2016**

Dear Mr Studdert

I refer to your email of 1 March 2016 seeking approval for Edge Environment Pty Ltd (Edge) to undertake the Independent Environmental Audit and Northstar Air Quality Pty Ltd (Northstar) to undertake the Independent Odour Audit for the above project.

Independent Environmental Audit – Schedule 4 Condition 4

The Department approves the proposed audit team, including Jon Panic from Edge, Gary Graham from Northstar and Matthew Verth from Resonate Acoustics. In undertaking the audit, Edge must ensure the audit:

- is conducted in accordance with AS/NZS ISO 19011:2003 *Australian/New Zealand Standard: Guidelines for quality and/or environmental management systems auditing*;
- includes a compliance table indicating the compliance status of each condition of approval (and any other statutory instrument required to be audited);
- avoids terms such as "partial compliance". An audit is to make findings of either "compliance", "non-compliance" or "inability to be determined";
- includes recommended actions in response to non-compliances;
- identifies opportunities for improved environmental management and performance;
- covers all modifications to the project approval; and
- includes detailed consideration of odour, noise, wastewater and traffic management.

Please ensure that Edge, Northstar and Resonate Acoustics are advised of these requirements. Should Edge wish to discuss the scope of the audit with the Department, please advise them to contact myself or Deana Burn.

Independent Odour Audit – Schedule 3 Condition 5

Having considered the qualifications and experience of Mr Gary Graham from Northstar, approval is granted for Mr Graham to conduct the independent odour audit. Please ensure the scope of the audit addresses the requirements of condition 5a) to 5g) and 6A, 6C, 6D and 6E.

Finally, the Department requests that you:

- review both the audit reports to ensure they comply with the relevant conditions of approval, prior to submitting the reports to the Secretary; and
- submit an action plan detailing your response to the auditor's recommendations and timeframes to implement the recommendations.

Should you have any enquiries, please contact Deana Burn on 9228 6453.

Yours sincerely

Chris Ritchie
Director - Industry Assessments
*as the Secretary's nominee*Bridge St Office 23-33 Bridge St SYDNEY NSW 2000 GPO Box 39 SYDNEY NSW 2001
Telephone (02) 9228 6338 Facsimile (02) 9228 6455 DX 10181 Sydney Stock Exchange Website planning.nsw.gov.au

Independent Audit Declaration Form

Project Name:	Shoalhaven Starches
Consent Number:	06_0228
Description of Project	Shoalhaven Starches Independent Odour Audit (2019-2020)
Project Address	160 Bolong Road, Bomaderry, NSW 2541
Proponent	Shoalhaven Starches Pty Ltd
Title of Audit	Shoalhaven Starches Independent Odour Audit (2019-2020)
Date	21 st September 2020

I declare that I have undertaken the Independent Audit and prepared the contents of the attached Independent Odour Audit Report and to the best of my knowledge:

- the audit has been undertaken in accordance with relevant condition(s) of consent and the Independent Audit Post Approval Requirements (Department 2018);
- the findings of the audit are reported truthfully, accurately and completely;
- I have exercised due diligence and professional judgement in conducting the audit;
- I have acted professionally, objectively and in an unbiased manner;
- I am not related to any proponent, owner or operator of the project neither as an employer, business partner, employee, or by sharing a common employer, having a contractual arrangement outside the audit, or by relationship as spouse, partner, sibling, parent, or child;
- I do not have any pecuniary interest in the audited project, including where there is a reasonable likelihood or expectation of financial gain or loss to me or spouse, partner, sibling, parent, or child;
- neither I nor my employer have provided consultancy services for the audited project that were subject to this audit except as otherwise declared to the Department prior to the audit; and
- I have not accepted, nor intend to accept any inducement, commission, gift or any other benefit (apart from payment for auditing services) from any proponent, owner or operator of the project, their employees or any interested party. I have not knowingly allowed, nor intend to allow my colleagues to do so.

Notes:

- a) Under section 10.6 of the *Environmental Planning and Assessment Act 1979* a person must not include false or misleading information (or provide information for inclusion in) in a report of monitoring data or an audit report produced to the Minister in connection with an audit if the person knows that the information is false or misleading in a material respect. The proponent of an approved project must not fail to include information in (or provide information for inclusion in) a report of monitoring data or an audit report produced to the Minister in connection with an audit if the person knows that the information is materially relevant to the monitoring or audit. The maximum penalty is, in the case of a corporation, \$1 million and for an individual, \$250,000; and
- b) The *Crimes Act 1900* contains other offences relating to false and misleading information: section 307B (giving false or misleading information – maximum penalty 2 years imprisonment or 200 penalty units, or both)

Name of Auditor Gary Graham
Qualification BSc(hons), MSc, CSci, CEnv, CAQP
Company Northstar Air Quality Pty Ltd
Company Address Suite 1504, 275 Alfred Street, North Sydney NSW 2060

Signature

