Shoalhaven Starches Pty Ltd
Expansion Development Consent 06_0228
Annual Environmental Management Report 2022

Document Control

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Annual Environmental Management Report (AEMR) 2022	
Name of operation	Shoalhaven Starches Pty Ltd
Application No.	06_0228
Annual Review start date	1st July 2021
Annual Review end date	30th June 2022
Reporting officer	John Studdert
Reporting officer title	Compliance Manager
Date	31st October 2022

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1. STATEMENT OF COMPLIANCE

During the reporting period Shoalhaven Starches (SS) has demonstrated a high level of compliance with its Consolidated Development Consent 06_0228 (the 'Consent'). Of the approximately 180 conditions of consent, 2 non-compliances were identified. Table 1 summarises the non-compliances which are further discussed in section 9.1 of the report.

Table 1 Non-compliances Summary

Schedule Condition	Condition Description (summary)	Details	Section in Annual Review
Sch.3 Cond. 9	Boiler Emission Monitoring	Quarterly Boiler 4 emission testing was not performed in accordance with the Environment Protection Licence (EPL) requirements.	9.1.1
Sch. 3 Cond. 9	Emission Limits – Boiler Stacks	Boiler 5 and 6 stack exceeded EPL emission limits.	9.1.2

N.B. The above non-compliances exclude the non-compliances raised in the 2019 Independent Environmental Audit which are discussed in Table 16 of this report.

2. INTRODUCTION

The Annual Environmental Management Report 2022 (AEMR) has been prepared to satisfy Schedule 4, Condition 3 (Annual Reporting) of Shoalhaven Starches Expansion Development Consent 06_0228 issued by the NSW Department of Planning, Industry & Environment (DPIE). The format of the report has been prepared in accordance with the Annual Review Guideline, published by the NSW Government in October 2015.

Table 2 lists the annual reporting requirements and the relevant section in the document where this information can be found.

Table 2 Annual Report Requirements

By the end of October each year, or other timing as may be agreed by the Secretary, the Applicant shall review the environmental performance of the Development to the satisfaction of the Secretary. This review must:	**Section in report**
a) be submitted to the Secretary by the end of October each year;	-
b) describe the development that was carried out over the previous 12 month period, and the development that is proposed to be carried out over the next year;	4.3 and 10
c) include a summary of monthly production levels over the year;	4.1
d) include a comprehensive review of the monitoring results and complaints records of the Development over the previous year, which includes a comparison of these results against:	6 and 7.1
(i) the relevant statutory requirements, limits or performance measures/criteria;	6
(ii) requirements of any plan or program required under this consent;	6
(iii) the monitoring results of previous years; and	6
(iv) the relevant predictions in the EA;	6
e) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;	9.1
f) identify any trends in the monitoring data over the life of the Development;	6
g) identify any discrepancies between the predicted and actual impacts of the Development, and analyse the potential cause of any significant discrepancies; and	6
h) describe what measures will be implemented over the next year to improve the environmental performance of the Development.	6 and 10

2.1 BACKGROUND

Shoalhaven Starches is a member of the Manildra Group of companies. The Manildra Group is a wholly Australian owned business and the largest processor of wheat in Australia. It manufactures a wide range of wheat-based products for food, beverage and industrial markets both locally and internationally.

The Shoalhaven Starches factory located on Bolong Road, Bomaderry, produces a range of products for the food, beverage, confectionary, paper and motor transport industries including starch, gluten, glucose and ethanol. Ethanol production results in some liquid and solid by-products, which are processed through the stillage recovery process plant. The solids in the stillage are recovered as Dried Distillers Grains (DDG) and sold as a high protein animal feed. The waste water resulting from the ethanol production is treated in the site's wastewater treatment plant and is re-used in the factory, with surplus treated water irrigated onto Shoalhaven Starches Environmental Farm to the north of Bolong Road, which comprises over 1000 hectares of land used for fodder crops, pasture and cattle grazing.

Biogas generated from the anaerobic wastewater treatment process is recovered and used in the gas-fired boilers located at the factory for process heat, reducing the site's use of Natural Gas and coal.

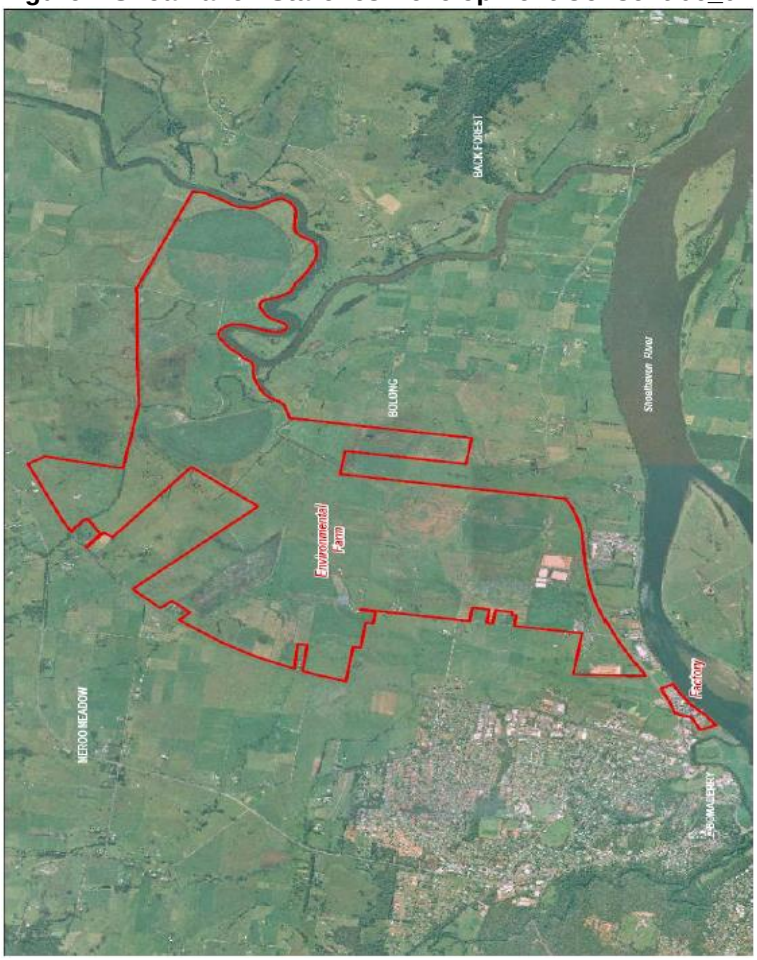
In 2009 the Minister for Planning issued Project Approval 06_0228 pursuant to the then Part 3A of the Environmental Planning & Assessment Act for an application made by Shoalhaven Starches to increase its ethanol capacity to meet the expected increase in demand for ethanol arising from the NSW Government ethanol mandate by upgrading the existing ethanol plant located at the Shoalhaven Starches Plant at Bomaderry.

This Project Approval (now referred to as a 'Development Consent') enables Shoalhaven Starches to increase its ethanol production at its Bomaderry Plant from 126 million litres per year up to 300 million litres per year. The Consent also consolidated all previous approvals into the one Consolidated Development Consent 06_0228.

Unfortunately, the expected increase in demand for ethanol to meet the demand arising from this mandate has not occurred due largely from a failure of the mandate to be imposed on petroleum suppliers. As a result, Shoalhaven Starches have been investigating alternative markets for the ethanol that is and will be produced at the Bomaderry plant in accordance with the Development Consent.

Figure 1 shows the Shoalhaven Starches Development Consent site boundary which includes the Factory and Environmental Farm operations.

Figure 1 Shoalhaven Starches Development Consent 06_0228 Boundary



3. CONSENTS AND LICENCES

Shoalhaven Starches operates primarily under one consolidated Development Consent 06_0228 (the 'Consent') issued by the NSW Department of Planning on the 28th January 2009. The issue of this Consent included the surrender of all previous development consents and project approvals.

Compliance with the site's Environment Protection Licence (EPL) 883 is reported annually to the NSW Environment Protection Authority (EPA) via the EPA Annual Return and EPA Annual System Performance Report.

A number of development applications to modify the Consent and the associated environmental assessments (EA) have been approved by the DPIE.

Table 3 lists the site's current approved modifications (MODs) to the Consent and the current EPA licence.

Table 3 Development Consent and Licences

Consent Number	Description	Date Issued
06_0228	Shoalhaven Starches Expansion Project	28-1-2009
MP06_0228 MOD 1	Deletion of Dried Distillers Grain (DDG) Pelletiser	30-9-2011
MP06_0228 MOD 2	Operational & Energy Efficiency Improvements	14-9-2012
MP06_0228 MOD 3	Relocation of car park	9-10-2012
MP06_0228 MOD 4	Modification to the footprint, design and location of Dried Distillers Grain (DDG) Pelletising Plant	25-3-2014
Mp06_0228 MOD 5	Modification to the footprint, design and odour controls on the Dried Distillers Grain (DDG) Pelletising Plant	16-9-2015
MP06_0228 MOD 6	Modification to demolish a building and construct a temporary car park	25-11-2015
MP06_0228 MOD 7	Relocation of Starch Dryer No.5	18-1-2016
MP06_0228 MOD 8	Alterations to Existing Flour Mill	1-3-2016
MP06_0228 MOD 9	Packing Plant	8-3-2017
MP06_0228 MOD 10	Flour Mill B	18-4-2017
MP06_0228 MOD 11	DDGS Dryers	1-9-2017
MP06_0228 MOD 12	Beverage Grade Ethanol	1-9-2017
MP06_0228 MOD 13	Conversion of Boilers	18-1-2018
MP06_0228 MOD 14	Use of Paper Mill Site	27-4-2018
MP06_0228 MOD 15	Carbon Dioxide Plant	7-8-2018
MP06_0228 MOD 16	Flour, Gluten and Starch Increase	18-6-2019
MP06_0228 MOD 17	Relocation of the approved No.5 Starch Dryer baghouse, installation of a service lift, alterations to the Specialty Products Building and Product Dryer Building including increase of building footprint, elevation of service conduit and alternative woodchip fuel source for Boilers 2 and 4.	23-10-2020
MP06_0228 MOD 18	Relocation of gas fired boiler to enable the production of hand sanitizer grade ethanol and the repurposing of existing de-fatting plant for production of hand sanitizer.	4-9-2020
MP06_0228 MOD 19	Expansion of the ethanol distillery plant including new distillery columns, three ethanol storage tanks and cooling towers to facilitate the production of 100 mega litres (ML) of beverage grade ethanol within the approved limits and additional site infrastructure.	8-3-2021
MP06_0228 MOD 20	Supagas Additional Storage Vessels	26-10-2021

MP06_0228 MOD 21	Amendments to packing Plant	16-5-2022
MP06_0228 MOD 23	Gas Fired Co-Generation Plant	28-4-2022
MP06_0228 MOD 24	Gluten Dyer No.8 Alterations	15-2-2022
Licence Number	**Description**	**Version Date**
883	Environment Protection Licence 883	22-4-2022

4. OPERATIONS SUMMARY

4.1 LIMITS ON CONSENT

The limits on Consent, as required under Schedule 2, Condition 6 are:

(1) The Applicant must not produce on site:

a) more than 1,112,800 tonnes of industrial grade flour per year; and

b) more than 300 million litres of ethanol per year

c) more than 1.5 million litres of hand sanitiser per year

The annual reporting requirements as stipulated in Schedule 4, Condition 3 c) require a summary of monthly production levels over the year. A summary of monthly production levels for flour and ethanol in 2022 are shown in Figure 2 and Figure 3.

Figure 2 - Monthly Ethanol Production Volumes

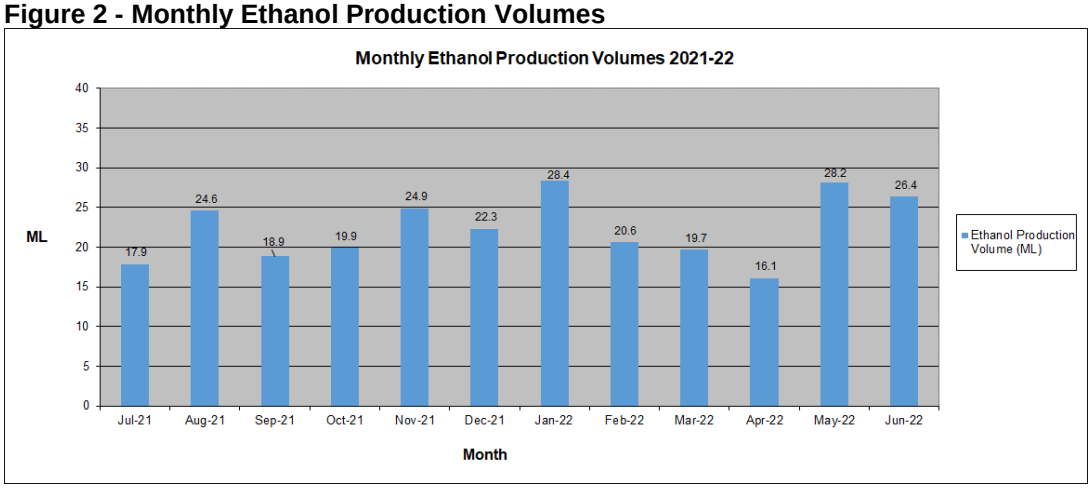
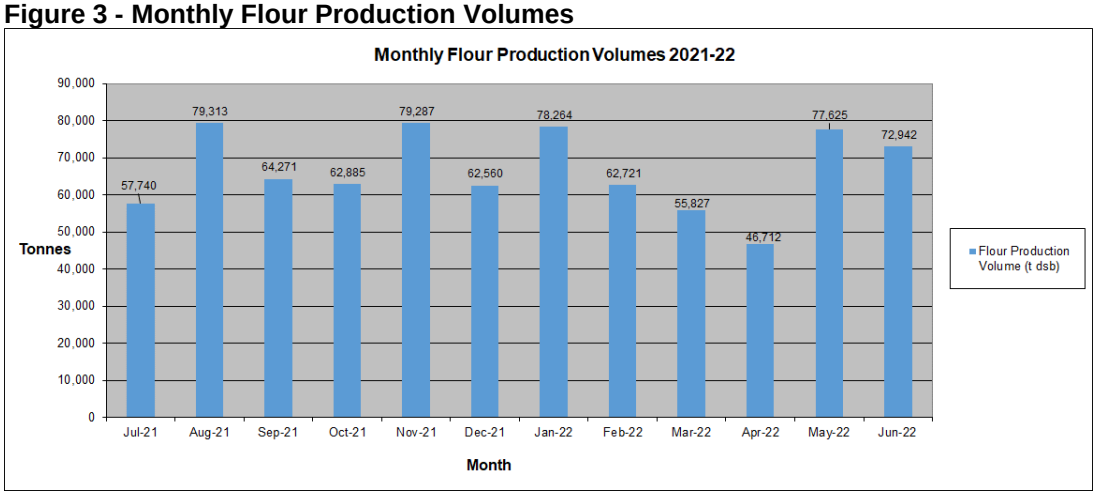


Figure 3 - Monthly Flour Production Volumes



A comparison of annual production levels from previous years against the approved production volumes are shown in Figure 4 and Figure 5.

Figure 4 Annual Ethanol Production Volumes

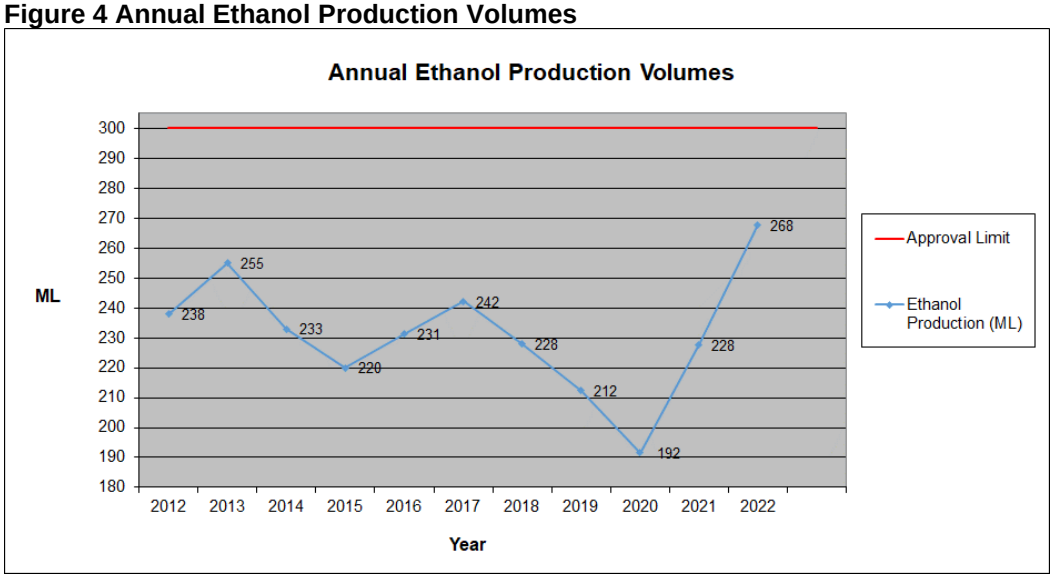
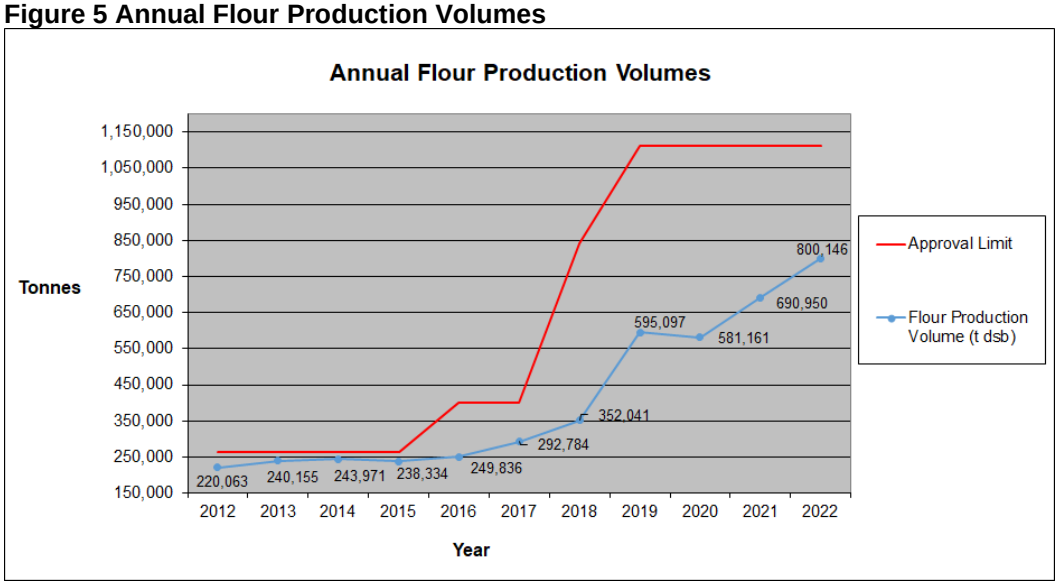


Figure 5 Annual Flour Production Volumes



4.2 HOURS OF OPERATION

The construction and operation hours for the site are carried out in accordance with schedule 3, condition 11 of the Consent, which are shown in Table 4 below.

Table 4 Construction and Operation Hours for the Development

Activity	Day	Time
Construction	Monday – Friday	7:00am to 6:00pm
	Saturday	8:00am to 1:00pm
	Sunday and Public Holidays	Nil
Piling activities	Monday – Friday	9:00am to 5:00pm
Operation	All days	Any time
Use of Paper Mill site	Monday – Saturday	7:00 am to 6:00 pm
	Sunday and Public Holidays	8:00 am to 6:00 pm

Note: Construction activities may be conducted outside the hours in Table 4 provided that the activities are not audible at any residence beyond the boundary of the site.

4.3 DEVELOPMENT DURING THE REPORTING PERIOD

The following development activities occurred during the reporting period:

- Supagas (MOD 20) application to undertake the following minor amendments to the Supagas Carbon Dioxide (CO_2) Plant approved under MOD 15. Supagas capture waste CO_2 gas from Shoalhaven Starches fermenter tanks, purify the CO_2 gas and convert to a liquid to supply various food, hospitality and industrial uses. This MOD was approved in October 2021 which includes:
    - Installation of two (2) 150 kL capacity Liquid CO2 storage vessels. Each vessel will be 17.2m high and 3.8 m diameter.
    - Installation of the above Liquid CO2 storage vessels will require the relocation of a set of existing ambient vaporisers.
    - Installation of an additional NOx removal bed to accommodate the expected longer running period of the plant. Vessel dimensions are 2.4 m high x 0.92 m diameter.
    - Interconnecting pipework from the process to the new equipment.
    - Concrete bases for the above equipment items. This will include piling due to the substandard grade of the existing soil.

    The above modification will enable:

    - Improved storage volume capacity of liquid CO_2 product during planned and unplanned outages.
    - Better batching/quarantining of product and quality control.
    - Better availability of product during high demand periods.
    - Reduced plant fatigue and damage
- Packing Plant (MOD 21) application involving modifications to the approved Packing Plant (MOD 9) and other works. This MOD was approved in April 2022 and construction has commenced which includes the following:
    - amendments to the approved Packing Plant on the northern side of Bolong Road to accommodate the different packaging requirements for this increased range of specialised products.
    - The installation of a waste water buffer tank adjacent to the existing waste water tank located within the vicinity of the water treatment plant and waste water storage ponds located on the Environmental Farm;
    - The installation of an Ethanol Nitrogen Generator and storage vessels within the Shoalhaven Starches factory site;
    - The installation of an Indirect Cooking plant within the Shoalhaven Starches factory site
    - The installation of an additional two fermentation tanks within the eastern part of the site.
- Gas-fired Cogeneration Plant (MOD 23) application, approved in April 2022, has commenced construction involving modifications to the approved gas-fired co-generation plant which includes the following:
    - New gas fired cogeneration plant, consisting of two natural gas turbines that will generate an anticipated power output each of 30 MW, providing a total power to the site of 60 MW.
    - The waste heat from each of the gas turbine exhausts will be used to generate 11 barg steam in two 110 t/hr heat recovery steam boilers. The boilers will be fired with natural gas and will be able to operate at full output when the turbine is offline for maintenance.
    - The proposed new gas fired co-generation plant will replace the gas fired co-generation plant approved under the original Project Approval as well as the coal fired co-generation plant approved under Mod 16.
- On-going construction of the second beverage grade ethanol plant (MOD 19) project and other works. The modification includes:
    - **Beverage Grade Ethanol**

• production of an additional 100 ML of beverage grade ethanol per annum within the existing 300 ML ethanol limit, allowing up to a total maximum of 210 ML of beverage grade ethanol.

- **Ethanol Plant**

  • installation of three distillery columns and associated processing equipment within the Ethanol Distillery Plant

  • three new ethanol storage tanks and ethanol loadout area

  • relocation of ethanol distillery control room.

- **Cooling towers**

  • 12 new cooling towers to service ethanol plant modifications.

- **ISO Container Storage**

  • relocation of existing ISO container storage area to accommodate the installation of new cooling towers.

- **Electrical Substation**

  • relocation of approved but not constructed electrical substation to the northern side of the Starch Dryer No. 5 building.

- **Interim Packing Plant**

  • three product silos above interim packing plant.

- **Car Parking**

  • extend the existing car park location within the south-western part of the site to provide an additional 31 car parking spaces.

- Preparation and submission of modifications to Gluten Dryer 8 (MOD 24) application which includes further re-design of the siting and footprint of the approved Gluten Dryer 8 building. This MOD was approved in February 2022.

- Ongoing construction works associated with the MOD 16 and MOD 17 approval which includes:

  - Specialty Products Building (SPB) and associated equipment for production of specialised products such as cationic starch.
  - Product Dryer No.9, to be installed within the SPB, to initially dry gluten, and which may be converted to a starch dryer once Gluten Dryer No.8 is installed.
  - Commencement of construction of Gluten Dryer 8.

- Completion of construction and commencement of commissioning of the Gas-fired Boiler 8 (MOD 18) required to ensure a stable supply of steam to the distillery necessary to enable production of the higher grades of ethanol such as hand sanitiser grade and beverage grade ethanol and;

  - Construction of two Ethanol Storage Tanks to store higher grades of ethanol.

- Commissioning and operation of the mechanical vapour recompression (MVR) evaporators approved under MOD 2 and then modified and relocated under MOD 12.

  The MVR evaporation is very energy efficient and will increase the solids in the feed to the Ethanol Plant and thus reduce the amount of liquid that needed to be heated to evaporate the ethanol in the distillery providing significant energy savings.

  The evaporators also provide significant water savings by recovering up to 2.4 million litres per day which is re-used within the factory processes and reduce the amount of wastewater generated on site.

- Preparation of the rail line extension modification (MOD 26) application which includes the following:

- Extend the existing rail line from its current terminus at the western boundary of the former Australian Paper Mill (on Lot 1 DP54473)) along the southern boundary of the Australian Paper Mill (Lot A DP 384559) before turning on Lot 102 DP 1283484 to head in a northerly direction generally along the eastern boundary of Lot 102 towards the Bolong Road frontage of this land.
- The rail line extension will generally comprise two separate rail lines, with the exception towards the terminus of the extended line which will involve a series of three lines to enable maintenance works to be carried out.
- The rail line will be extended a distance of about 1065 metres from existing terminus at the western boundary the former APM site to its proposed new terminus at the north-eastern corner of the former APM site.
- The alignment of the new rail line will require the demolition of an existing brick pumphouse building that was previously associated with the waste water treatment plant associated with the former APM operations.
- Erect light towers with a height of 25 metres at spacing of not less than 20 metres along the southern and eastern side of the rail line extension. These towers will be located a minimum of 4 metres from the top of the bank with the Shoalhaven River.
- 180 metres of existing cyclone wire mesh fencing that is presently situated along the southern part of the site will need to be relocated to enable the construction of the rail line extension.
- The carrying out of an upper-level addition to the Product Dryers 3 & 4 building having dimensions of 10 metres by 7 metres and to be erected upon part of the roof and upper level of the existing building and the installation of two starch grinding baghouses within the proposed addition.
- The proposed addition will increase the overall height of part of this building from 25.65 m AHD to 32.87 m AHD an overall height above existing ground level of 28.84 metres.

- Preparation and submission of modification (MOD 26) application for the erection of additional grain silos at the former Dairy Farmers factory to the east of the Shoalhaven Starches factory site and to construct associated grain handling facilities associated with this grain storage. This MOD includes the following aspects:
  - The installation of six (6) wheat silos to the west of the former Dairy Farmers factory building. These silos will have an overall height above ground level of 33.68 metres, diameter 18.29 metres and a volume of 7820 m3. Each silo will have the capacity to store 6, 399 tonnes of wheat.
  - Shoalhaven Starches seek to ensure that they are able to store a minimum of one week supply of wheat on site (23,000 tonnes initially). In addition to providing a buffer to interruptions to supply, the multiple silos will also enable Shoalhaven Starches to segregate wheat storage to reflect different quality specifications to enable the blending of wheat with different specifications to ensure a homogenous and consistent quality supply to the Shoalhaven Starches factory operations.
  - Construct a train and truck unloading facility to the south of the former Dairy Farmers factory building. Wheat that is brought to the site will be loaded into this facility and then delivered to the storage silos by conveyors. The unloading facility will accommodate wheat brought to the site by either rail or road. Whilst the bulk of Shoalhaven Starches raw material is supplied to the site by rail, during times when rail supply is interrupted, wheat will continue to be supplied to the site by road and unloaded into the same system as used for unloading by rail. The unloading facility will have the capacity to unload 1500 tonnes per hour enabling Shoalhaven Starches to unload a train in three (3) hours.
  - A container inverter to be sited immediately to the west of the proposed silos. If wheat supply is ever required to be imported to the site by container this facility will enable containers filled with imported or locally loaded wheat to be loaded into these hoppers to also enable storage in the silos.
  - The installation of services and grain conveyor gantry. Wheat that is delivered to the rail and road intake pits will need to be lifted to enable it to be delivered into the silos. The stored grain will then need to be transferred from the bottom of the silos over the rail line and then

transferred by conveyor along the southern boundary of the site to be used in the Shoalhaven Starches factory operations located further to the west.

- A container storage area to the west of the grain storage silos.
- The installation of a weighbridge to be sited to the west of the proposed silos. The weighbridge will provide a commercially calibrated scale to weigh containers of wheat and provide a raw material intake scale.
- A maintenance workshop to the south of the container inverter to provide an area where repairs and maintenance can be undertaken. This facility will enable maintenance personnel to respond quickly and efficiently for maintenance and repair tasks to this plant.
- A low voltage electricity substation will be positioned adjoining and to the south of the proposed container inverter, while a high voltage substation will be sited adjoining the southern side of the former Dairy Farmers factory building. These substations will provide electricity supply (transformers) and the electrical distribution equipment to operate the grain intake system.
- The slight relocation of the existing car parking area located between the Bolong frontage of the site and the former Dairy Farmers factory building to enable heavy vehicle movement along the frontage of the site and then to the rear of the site.

5. ACTIONS REQUIRED FROM PREVIOUS ANNUAL REPORT

Follow-up actions from the previous AEMR 2021 submitted to the DPIE on the 29th October 2021 are outlined in the DPIE's letter dated 17th November 2021. The DPIE review letter considered that the 2021 annual report generally satisfied Schedule 4, Condition 3 of the Consent as modified.

The DPIE review letter requested, in accordance with Schedule 4, Condition 6 of the Consent, to make the copy of the Annual Report available on the company website, including any other documents as required under Condition 6 and also ensure that these documents are up-to-date. This request has been completed by Shoalhaven Starches.

6. ENVIRONMENTAL PERFORMANCE

The environmental monitoring reporting requirements under Schedule 4, Condition 3 d), e), f), and g) are as follows:

d) include a comprehensive review of the monitoring results and complaints records of the Development over the previous year, which includes a comparison of these results against the
(i) the 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 EA;
e) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;
f) identify any trends in the monitoring data over the life of the Development;
g) identify any discrepancies between the predicted and actual impacts of the Development, and analyse the potential cause of any significant discrepancies;

A summary of the key environmental aspects monitored during the reporting period are shown in the following sections. Comparison against the relevant predictions in the EA and/or EPL limits are shown where applicable and have been updated to include the latest MOD 24 Consent.

6.1 WATER USE

Water is supplied to the Shoalhaven Starches site by Shoalhaven City Council (Council), which includes both potable and raw water supplies. Raw water is referred to water supplied by Council that has been taken from the Shoalhaven River upstream section prior to treatment by the Council's potable water treatment plant.

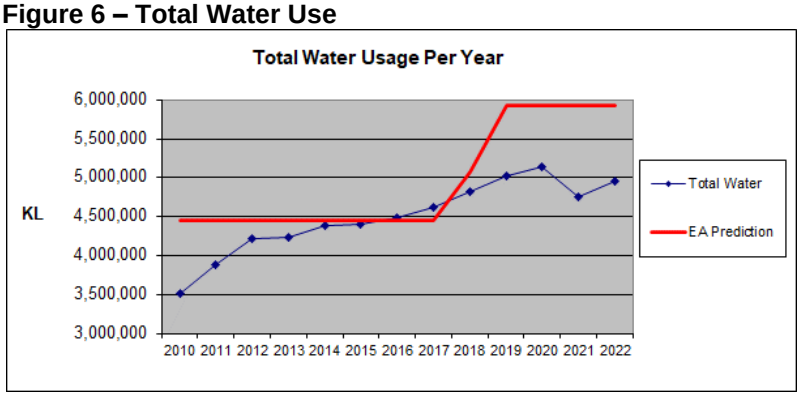
Shoalhaven Starches operates its own integrated waste water treatment plant and recovers water from it's Reverse Osmosis (RO) plant for re-use in its factory operations.

6.1.1 Total Water

Figure 6 shows total water use on site which includes purchased Council water and site RO water. Total water use has increased by 4.4% in 2022.

Factors that will affect the amount of water used on site includes wheat quality which will vary from season to season, the amount of flour throughput and the types of finished products manufactured based on market demand, with each product having different water usage requirements.

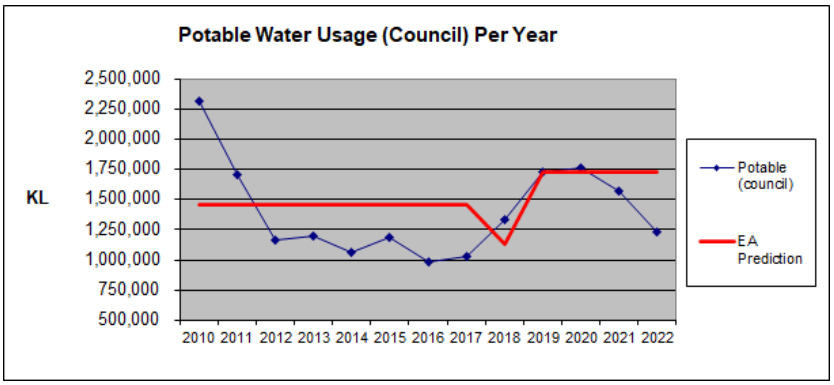
Figure 6 – Total Water Use



6.1.2 Potable Water

Figure 7 shows Council potable water use has decreased by 21.6 % in 2022. The decreased council potable water usage is the results of water savings from operation of the MVR evaporators and increased RO water re-use.

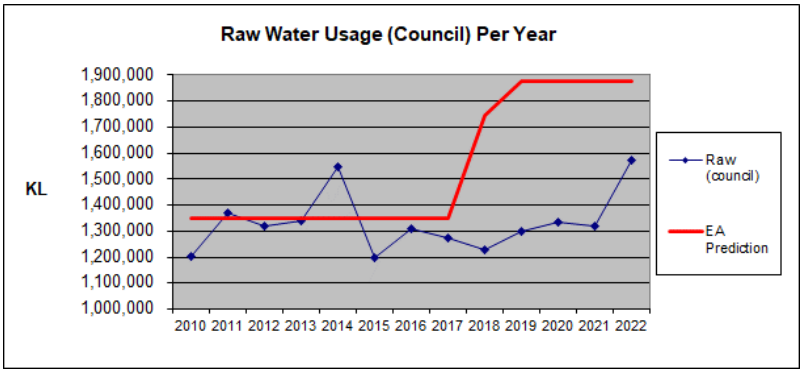
Figure 7 – Potable Water Use



6.1.3 Raw Water

Figure 8 shows council raw water use has increased by 19.3% in 2022. Raw water is used in cooling towers and feedwater for the boilers.

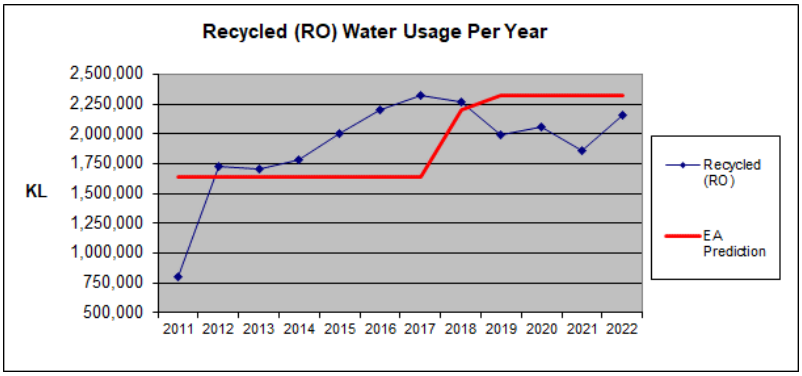
Figure 8 – Raw Water Use



6.1.4 Recycled Water

Treated water from the company's reverse osmosis (RO) plant is re-used back in the factory operations. Figure 9 shows recycled water use has increased by 15.7% in 2022.

Figure 9 – Recycled (RO) Water Use



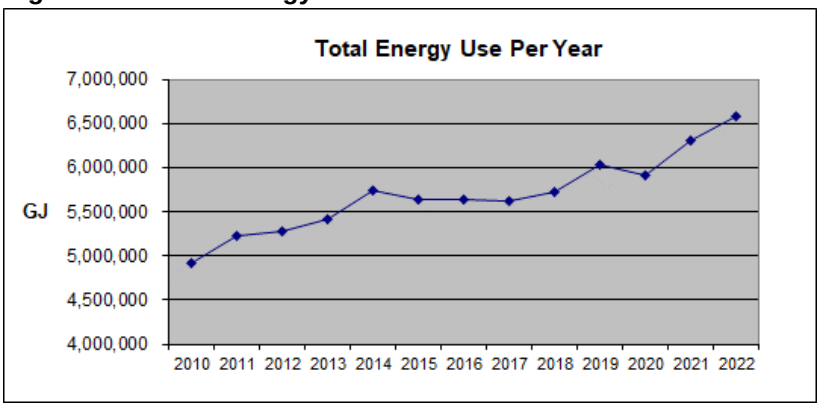
Water use on site is continually monitored and actions implemented to improve water efficiency during the production process. Installation of the company's wastewater treatment plant and increased RO capacity has reduced our council potable water usage since it was installed in 2010-11 (refer to Figure 7).

6.2 ENERGY USE

6.2.1 Total Energy

Figure 10 shows total on-site energy use (which includes coal, natural gas, biogas, and electricity) has increased by 4.4% in 2022. Energy use will vary depending on the amount of flour processed and the types of finished products manufactured based on market demand, with each product having different energy intensities associated with its production.

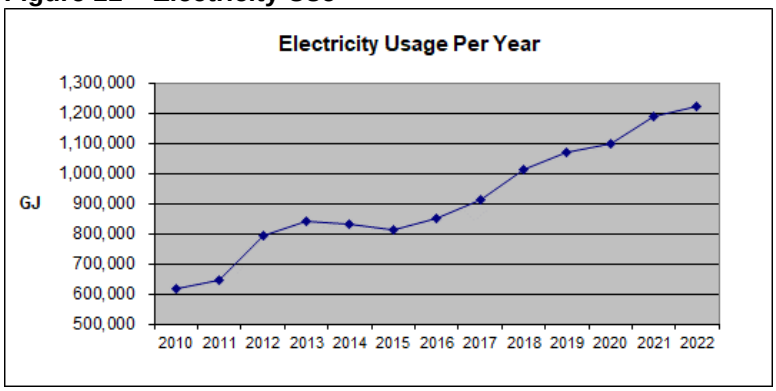
Figure 10 – Total Energy Use



6.2.2 Electricity

Figure 11 shows electricity use has increased by 2.8% in 2022.

Figure 11 – Electricity Use



6.3 WASTE

6.3.1 Liquid Waste

Figure 12 shows total factory wastewater volumes to the site's wastewater treatment plant (WWTP) has remained relatively steady with a slight increase of 0.5% in 2022.

Figure 12 – Total Liquid Waste Volumes to WWTP

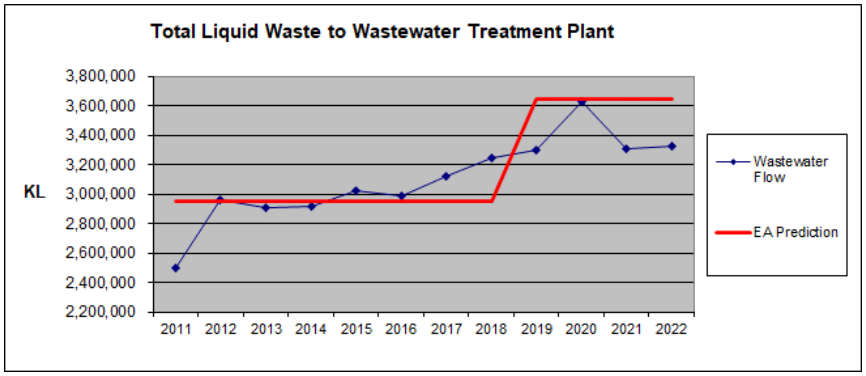
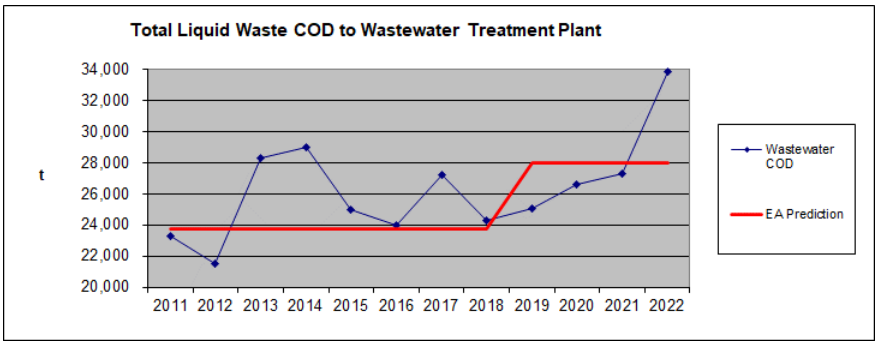


Figure 13 below shows total wastewater chemical oxygen demand (COD) load to the WWTP has increased by 24.2% in 2022. The COD volumes will vary due to errors in measurement uncertainty associated with continuous COD measurements and fluctuations in the strength and volume of the wastewater generated from the factory.

Figure 13 – Total COD to WWTP



The WWTP continues to operate effectively as shown by the treated irrigation water quality monitoring results shown in the following section.

6.3.2 Treated Irrigation Water

The wastewater treatment plant (WWTP) continues to perform well since it was installed and began operating in 2011. Surplus treated water that is not passed through the Aerobic Membrane Bio-reactor (MBR) and RO process for factory re-use is stored in ponds for irrigation on the sites Environmental Farm.

Irrigation water quality monitoring is conducted in accordance with the sites EPL (Monitoring Point 2). The average annual results are shown in Figures 14 – 18 (there are no EPL limits prescribed).

Figure 14 Irrigation Water Quality – BOD

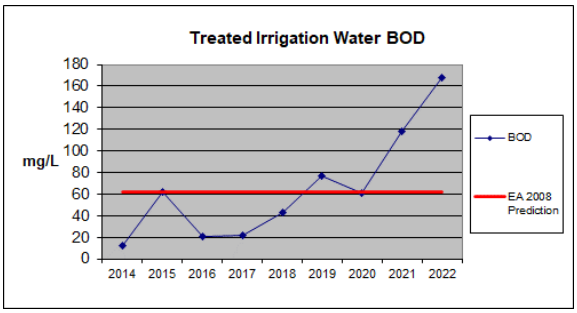


Figure 15 Irrigation Water Quality - Conductivity

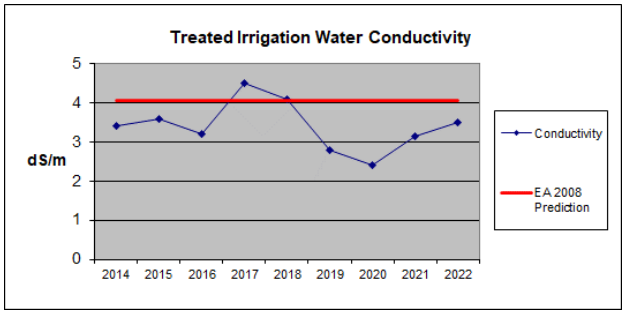


Figure 16 Irrigation Water Quality – Total Nitrogen

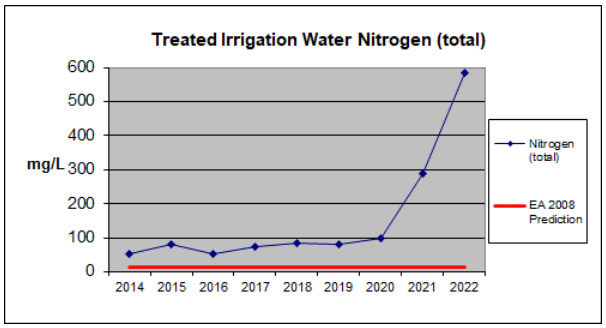


Figure 17 Irrigation Water Quality – Total P

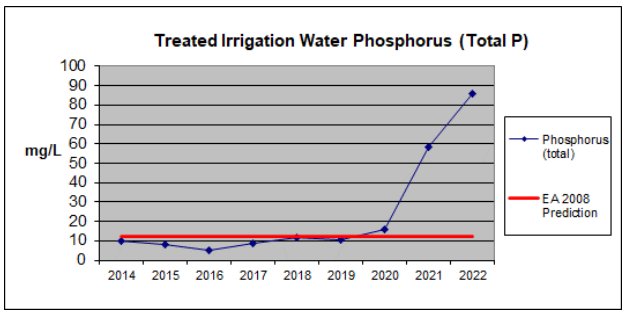
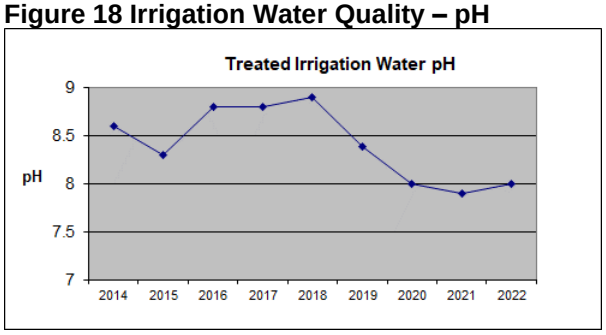


Figure 18 Irrigation Water Quality – pH



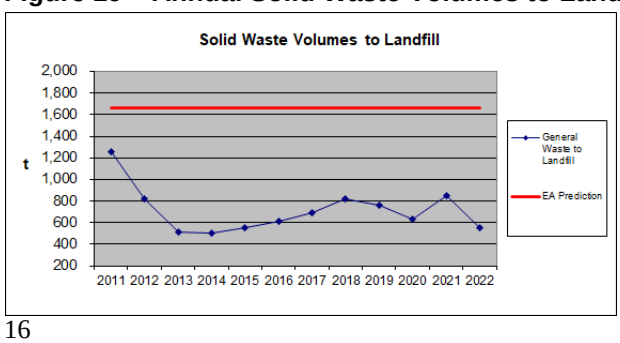
The 2022 results show the conductivity is below predicted levels in the EA. Total nitrogen (N) Total Phosphorous and Biological Oxygen Demand (BOD) levels are above the EA prediction, however the uptake of nitrogen and phosphorous for pasture growth outstrips supply from the wastewater. The pH results remain relatively steady (no predictions in the EA).

Elevated Total P levels are the result of increased production of modified starches that utilise phosphorus as a chemical reactant. Factory trials are currently underway to reduce the P levels in the wastewater effluent. Further discussion of the wastewater quality impacts on soil monitoring results is presented in section 6.7 of this report.

6.3.3 Solid Waste

Figure 19 shows solid waste to landfill has decreased by 35% in 2022. Whilst recycling of waste continues on-site, solid waste is expected to continue to increase as further expansion projects are completed in the next few years.

Figure 19 – Annual Solid Waste Volumes to Landfill



6.3.4 Waste Recycling

Figure 20 shows total waste recycled has increased by 71% in 2022. Figure 21 shows the annual recycled volumes by type during the reporting year.

Increased volumes of construction & timber waste have been diverted from landfill to a local recycling facility in the reporting year.

Figure 20 – Annual Recycled Waste Volumes

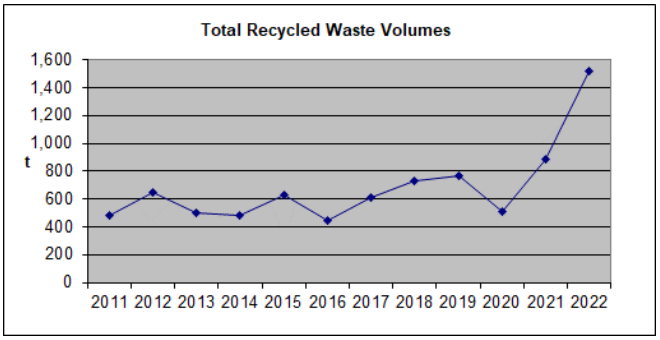
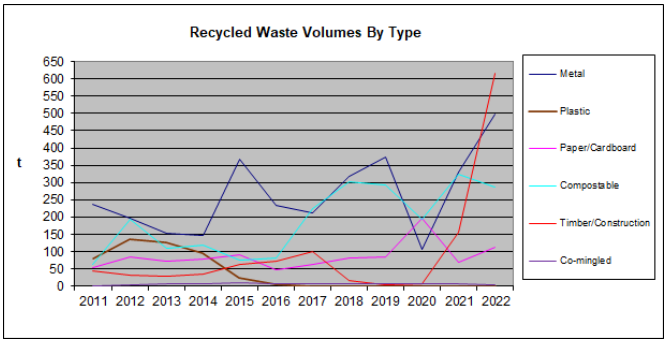


Figure 21 – Annual Recycled Waste Volumes by Type



6.4 AIR EMISSIONS

The emission testing results of the Boiler stacks, as required by condition 9 of the Consent and the site's EPL is shown in the following sections.

6.4.1 Boilers 5 and 6 Monitoring Results

Quarterly air emission testing results from the combined Boilers No. 5 and 6 stack (Monitoring Point 35) in 2022 are shown in Figures 22 – 25.

One non-compliance against the sites EPL limits for total solids particulates occurred during quarter 4 testing which is further discussed in section 9.1 of this report.

Figure 22 - Total Solid Particulates

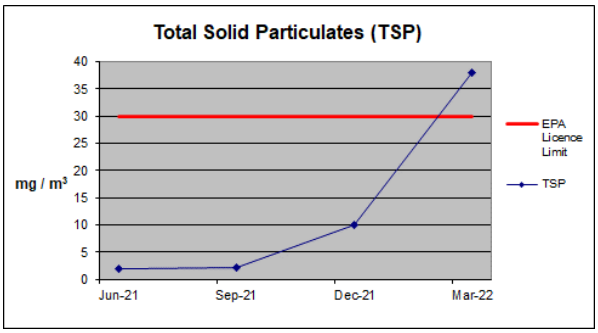


Figure 23 – Volatile Organic Compounds (VOCs)

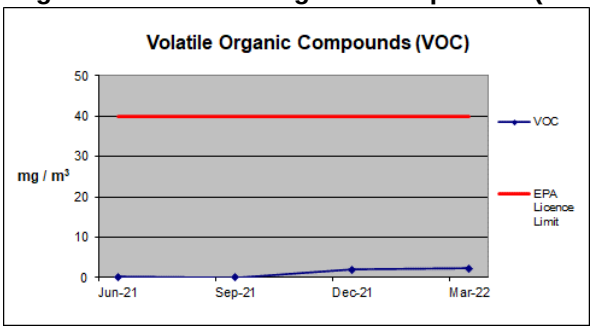


Figure 24 - Oxides of Nitrogen

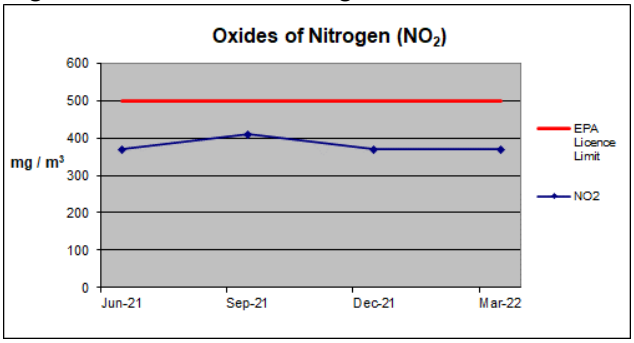
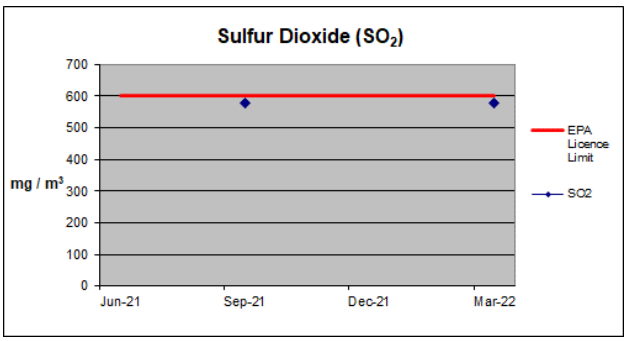


Figure 25 – Sulphur Dioxide



N.B. SO_2 testing frequency required by the EPL is Annual.

Figures 26 to 29 provide a comparison of average annual air emissions monitoring results from previous years. The results show the pollutants tested are all below EPL limits and are relatively steady. The decline in sulphur dioxide is likely the result of reduced sulphur level in the boiler feedstock (coal).

Figure 26 - Total Solid Particulates - Annual

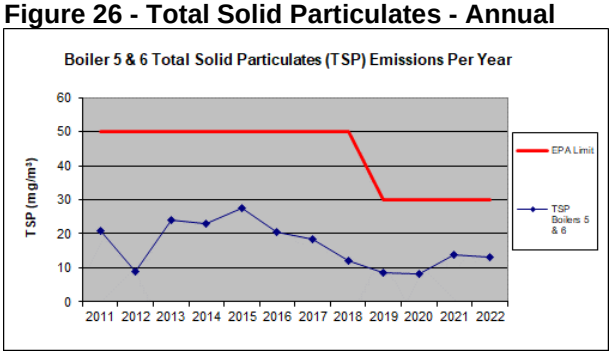


Figure 27 – Oxides of Nitrogen - Annual

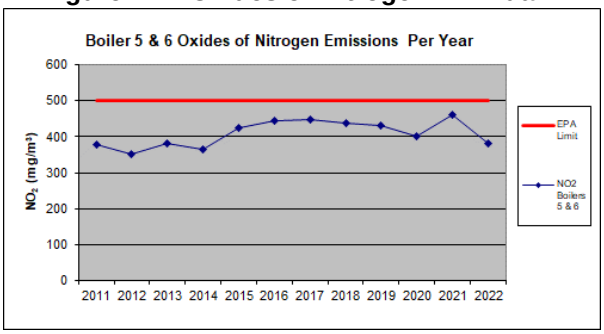


Figure 28 – Sulphur Dioxide – Annual

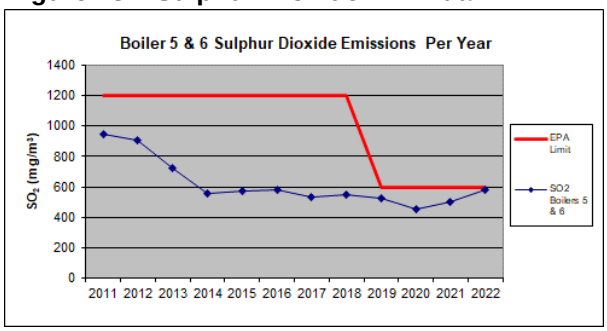
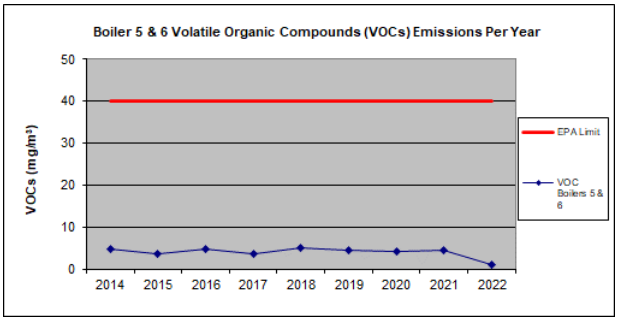


Figure 29 VOCs – Annual



6.4.2 Boiler 2 Monitoring Results

Quarterly air emission testing for Boiler No. 2 (EPL Monitoring Point 45) are all within EPL limits as shown in Figures 30 to 33.

Figure 30 - Total Solid Particulates

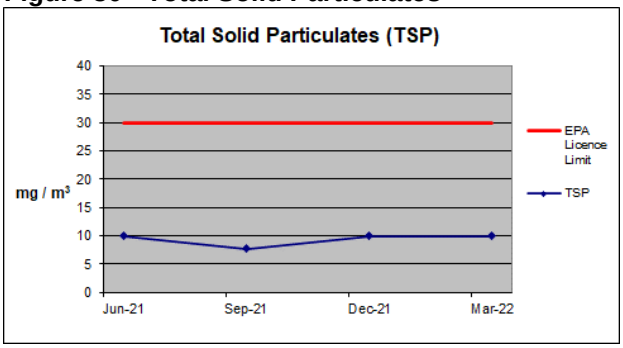


Figure 31 – Volatile Organic Compounds (VOCs)

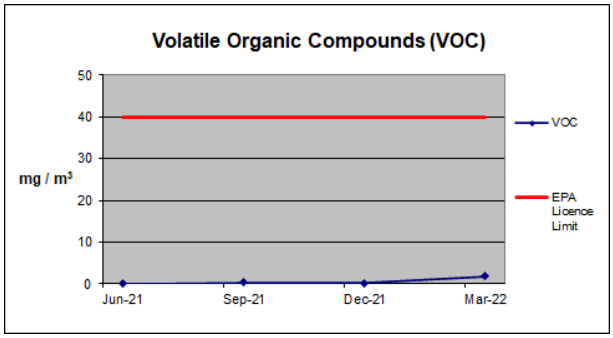


Figure 32 - Oxides of Nitrogen

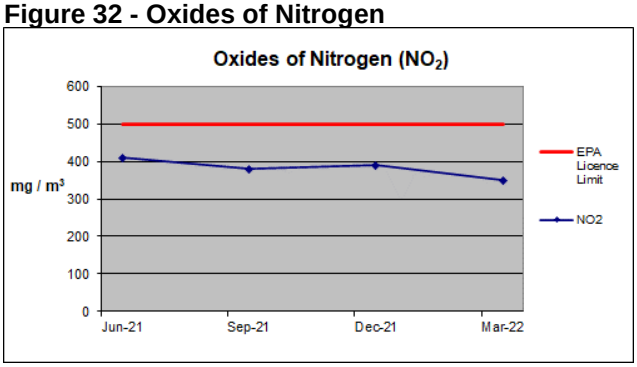
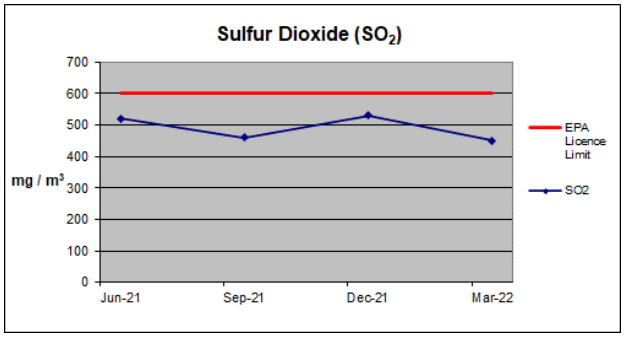


Figure 33 – Sulphur Dioxide



6.4.3 Boiler 4 Monitoring Results

Quarterly air emission testing for the Boiler 4 stack (Monitoring Point 42) was not completed during the reporting year. This occurred due to number of reasons which are discussed in section 9.1 of this report.

6.5 ODOUR

6.5.1 Quarterly Odour Monitoring

Quarterly odour monitoring has been completed in accordance with the site's EPL. There are no specific odour limits (or EA predictions) for the EPL monitoring point sources. Figures 38 to 47 show the historical quarterly odour results up to and including the 2022 reporting year.

Results shown as zero represents the EPL point was not operating or not available on the days of testing.

The red lines shown in Figures 38 and 39 are running averages for all the gluten and starch dryers respectively. Care should be taken in comparing results and identifying trends as the measurement of uncertainty for odour testing is (generally) 3 times the determined value. Based on this, the long-term odour trends for all odour sources remain relatively steady.

Figure 38 - Gluten Dryers No's. 1, 2, 3 & 4 (EPL Point No'.s 8, 9, 10 & 11 respectively)

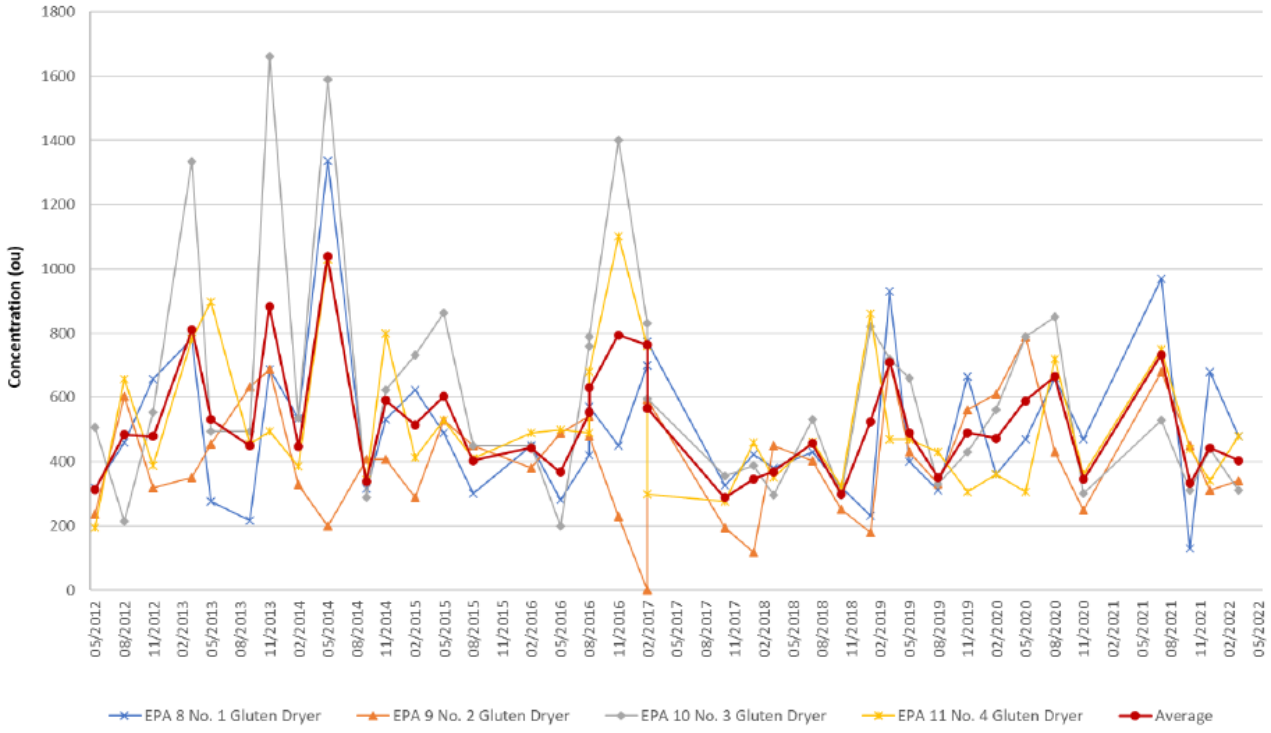
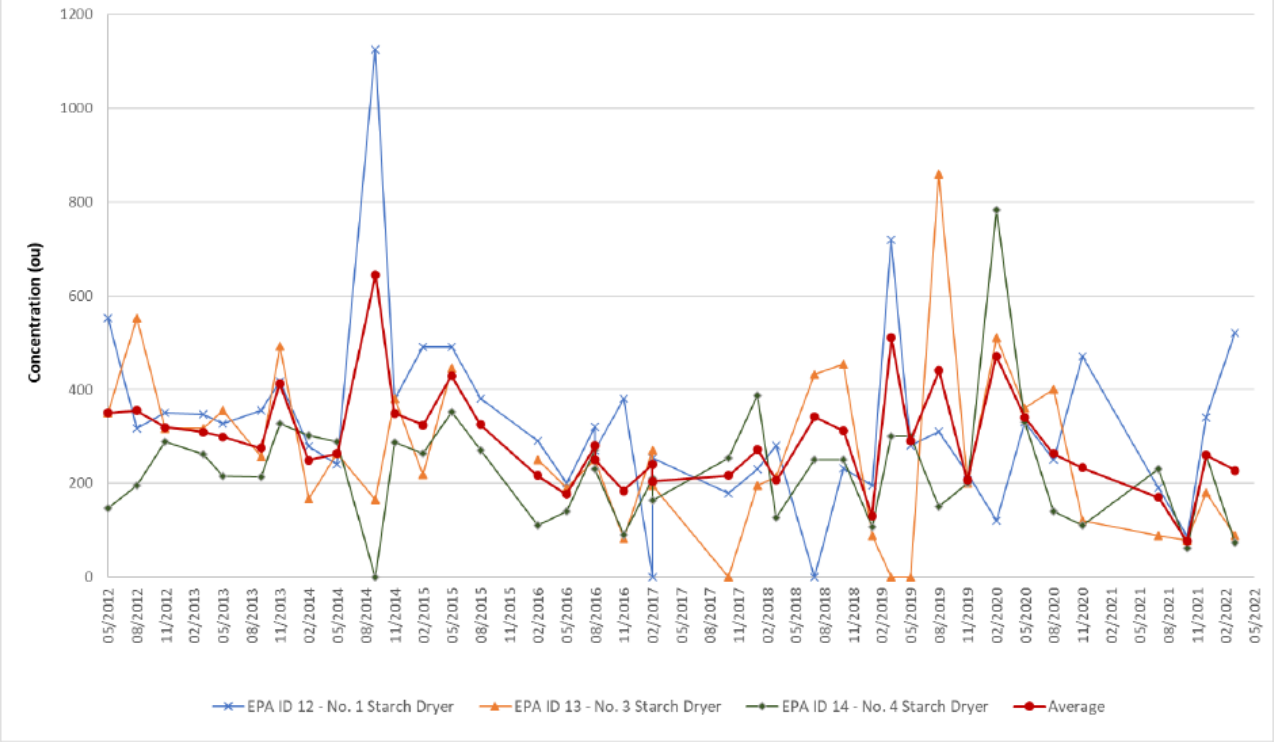
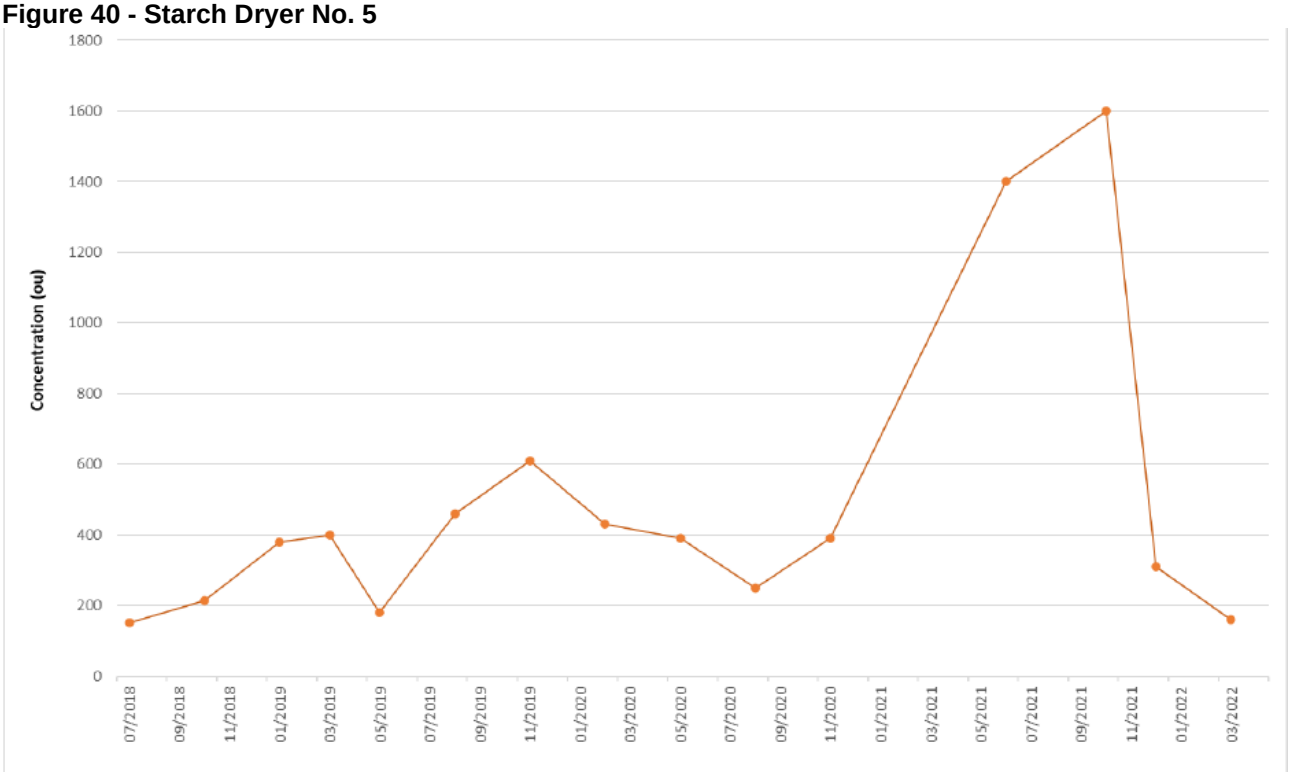


Figure 39 - Starch Dryers No's. 1, 3 & 4 (EPL Point No's. 12, 13 & 14 respectively)



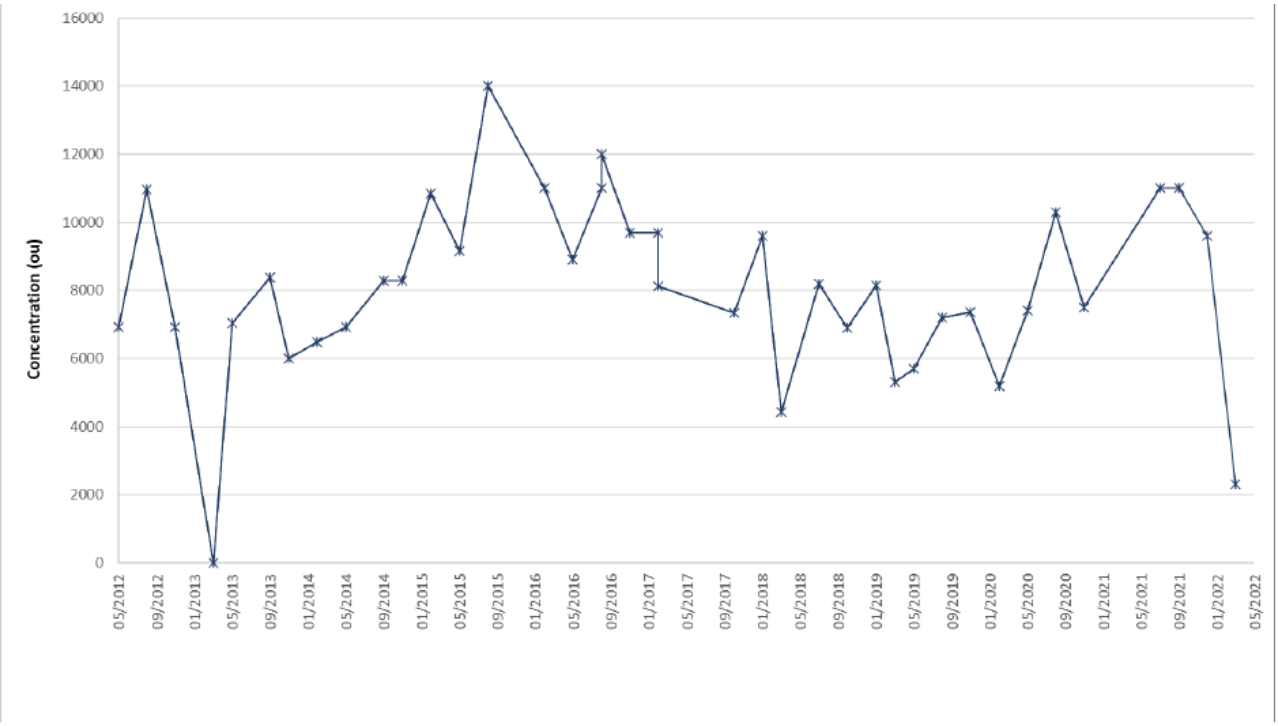
Zero result represents Dryer not operating on days of testing.

Figure 40 - Starch Dryer No. 5



Significant variations in Fermenter odour shown in Figure 41 from 2010 – 2013 are likely the result of variations in the stage of fermentation when sampling is undertaken. This has been addressed and sampling is now conducted during the filling of a fermenter, with the odour results from 2014 onwards more consistent.

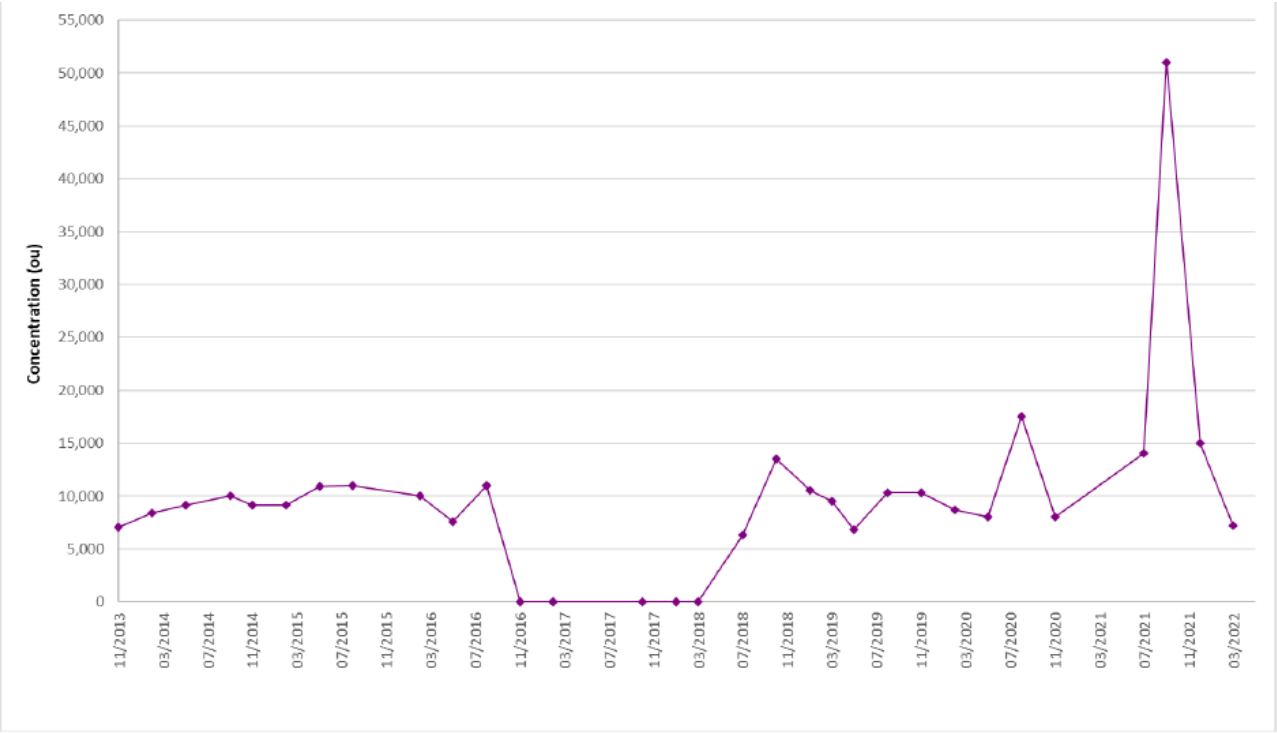
Figure 41 - Fermenter's (EPL Point No. 44)



Zero result represents Fermenter not operating on days of testing.

Figure 42 shows the odour emissions from the carbon dioxide (CO_2) scrubber are relatively stable. The CO_2 scrubber takes air emissions from the fermenters through a water scrubber to strip out residual ethanol. The CO_2 outlet odour testing was added to the EPL on 8th November 2013.

Figure 42 - Carbon Dioxide Scrubber (EPL Point No. 16)



Zero result represents Fermenter not operating on days of testing.

Figures 43 to 45 show odour emission results from Boiler 5 & 6 stack (EPL Point 35), Boiler 4 stack (EPL Point 42) and Boiler 2 stack (EPL Point 45) respectively. Odours are captured from the Dried Distillers Grain (DDG) process and directed to the boilers air intake to reduce odours via boiler combustion.

Odour testing for Point 35 and Point 42 was added to the EPL on 8th November 2013 and Point 45 added in October 2018.

Figure 43 - Combined Boiler 5 & 6 Stack (EPL Point No. 35)

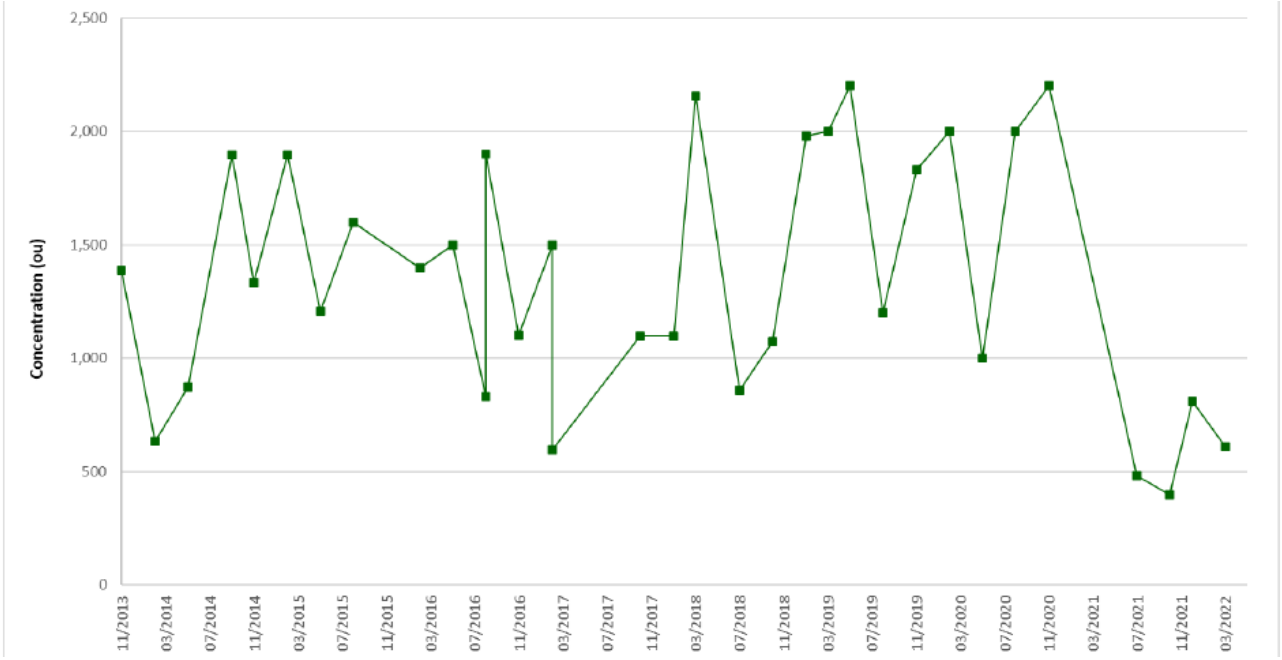


Figure 44 - Boiler 4 (EPL Point No. 42)

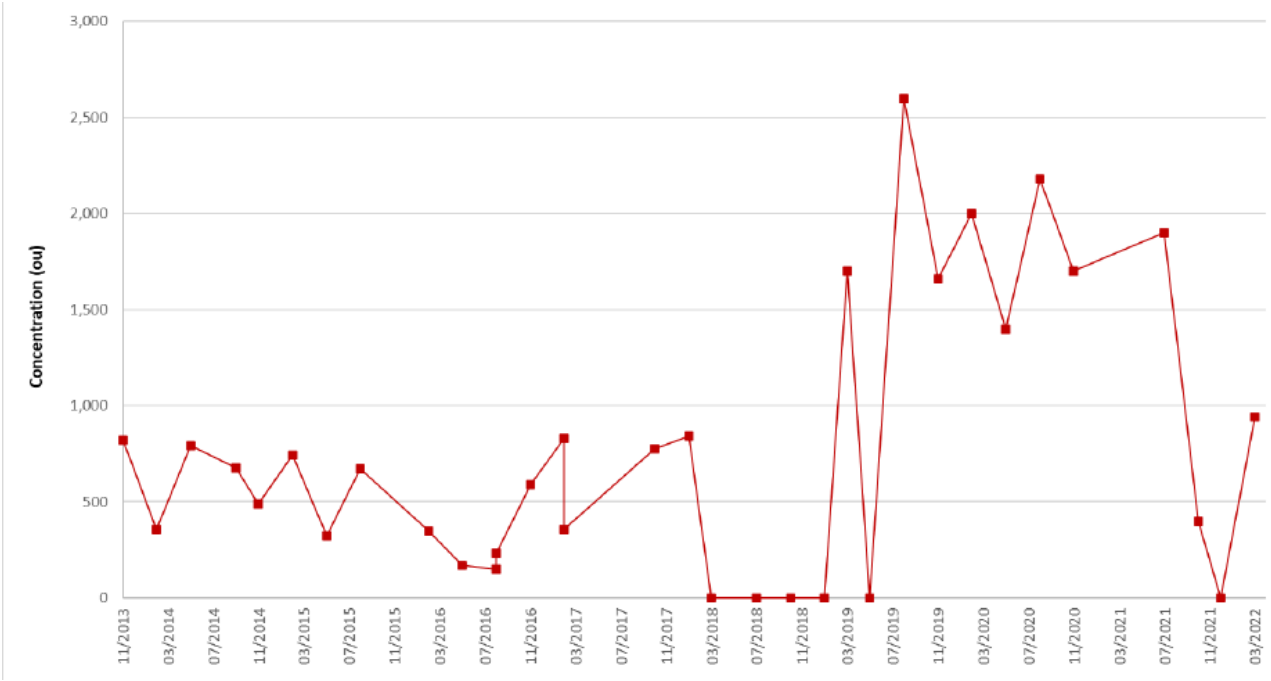


Figure 45 - Boiler 2 (EPL Point No. 45)

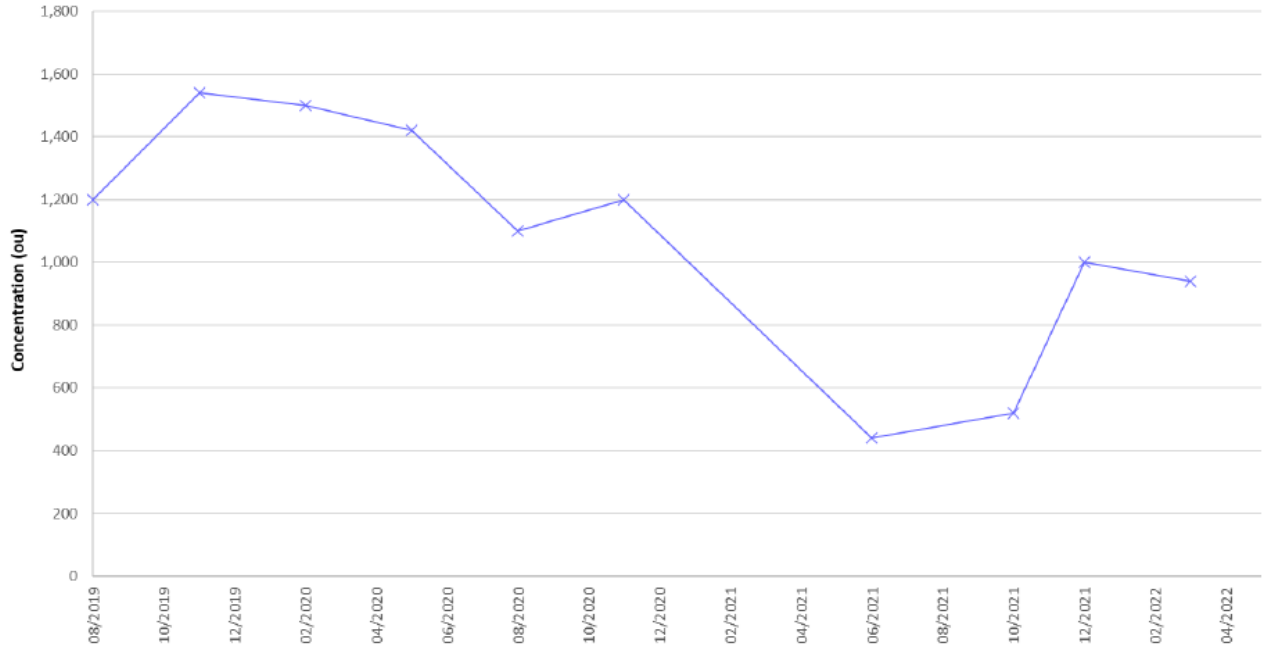


Figure 46 shows the odour results for the biofilter inlet and biofilter outlet. The biofilter's capture and treat DDG odours from the DDG Evaporator plant. The biofilter outlet results are an average of the two biofilter's A and B.

The results show an increase in biofilter outlet odour concentrations which appears to coincide with the addition of DDG Dryer 4 operation and the recovered odours being sent to the Biofilters.

Investigations are currently underway to address the increased odours which includes an additional odour scrubber and additional Biofilter capacity.

Figure 46 - Biofilter Inlet & Biofilter Outlet A & B (EPL Point No's. 39, 40 & 41)

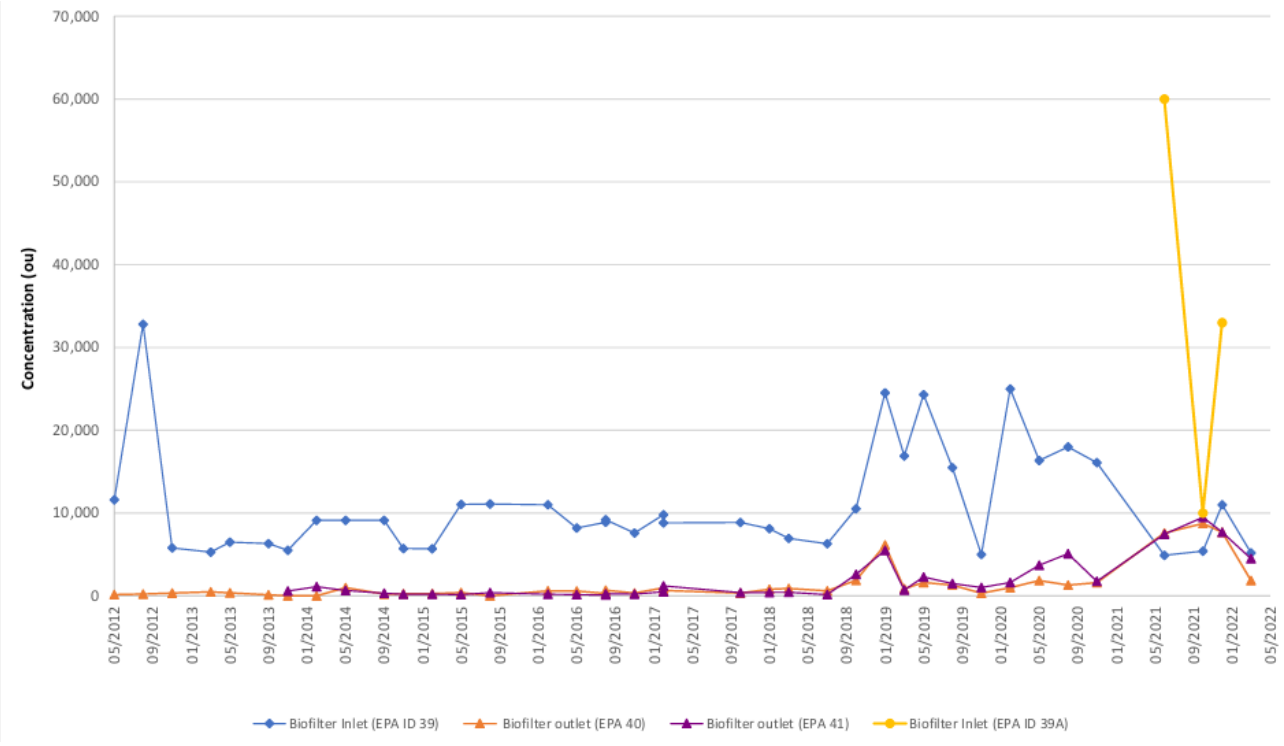
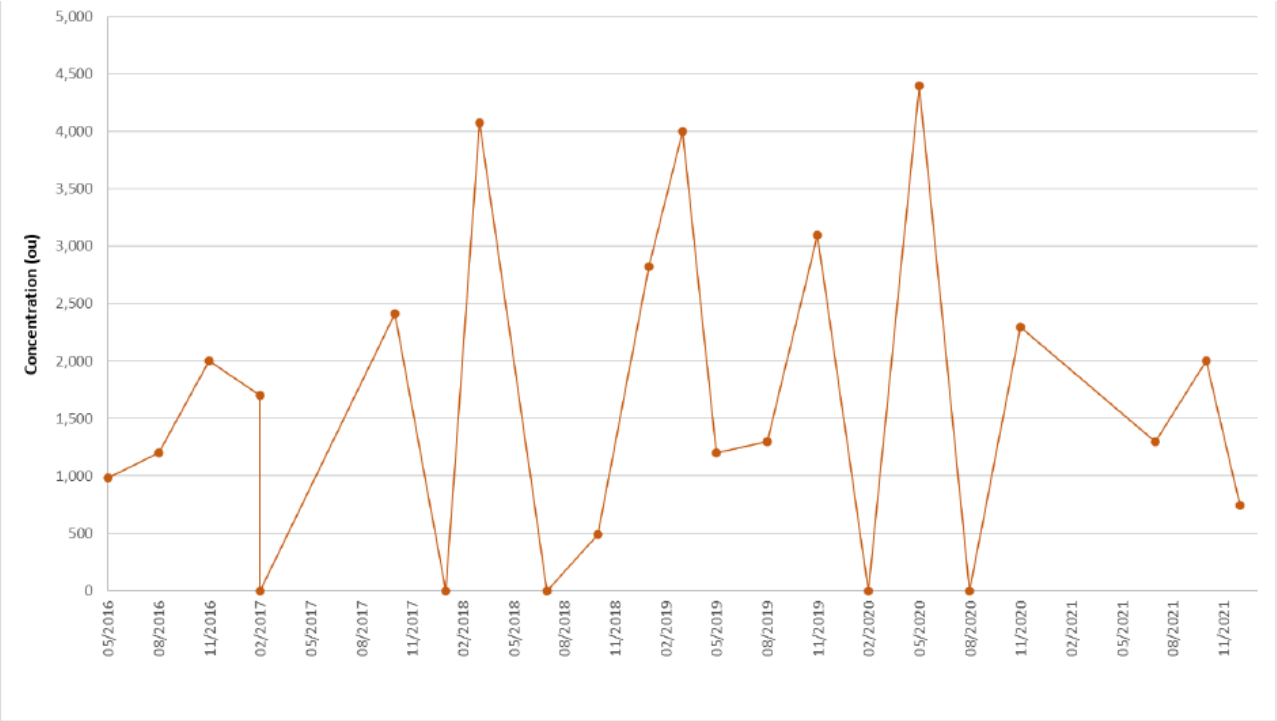


Figure 47 shows the odour results from the DDG Pellet Plant stack which was added to the EPL on 18th December 2015.

Figure 47 – DDG Pellet Plant (EPL Point No. 46)



Zero result represents DDG Pellet Plant not sampled for that event.

6.5.2 Annual Odour Monitoring

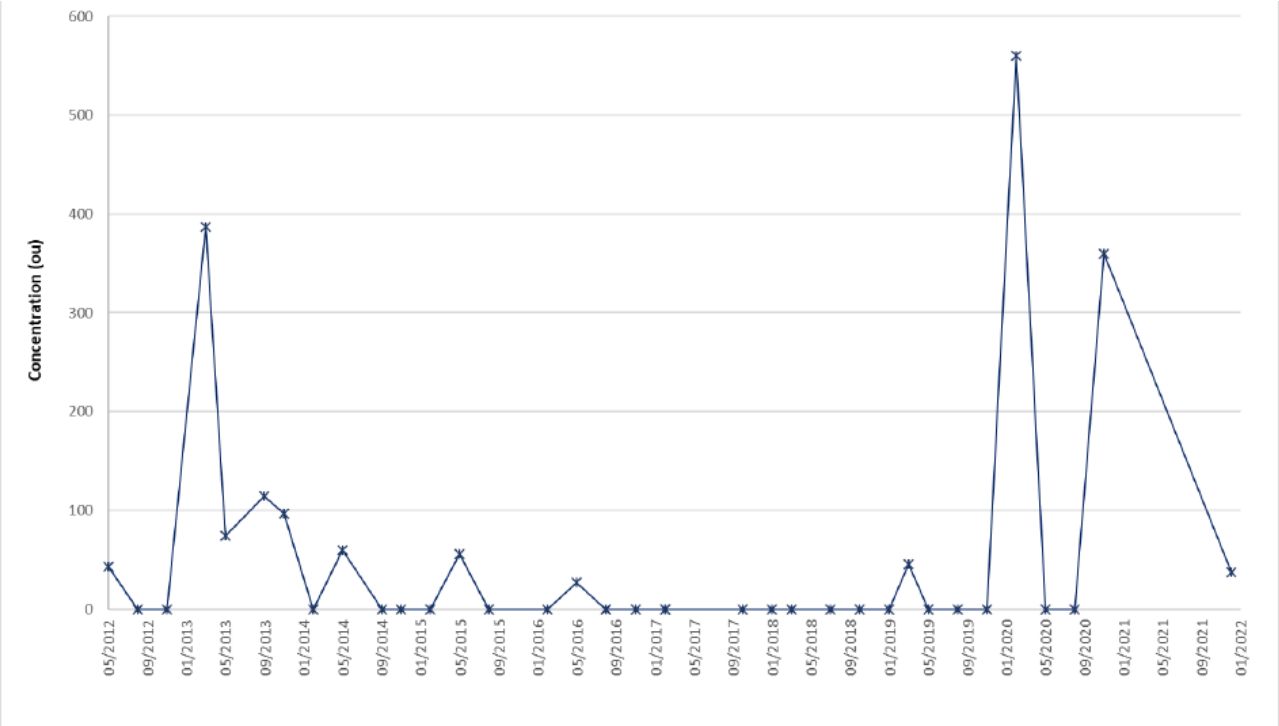
The following Figures 48 to 53 show the annual odour monitoring results from the sites Environmental Farm. In 2015 the EPL frequency for odour monitoring at the Environmental Farm was reduced from quarterly to yearly as a result of a significant reduction in odour emissions due to the installation of the WWTP in 2010.

The storage ponds store treated water from the WWTP for irrigation on the Environmental Farm. All the pond results show significant reductions in odour since operation of the WWTP.

The Sulphur Oxidation (SO) basin, as shown in Figure 53, is an aerated pond which receives treated water from the anaerobic treatment system prior to entering the MBR and RO systems. All water passing through the MBR-RO system is returned to the factory for re-use. Surplus water from the SO pond is sent to the storage ponds for irrigation.

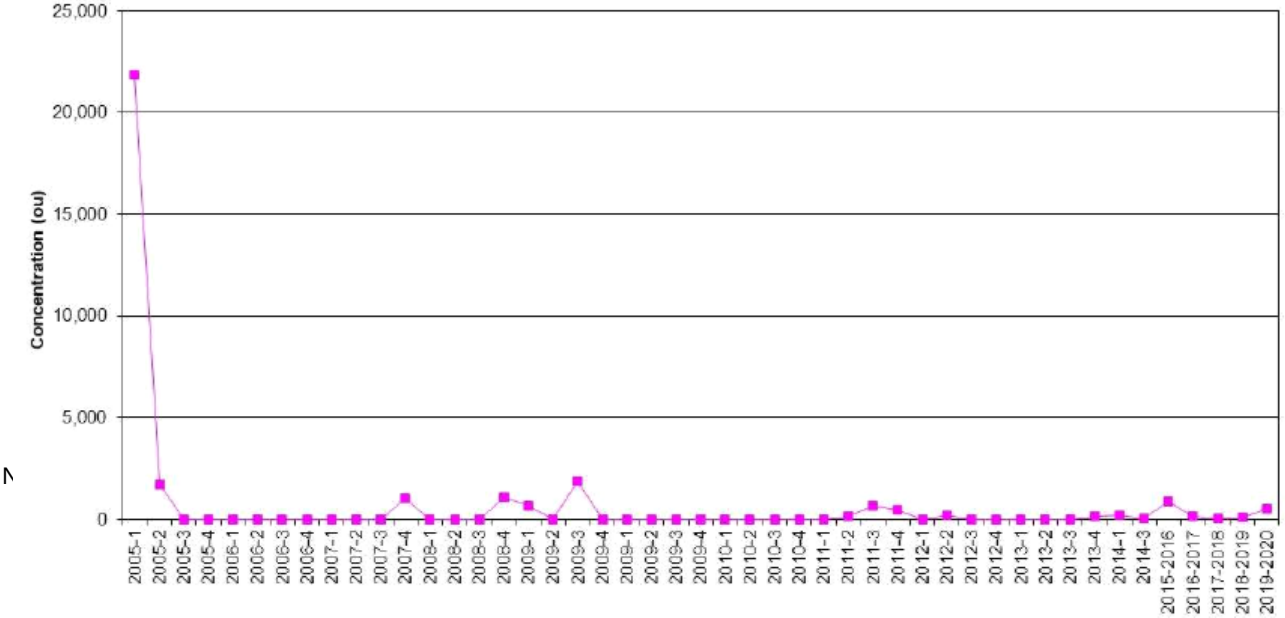
Note the EPL reporting year is from 1st May 2021 to 30th April 2022, with the 2021-22 result tested in December 2021 (Quarter 3).

Figure 48 - Pond No. 1 (EPL Point No. 19)



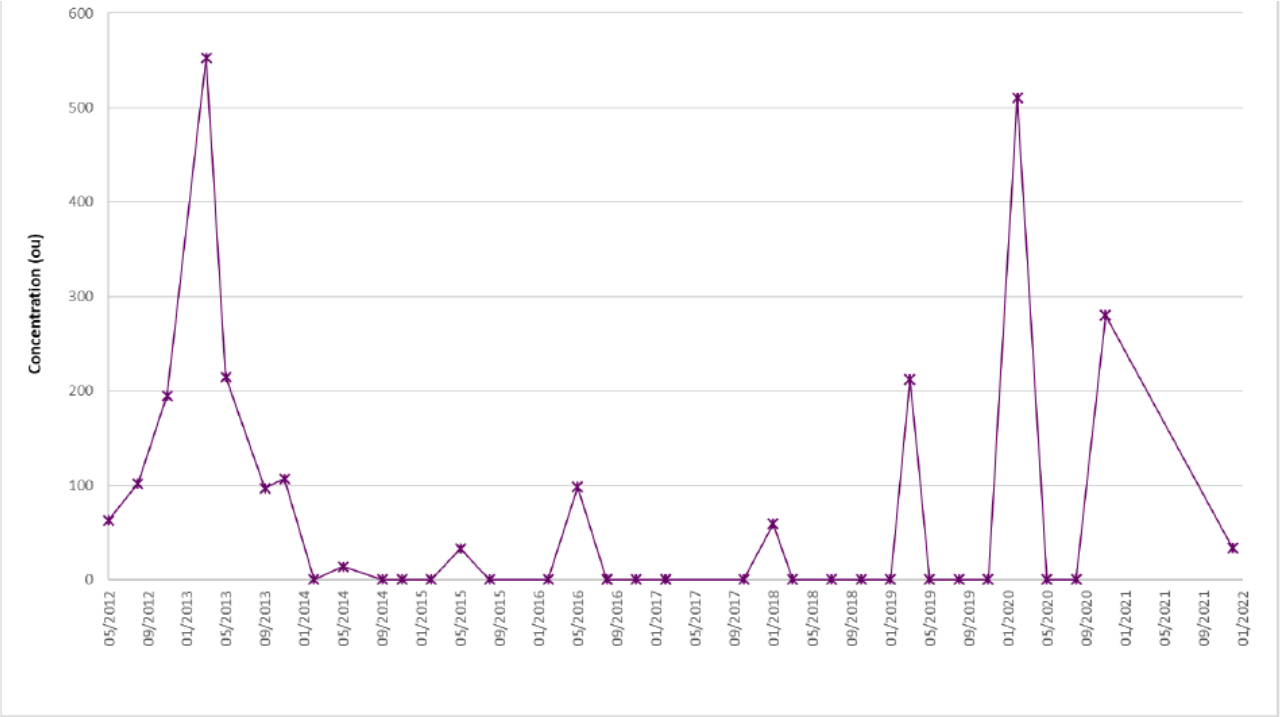
Zero results represent insufficient volume to perform sampling.

Figure 49 - Pond No. 2 (EPL Point No. 20)



N

Figure 50 - Pond No. 3 (EPL Point No. 21)



Zero results represent insufficient volume to perform sampling.

Figure 51 - Pond No. 5 (EPL Point No. 23)

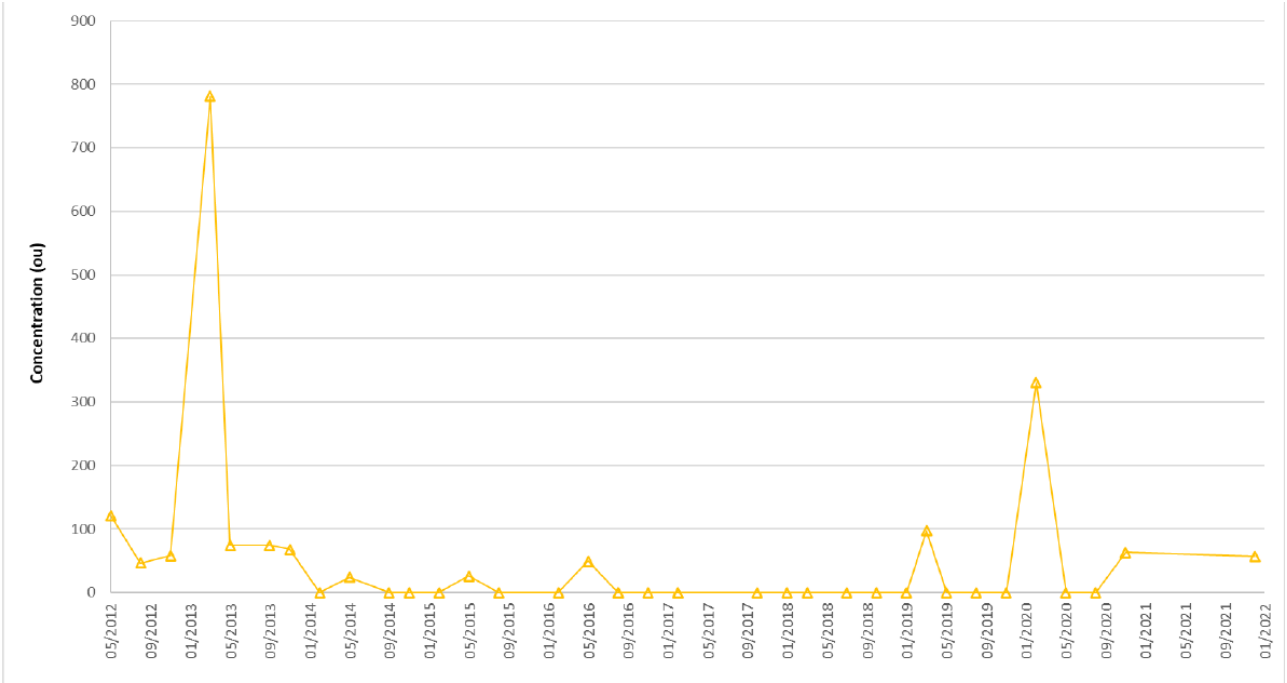
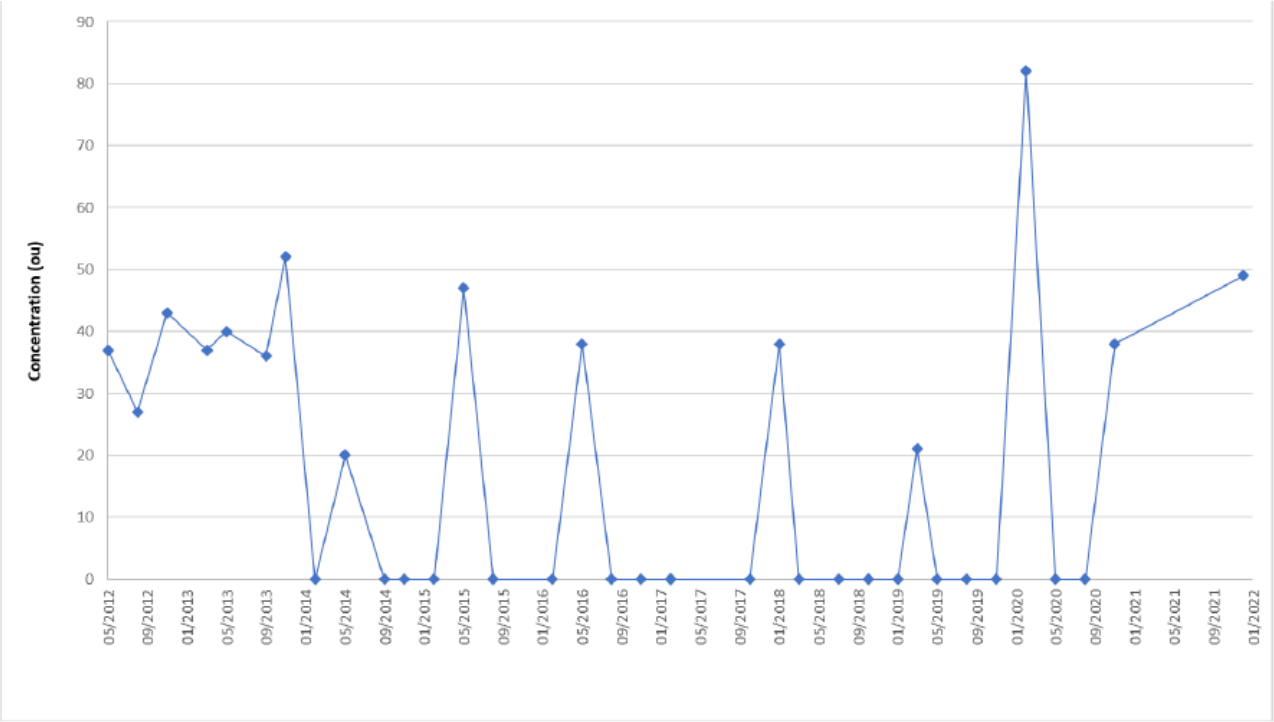
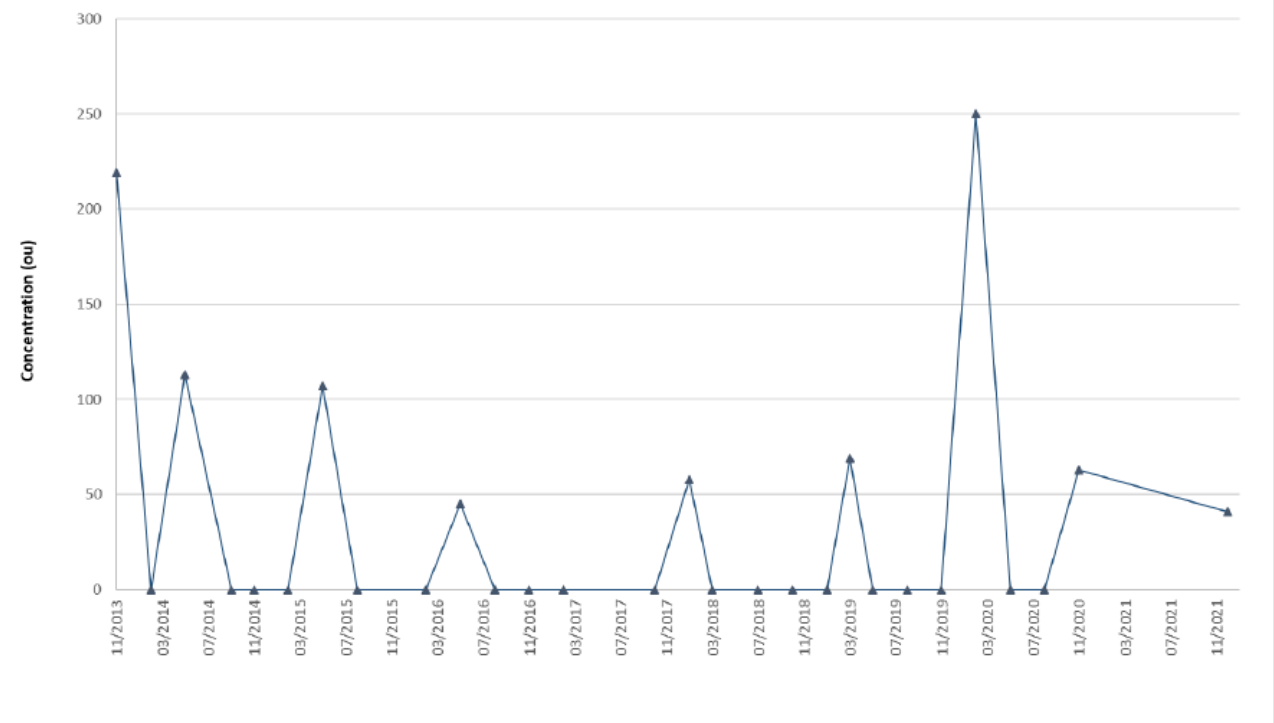


Figure 52 - Pond No. 6 (EPL Point No. 24)



Zero results represent insufficient volume to perform sampling.

Figure 53 - Sulphur Oxidation Basin (EPL Point No. 25)



Zero results represent insufficient volume to perform sampling.

6.5.3 Annual Odour Audit

Annual odour modelling is conducted each year and submitted as part of the sites EPL Annual Return and annual odour audit requirements under schedule 3, condition 5 of the Consent. The 2022 independent odour audit was conducted in September 2022 by Northstar Air Quality Pty Ltd.

The odour modelling predicts the ground level odour concentration (in odour units, OU) at the nearest residential receptors. The previous 12 months of odour monitoring data are used to update the site's odour model. The results of the odour modelling for the current reporting period 2022 and the previous year 2021 are shown in Figures 54 and 55 respectively.

A comparison between Figures 54 and 55 shows similar contour plots to the previous year.

The figures below show 2 contour plots for comparison as follows:

1. Red = All odour sources at current ethanol production levels (254 ML pa) in 2022*
2. Blue = All odour sources scaled to approved ethanol production limit (300 ML pa)

* Daily production rate converted to annual production equivalent at the time of sampling

Figure 54 - Odour Modelling Contour Plot 2022

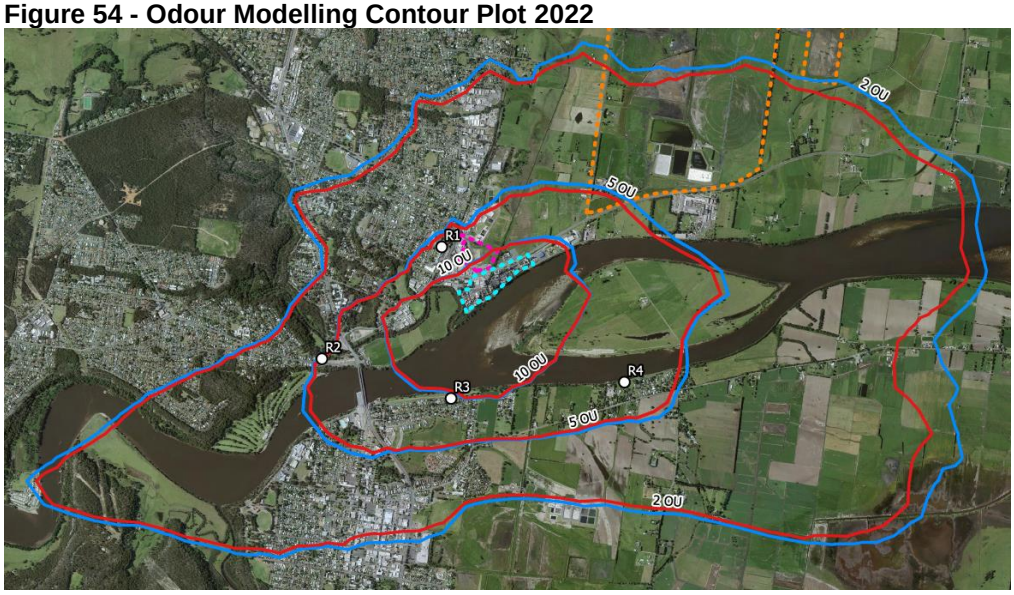
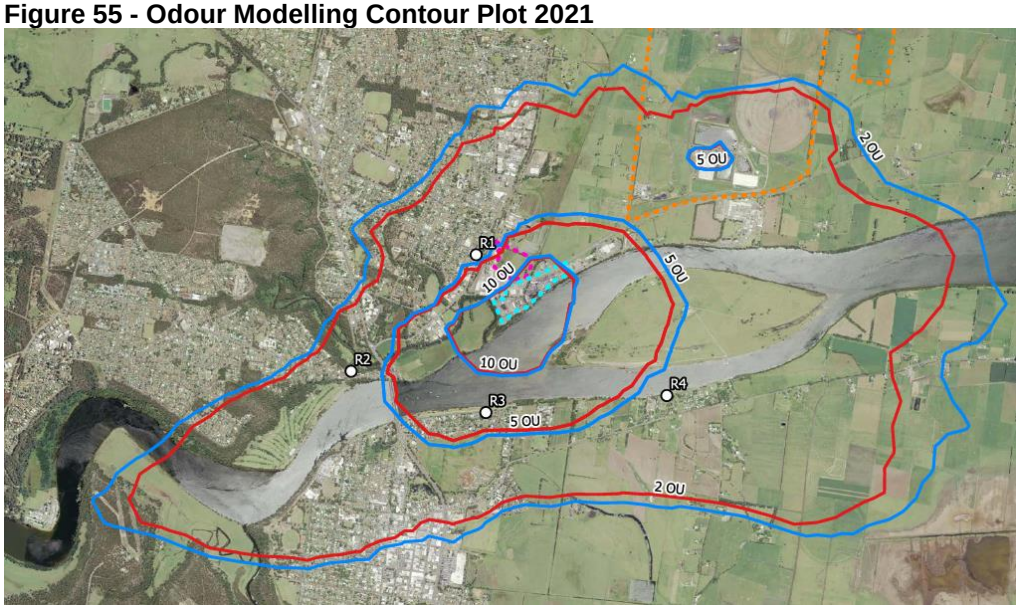


Figure 55 - Odour Modelling Contour Plot 2021



Predicted odour concentrations at all 4 receptor locations are shown in Table 6 below. The results show odour concentrations are below the 2008 EA predictions at Bomaderry, whilst Terara, North Nowra & Nowra are slightly above the odour concentrations approved in the 2008 EA.

Table 6 Annual odour modelling predicted odour concentrations

Receptor Location	EA 2008 Approval	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
R1 Bomaderry	6	4.7	4.8	4.7	3.6	4.2	4.4	4.8	4.3	3.1	3.8	3.9	4.1	5.2
R2 North Nowra	3	2.3	2.6	2.6	2	2.2	2.2	2.2	2.4	2.0	3.1	2.9	3.6	5.0
R3 Nowra	5	4.8	4.9	5.3	4.2	4.9	4.6	5.1	4.9	3.6	5.3	5.0	6.0	9.1
R4 Terara	5	5.3	5.1	5.4	3.9	4.6	4.6	5.3	4.6	3.0	4.0	3.9	4.3	6.2

N.B. Figures above and below are based on actual emissions, not scaled to 300 ML pa (as per EPL Annual Return requirements)

The predicted increase in odour concentrations at the receptors in 2022 is largely the results of elevated Biofilter outlet concentrations which are a ground-level odour source and due to its location have the most impact at the Nowra and Terara locations.

Figures 56 to 58 show the odour unit concentrations at the nearest residential receptors against predictions in the EA (blue line) and NSW EPA guidelines (red line).

Figure 56 - Odour Modelling Results - Bomaderry

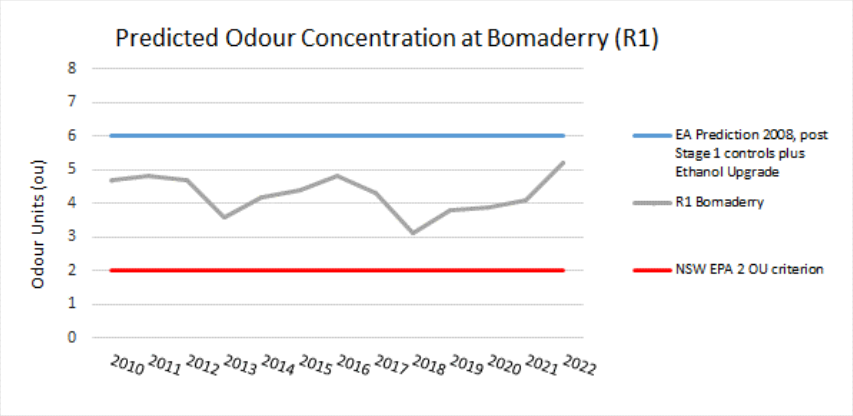


Figure 57 - Odour Modelling Results - North Nowra

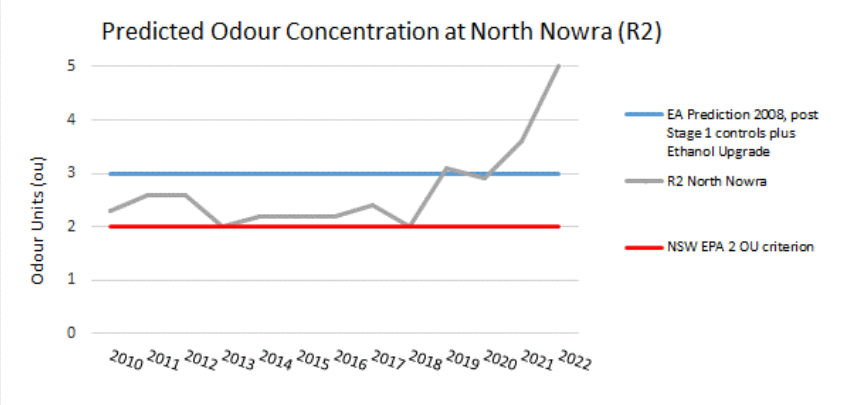
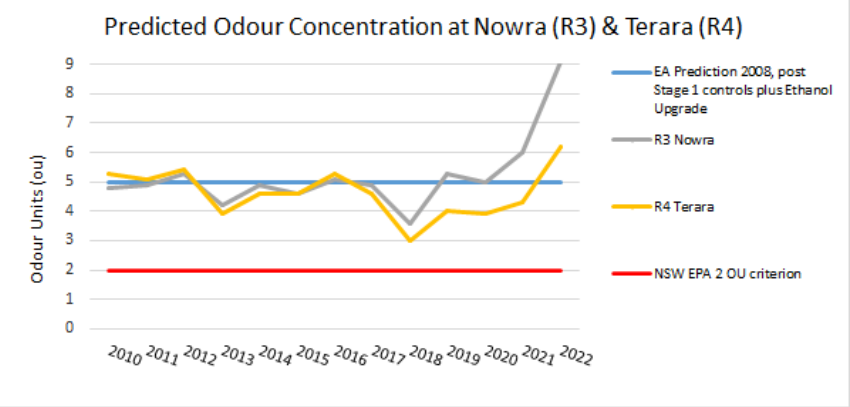


Figure 58 – Odour Modelling Results - Nowra and Terara



As required under condition 5 of the Consent, the annual independent odour audit was completed for the 2022 reporting year by Northstar Air Quality Pty Ltd.

The non-compliances and recommendations from the 2022 odour audit and Shoalhaven Starches response to the audit recommendations are shown in Table 7 and Table 8, which has been submitted to the DPIE and EPA.

Table 7 - 2022 Independent Odour Audit Non-compliances

Cond. No.	Condition and Requirement	Audit Report Non-compliances	Shoalhaven Starches (SS) Response	Timeframe	Status
-	None	None	None	-	-

Table 8 - 2022 Independent Odour Audit Recommendations

Audit Reference	Audit Report Recommendations	Shoalhaven Starches (SS) Response	Timeframe	Status
21/22-REC-A	Whilst it is acknowledged that the biofilters are achieving a reasonable degree of odour control (56 % efficacy), the flow-weighted average odour concentration is not achieving the de-facto 500 OU standard. This matter remains an unresolved issue and it is recommended that it is resolved at the earliest opportunity.	The biofilter media was replaced on Biofilter B in September 2022.Once the new media acclimatises and odour results are satisfactory, the media will be replaced on Biofilter A. Further quarterly odour monitoring will be undertaken to determine if this resolves the issue.	-	In progress.
21/22-REC-B	It is recommended that the safety issue(s) preventing EPA 20 from being tested are resolved to ensure that EPA 20 is available to be tested during the 2022-2023 period. It is understood that the safety issue is the stability of the dam banks due to the low water levels and the dam is only used when all other dams are full.	It is planned to remove the bank between Dam 1 (EPA 19) and Dam 2 (EPA 20) and convert to a single larger dam. These proposed works will be included in a modification application to the Department of Planning as part of proposed upgrades to the site's wastewater treatment plant.	October 2023	In progress.
21/22-REC-C	With regard to flow measurements at EPA ID 8 the odour monitoring reports state: "Sampling was undertaken at the exit of the stack as it was the only accessible area for the samples to be taken. No temperature or flow rate readings could be taken due to access issues." It is recommended that the access restrictions to EPA ID 8 are resolved to enable compliant odour monitoring to be performed. It is understood that new sampling ports have been installed (Sep 2022) that would be in compliance during the following odour audit period.	New sample ports have been installed. No further action required.	-	Complete.
21/22-REC-D	It is recommended that the difference between reported predicted concentration values as reported in (GHD, Nov 2021) and (GHD, Jan 2022) is clarified so that there is consistency between the modelling reports.	GHD response is shown below (no further action required): The discrepancy between odour results presented in the MOD21 and MOD23 AQIA's is due to a different method in calculating the one second 99th percentile odour impacts based on hours of operation. The discrepancy arose as chronologically, the MOD23 AQIA was prepared before the MOD21 AQIA. During preparation of the MOD21 AQIA (i.e. the MOD23 AQIA had been completed) the NSW EPA	-	Complete.

		requested a different approach to calculating odour impacts be used. The differing methods are explained in-text in the MOD21 and MOD23 AQIA's (refer to Sections 7.4 of MOD21 [excerpt provided below] and Section 7.3 of MOD23) and are summarised below: • MOD21 – odour impacts predicted based continuous exposure 24 hours per day, 7 days per week to align with the hours of operation of the site (this is a new approach requested by the NSW EPA) • MOD23 - based on the hours of operation of the receptors (this is the existing approach adopted for all previous MOD's) *"Seven commercial/industrial receptors are included in the assessment. These are all located within approximately 125 m of the site. For previous modifications up to Mod 19, one second, 99th percentile odour impacts have been predicted based on the hours of operation of the receptors as per Section 2.2 (i.e. predicted odour impacts when the sites are not operational have been excluded from the assessment). For Mod 21, a revised approach was adopted where one second 99th percentile odour impacts were predicted based continuous exposure 24 hours per day, 7 weeks per week to align with the hours of operation of the site. It is noted that the commercial receptors may not be occupied for all hours of the day, consequently the predictions in Table 7.2 show the potential worst case odour impacts."* Therefore, the requirement to assess odour impacts at commercial receptors based on continuous exposure 24 hours per day, 7 days per week was requested by NSW EPA after the MOD23 AQIA had been prepared and consequently was not included in the assessment. It is noted that adopting the new calculation method only changes the predicted odour concentrations at commercial receptors C1 and C7 (when rounded to 1 d.p.).		

6.6 NOISE

Six monthly noise monitoring is required in accordance with the sites EPL and condition 12 of the Consent.

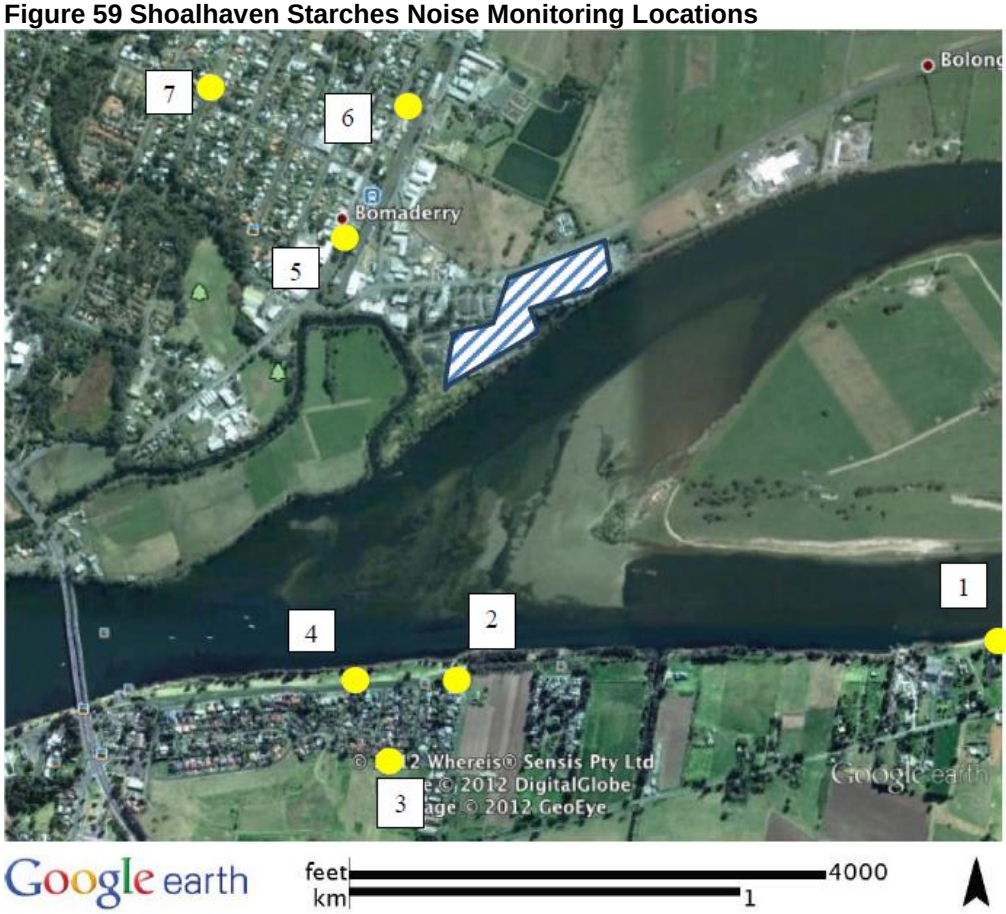
The sites noise limits are shown in Table 9 and the noise monitoring locations shown in Figure 59.

Table 9 Site Noise Limits

Location	Day/Evening/Night $LA_{eq(15\ minute)}$ dB(A)	Night $LA_{1(1\ minute)}$ dB(A)
1 - Terara on the south side of the Shoalhaven River	38	48
2,3 & 4 - DILWra on the south side of the Shoalhaven River	38	48
5 - Meroo Street, Bomaderry	42	52
6 - Other residential locations in Bomaderry	40	50
R1 – 390 Bolong Road Bomaderry	40	-
R2 – Pig (Burraga) Island	40	-
R3 – 39 Hanigans Lane Bomaderry	40	-
R4 – 1 Bryant Street Terara	40	-

Notes:
- Noise limits for Location 6 (other locations in Bomaderry) is depicted in Figure 49 below as Location 7. This is due to two noise monitoring locations (5 and 6) being conducted in Meroo St Bomaderry.
- Noise limits underlined in red are applicable to the use of the Paper Mill site (MOD 14).

Figure 59 Shoalhaven Starches Noise Monitoring Locations



Noise monitoring results for October 2021 were found to be 100% compliant with the EPL noise limits as shown in Table 10. Noise compliance testing was not undertaken during the second semester of 2022 (typically conducted around February/March) due to the unavailability of the noise testing consultant.

Table 10 – October 2021 Noise Monitoring Results

Location	Date	Measurement Period	Measured levels dB(A) LA_{eq}	100 percentile limit	Exceedance (yes/no)
1	28/10/2021	15 min	<34	38	no
2	28/10/2021	15 min	38	38	no
3	28/10/2021	15 min	<23	38	no
4	28/10/2021	15 min	37	38	no
5	28/10/2021	15 min	41	42	no
6	28/10/2021	15 min	42	42	no
7	28/10/2021	15 min	<36	40	no

Note the noise limit descriptor has been changed from LA_{10} to LAeq as per the site's EPL variation on 20-6-18 however the noise limits remain the same.

Historical six-monthly noise monitoring results are shown in Figures 60 and 61.

Figure 60 - Noise Monitoring Results at Nowra (locations 2, 3 & 4) and Terara (location 1)

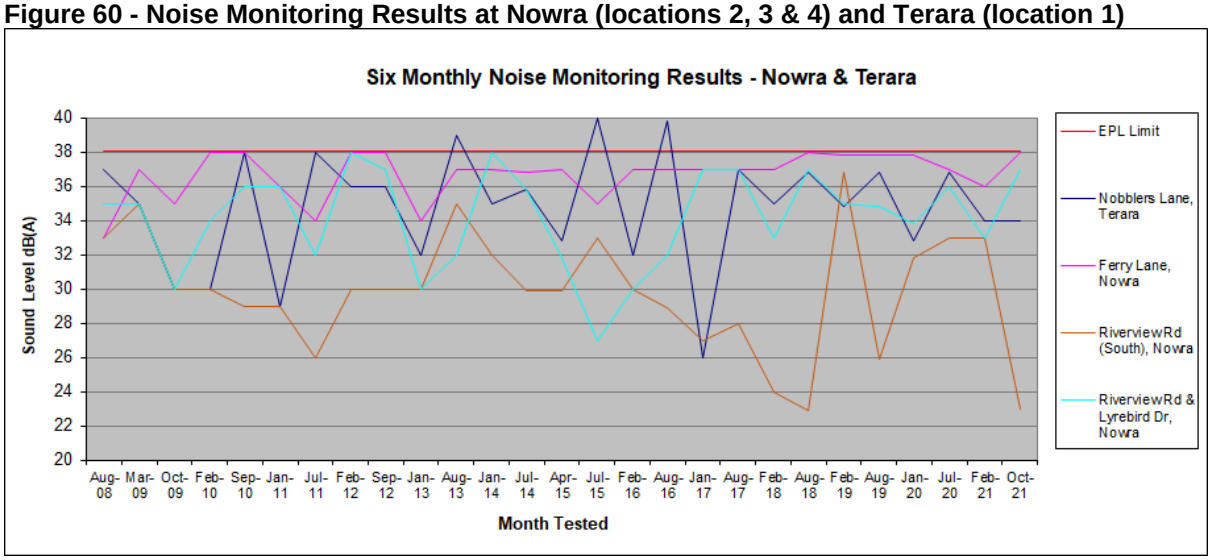
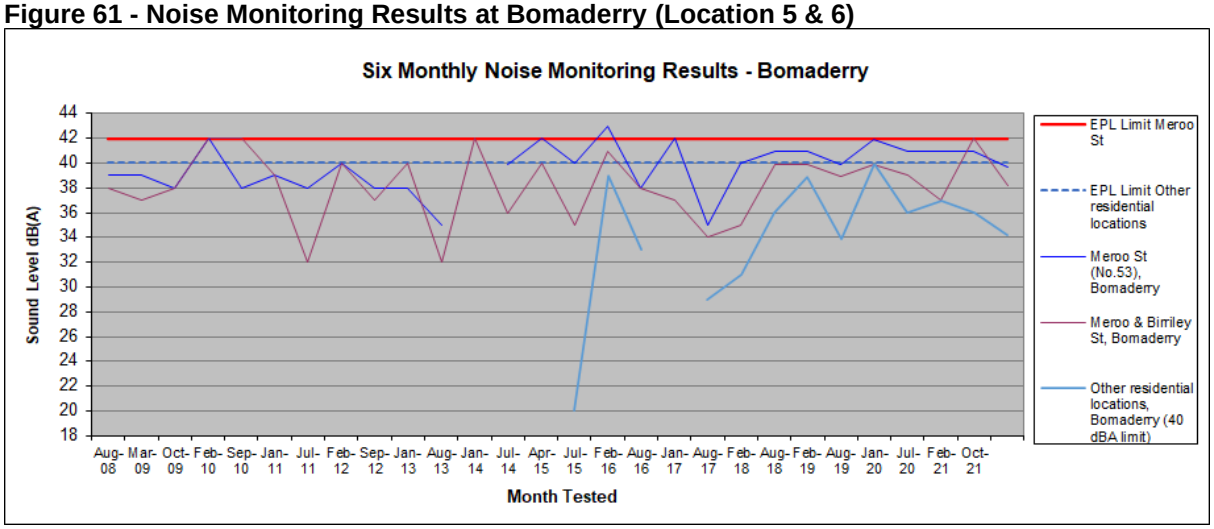


Figure 61 - Noise Monitoring Results at Bomaderry (Location 5 & 6)



N.B. Missing noise results in the above figures are due to unstable/variable weather conditions that would be described as atypical and from the EPA's *Noise Policy for Industry* would require exclusion during any compliance testing.

There is no EPL required for the former Paper Mill site, or any noise testing frequency stipulated in the Consent. Noise verification testing was conducted by The Acoustic Group in February 2019 at the Paper Mill site to determine compliance with the MOD 14 Consent and was found to be compliant with the noise limits which was reported in the 2020 AEMR.

6.6.1 Noise Validation

There was no noise validation monitoring conducted, as required under condition 14N, during the reporting year.

Several noise design verification reports were undertaken during the reporting year and submitted to DPE which are shown in Table 11 below.

Table 11 – Design Noise Verification Reports

Condition	MOD	Title
14M	16 & 17	Design Noise Verification Report, Specialty Products Building, 3-9-2021
14M	16 & 17	Design Noise Verification Report, Gluten Dryer 8, 16-12-2021
14F & 14H	9 & 21	Design Noise Verification Report, North Packing Plant, 1-2-2022
14M	11	Design Noise Verification Report, DDG Dryer #5, 23-11-2021

The above reports conclude that the proposed noise design goals for individual items of plant are acceptable to achieve noise limits in the Project Approval MP 06_0228.

6.7 SOIL MONITORING

Annual soil monitoring has been completed in accordance with the sites EPL (no EPL limits prescribed). Annual testing of the topsoil profile is sampled from representative locations within the approved irrigation area (Point 43) at the sites Environmental Farm.

A summary of the average annual soil results is shown in Table 12.

Table 12 - Annual Soil Monitoring Results

	Average Soil Sampling Results									
Parameter	2014	2015	2016	2017	2018	2019	2020	2021	2022	Units
Cation Exchange Capacity	40.77	39.6	38.0	41	39.3	33.7	41.3	38	41.8	cmol(+)/kg soil
Electrical Conductivity	1.52	0.55	1.0	1.1	0.8	1.0	1.3	0.8	1.14	dS/m
Exchangeable sodium percentage	2.9	6	2.2	4.2	3.4	3.6	4.9	2.5	3.46	%
Nitrate	69	15.88	71.9	60	63.2	97.1	63.4	57.3	61	mg/kg
Nitrogen (total)	7.6	8217	6992	7311	7668	0.6	7030	6670	7350	mg/kg
Organic Carbon	910	83510	48870	87046	61720	52	76350	60340	62437	mg/kg
pH	7.3	8.01	7.3	7.4	7.3	7.4	7.4	7.2	7.6	pH
Phosphorus (total)	2.8	446	236	107	241	167.4	106.8	3830	4187	mg/kg

General comments on the soil monitoring results are as follows:

- Test results will vary from paddock to paddock due to differences in soil type, irrigation volumes, changes in seasonal conditions, rainfall and land management practices taking place at the paddock scale.

- All soil parameters remain relatively steady compared to previous years. Elevated Phosphorus levels are likely the result of elevated Phosphorus in the treated effluent for irrigation.

- Exchangeable sodium percentage (ESP) levels over 5% are classified as being sodic associated with an increased tendency for clay dispersion and loss of permeability. High levels of organic matter and salinity can help counteract the potential of dispersion and maintain soil structural stability. High levels of ESP are a natural feature for low lying areas of the Shoalhaven River.

- Nitrogen and Nitrate levels remain similar to previous years and fluctuate with seasonal conditions and pasture growth and removal.

- Elevated organic carbon levels help maintain soil structural stability.

6.8 LANDSCAPE & VEGETATION MANAGEMENT PLAN

Shoalhaven Starches Landscape & Vegetation Management Plan (LVMP) continues to be implemented during the reporting year. The action plan status of the LVMP is shown in Table 13.

Lantana removal and planting of lomandra species along Abernethy's Creek bank adjacent to the factory south of Bolong Rd towards the outflow to the Shoalhaven River has continued in addition to ongoing weed suppression across the site and along riparian zones.

Table 13 - LVMP Summary of Actions Update 2022

ASPECT / FORESHORE	MANAGEMENT ZONE	AREA	ACTIONS	IMPLEMENTATION SCHEDULE	STATUS	REFERENCE
Phase 1						
Landscaping	-	Fermenters	Plant Casuarina Glauca at 1.5m spacing to screen fermenters		Complete	Appendix A
		New Packaging Plant [1]	Remove weeds and plant Melaleuca, Eucalyptus and Casuarina species between packaging plant and Bolong Rd.	On completion of construction works	Incomplete (Packing Plant Not Constructed)	Appendix C
Shoalhaven River	Zone A	Emergency Revetment	Removal immature coral trees from revetment and adjacent area		Complete	Figure 4
			Complete revegetation of revetment IAW landscaping plan (Appendix B)			
			Plant fast growing Casuarina glauca at rear of revetment	On completion of construction works at flour mill	Complete	
			Plant Eucalyptus and Melaleuca canopy species, and Lomandra as a groundcover at rear of revetment			
		Confluence Shoalhaven River and Bomaderry Creek to 10m behind the bank	Slash and spray Kikuyu grass		Complete	Figure 4
			Eradicate African Boxthorn and remove Lantana			
			Plant out waterline with Grey Mangroves and Juncas Krausii			
			Plant fast growing native species at the top of the bank and canopy species at the rear of the bank, and fill in with groundcovers			
Bomaderry Creek	Zone A	Confluence with Shoalhaven River to 250m upstream	Slash and spray Kikuyu grass		Complete	Figure 5
			Plant top of bank with canopy species and midstorey species			
			Fill in with groundcovers			
Abernethy's Creek	Zone A	Western bank, north of Bolong Rd [1]	Slash and spray Kikuyu grass	To be completed when once Packing Plant is constructed.	Incomplete (Packing Plant Not Constructed)	Figure 6 and Appendix C
			Plant full list of riparian species at rear of bank			
			Plant top of bank with Melaleuca erificifolia and other listed species			
			Fill in the Lomandra and Dianella spp.			
Broughton Creek	Zone A	Stock flood refuge area to 10m behind bank	Slash and spray Kikuyu grass		Complete	Figure 7
			Plant canopy and midstorey species at rear of bank			
			Plant scattered Casuarina glauca and Myoporum acuminatum on bank (but not the waterline)			

			Erect temporary barriers when area is used as flood refuge			
		Embankments with no canopy or midstorey	Slash and spray Kikuyu grass		Complete	
			Plant canopy and midstorey species at rear of bank			
			Plant scattered Casuarina glauca and Myoporum acuminatum on bank (but not the waterline)			
Phase 2						
Shoalhaven River	Zone B	Dense area of Acacia mearnsii	Clear 10m x 10m plots and replant with other canopy species at 2m spacing		Complete	Figure 4
			Remove acacia seedlings and monitor success of plantings			
		Grassy area behind crib shed	Whipper-snip and spray Kikuyu grass	Commence by June 2022	Incomplete	
			Plant toe with water line species			
			Plant canopy and midstorey species at top of bank			
			Fill in with groundcovers			
	Zone C	Eastern boundary to revetment	Spray lantana		Complete	
			Plant out with groundcover species (Lomandra)			
		West of Abernethy's	Remove lantana using mosaic approach		Complete	
			Suppress African Boxthorn and Blackberry			
	Unzoned	Between crib shed and revetment	Geotechnical assessment of bank stability to assess potential of removing Coral trees from bank	Coral trees are to remain	Complete	
Bomaderry Creek	Zone B	Upstream and downstream embankment	Remove Lantana using mosaic approach		Complete	Figure 5
			Eradicate African boxthorn and Blackberry			
			Frill privet			
Abernethy's Creek	Zone B	Eastern bank, north of Bolong Rd [1]	Remove Lantana using mosaic approach	To be completed when once Packing Plant is constructed.	Incomplete (Packing Plant Not Constructed)	Figure 6
			Assist natural regeneration, or supplementary plantings			
		Both banks, south of Bolong Rd to electrical easement	Spray weeds on embankments	Estimate 2 - 3 years to complete	In progress	
			Dense plantings of groundcover species			
		Both banks, south of electrical	Suppress Privet and spray other weeds		In progress	
			Plant eastern bank with selection of midstorey species			

		easement to outflow [2]				
Broughton Creek	Zone A	Stock flood refuge area to 10m behind bank	Plant out waterline with suitable mangrove species		Complete	Figure 7
		Embankments with no canopy or midstorey	Plant out waterline with suitable mangrove species		Complete	
	Zone B	Transition areas	Slash and spray and Kikuyu grass		Complete	
			Plant suitable upper bank canopy and midstorey species			

Phase 3 Additional Landscaping Works 2011 - 2019

ASPECT / FORESHORE	PA 06_0228 Approval	AREA	ACTIONS	IMPLEMENTATION SCHEDULE	STATUS	REFERENCE
Landscaping	MOD 2	Bolong Rd - DME Storage / Ethanol Loadout	Screen plantings as per Landscape Plan Appendix 2B (MP06_0228 MOD 2)		Complete	Appendix A
		Bolong Rd - Fermenters / Cooling Towers	Screen plantings as per Landscape Plan Appendix 2B (MP06_0228 MOD 2)		Complete	
		Bolong Rd - Ethanol Distillery	Screen plantings as per Landscape Plan Appendix 2B (MP06_0228 MOD 2)		Complete	
		Bolong Rd - Fermenters to Mid-section of Open Paddock	Screen plantings as per Landscape Plan Appendix 2B (MP06_0228 MOD 2)		Complete	
Landscaping	MOD 3	Bolong Rd - Open Paddock to ex. Dairy Farmers site	Screen plantings as per Landscape Plan Appendix 2C (MP06_0228 MOD 3)		Complete	Appendix B
Landscaping	MOD 9	Packing Plant [1]	Screen plantings as per Landscape Plan MN262-002	On completion of construction works	Incomplete (Packing Plant Not Constructed)	Appendix C & Figure 6
Landscaping	MOD 11	Coal & Woodchip	Screen plantings as per Landscape Plan MN6638-102	Complete by December 2019	Complete	Appendix D

		Storage at Farm				
Landscaping	MOD 14	Former Paper Mill Site	Screen plantings as per Landscape Plan MN6416-001	Complete by end of June 2018	Complete	Appendix E
Landscaping	MOD 15	SupaGas Plant at ex. Dairy Farmers site	Screen plantings in front of CO2 Plant	On completion of CO2 Plant	Complete August 2019	Appendix F
Landscaping	MOD 16	BOC Gas site	Provide screening landscaping to the south of the proposed new indoor electrical sub-station along the frontage of Bolong Road. Refer to Plan MN6531-010	On completion of Indoor Electrical Substation	Incomplete (Substation not constructed)	Appendix G

Notes:
1. Phase 1 & Phase 2 landscape screening & riparian plantings along Abernethy's Creek north of Bolong Rd has not been completed due to the new Packing Plant (MOD 9 and MOD 21) project still under construction (any plantings will likely be impacted by construction works)

2. Some Phase 2 riparian plantings along Abernethy's Creek south of Bolong Rd towards the Shoalhaven River have been completed; this area will be given priority in the next 3 years.

3. References in the table are from Shoalhaven Starches Landscape and Vegetation Management Plan, EN-P-251.

7. COMMUNITY

7.1 COMPLAINTS

The annual reporting requirements under schedule 4, condition 3d) are:

d) include a comprehensive review of the monitoring results and complaints records of the Development over the previous year …

A total of 4 environmental complaints were received in 2022, compared to 5 received in 2021. Total complaints received by year and by type are shown in Figures 62 and 63 respectively.

Table 14 details the types of complaints received during the year and the actions taken to address the complaint.

Table 14 - Summary of Complaints 2022

Date and Time Rec'd	Location	Issue	Action Taken
11-10-2021 13:41	Bomaderry	Odour	Odour complaint received via EPA, described as 'cheesy whey smell' detected on the evening of 6 October which persisted for the next two days. Investigation revealed odour was not coming from the Shoalhaven Starches premises but from local farmers applying fertiliser (chook manure) on their land. EPA and complainant advised of the findings.
20-12-2021 14:45	Bomaderry	Rail Noise	Noise complaint received via EPA of noise and diesel fumes coming from trains idling on the railway. Investigation revealed trains were left idling unattended for an extended period. Contacted the complainant and apologised for the inconvenience caused. EPA advised of the findings.
9-4-2022 10:04	Bomaderry	Noise	Noise complaint received, complainant woken by loud noise at ~ 0430. Investigation revealed noise caused by high pressure mechanical clean of stillage evaporators. Details of the complaint were discussed with the complainant.
9-4-2022 05:27	Bomaderry	Noise	Noise complaint received, complainant woken by loud noise at ~ 0500, never heard this noise before. Investigation revealed noise caused by high pressure mechanical clean of stillage evaporators. Complainant advised of the cause.

Note: complaints received are aligned with the EPL reporting year from 1st May 2020 to 30th April 2022.

Figure 62 – Total Complaints received by Year

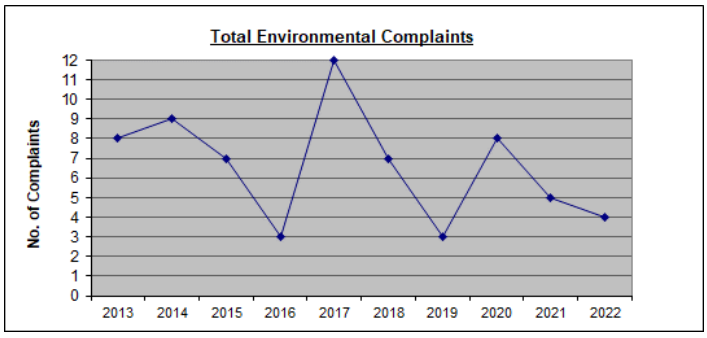
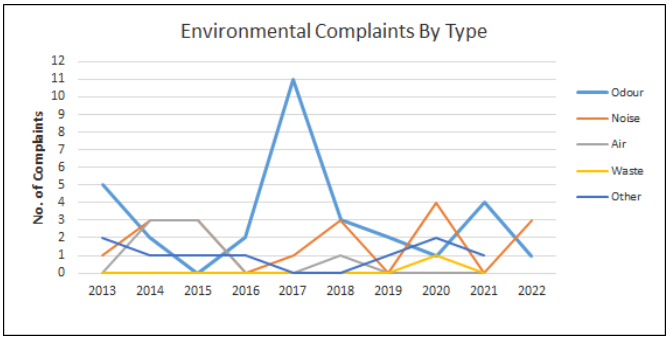


Figure 63 – Total Complaints received by Type



7.2 COMMUNITY RELATIONS

During the reporting period Shoalhaven Starches contributed significantly to the local community. Table 15 lists the local community organisations that received contributions from Shoalhaven Starches in the 2022 reporting year.

Table 15 - Community Funding Recipients

ORGANISATION / INDIVIDUAL / CHARITY	REMARKS
PCYC School Breakfast Club	Ongoing sponsorship through cash donation to the local schools for the School Breakfast Program
Bomaderry Tigers Cricket Club	Donation
Shoalhaven River Festival	Donation
Bomaderry Vision	Donation / Sponsorship
Manildra Cup Gold Day, Nowra Golf Club	Donation
Milton CWA	Donation of scone mix and bakery mixes
Nowra Community Food Store	Donation of The Healthy Baker flour

Due to the COVID-19 pandemic, there was limited opportunity participate in direct community engagement activities during the year.

Two Shoalhaven Starches Community Newsletters, Spring 2021 (edition 8) and Autumn 2022 (edition 9), were prepared and distributed by mail to approximately 30,000 homes in the Bomaderry/Nowra region. The newsletter outlines the activities and projects ongoing at the Shoalhaven Starches site and has also been widely distributed electronically, and is listed online through our website and social media channels. A copy of the newsletters can be found at: https://www.manildra.com.au/shoalhaven-starches-newsletter.

Manildra Group's The Cultivator Magazine Spring 2021 edition and Autumn 2022 edition were released in hard copy and electronically. The electronic version of the magazine is sent to over 5,000 stakeholders including joint ventures, producers, customers, staff, industry bodies and subscribers. A copy of the magazine can be found at: https://www.manildra.com.au/the-cultivator/

8. INDEPENDENT ENVIRONMENTAL AUDIT

An independent environmental audit was conducted in the 2019 reporting year (April 2019) against the sites consolidated Development Consent 06_0228. Of the 167 development consent conditions audited, 15 non-compliances were identified which represent 91% compliance with Consent conditions during the 3-year audit period. A summary of the audit findings is shown in Table 16 below.

Table 16 - Summary of 2019 Audit Findings

Schedule	Compliant	Non-compliant	Not triggered	Total
2 - Administrative Conditions	16	4	8	28
3 - Specific Environmental Conditions	92	9	28	129
4 - Environmental Management, Reporting & Auditing	8	2	0	10
Total	**116**	**15**	**36**	**167**

Table 17 provides the status of the non-compliances raised during the 2019 audit. Of the 15 non-compliances raised, 2 remain in progress.

The next independent environmental audit is due in April 2022. The audit has commenced and is anticipated to be completed by the end of this year.

Table 17 - Action Plan to address non-compliances received in the 2019 Independent Environmental Audit (update 2022)

NC No.	Sched	Cond	Requirement	Finding	Recommendation	Shoalhaven Starches Response	Timeframe	Status
NC1	2	2	The Proponent shall carry out the project generally in accordance with the: a) EA and associated site plans (see Appendix 2); b) amended modification proposal MP 06_0228 MOD 1 et al.	The Proponent was issued a PIN for non-compliance with this condition. Notwithstanding additional non-compliances found during the audit for other specific conditions, the auditor considers the Proponent to have carried out the project generally in accordance with the requirements listed.	Consider developing a document that briefly describes each MOD and a summary of the approved works for distribution to key / relevant staff to minimise the risk of unapproved works being carried out on site.	Application submitted by SS to DPIE on 1st November 2016 to 'regularise' the storage of coal and woodchip stockpiles at the SS factory site and Environmental Farm. DPIE approval received on 1st September 2017 (MOD 11) Each project modification approval is distributed to the relevant staff.		**Complete.**
NC2	2	8B	Within three (3) months of the date of approval of MP 06_0228 MOD 5, the Proponent shall: a) obtain and provide copies to the Secretary of all necessary building certificate(s) from Council for any structures proposed as part of MP 06_0228 MOD 5 that have been constructed or partially constructed prior to the approval of MP 06_0228 MOD 5; and b) ensure that all new structures, and any alterations or additions to existing structures, are constructed in accordance with the relevant requirements of the Building Code of Australia.	Building certificate not yet obtained	Ensure all approval requirements are captured, tracked and assigned a responsibility in the compliance management system	Council building inspection on 9-10-18 and subsequent Council email dated 22-10-18 identifying two issues to be addressed. Additional works by SS to address issues completed in April 2019. Re-inspection by PCA due 8-7-2019. Council to approve once PCA re-issues building compliance certificate. The issue is being tracked in the Environmental Management System (EMS)	Sep-19	**Complete.** Building Certificate BC16/1003 issued 29-8-19
NC3	2	8C	By the end of July 2018, the Proponent shall provide copies	Building certificate applications were	Ensure all approval requirements are	SS to follow-up with Council on building inspections.	Dec-21	**In progress.** Council to inspect

NC No.	Sched	Cond	Requirement	Finding	Recommendation	Shoalhaven Starches Response	Timeframe	Status
			of building certificates, where required, to demonstrate compliance with the BCA for the alterations to structures and additional structures listed in Table A. If an item in Table A does not require a building certificate in accordance with the BCA, the Proponent shall provide written evidence, to the satisfaction of the Secretary.	submitted in June 2018, however inspections and certificates have not been issued.	captured, tracked and assigned a responsibility in the compliance management system	The issue is being tracked in the Environmental Management System (EMS)		structures and issue building certificates.
NC4	2	11	The Proponent shall ensure that all plant and equipment used on the site is: a) maintained in a proper and efficient condition; and b) operated in a proper and efficient manner.	The requirements of the condition are generally being met; however, the Proponent was issued a fine by the NSW EPA during the audit period that resulted from activities not being carried out in a competent manner.	Appropriate corrective actions (including responses to the incident accepted by the EPA) have already been put in place. No further recommendation is considered necessary.	No further action required.		**Complete**
NC5	3	9	The Proponent shall ensure the emissions from boiler stacks 2, 4 and combined boiler stack 5 and 6 comply with the limits in the EPL.	One exceedance of the EPL opacity limit was recorded during the audit period.	Appropriate corrective actions (including preventative maintenance) have already been put in place. No further recommendation is considered necessary.	No further action required.		**Complete**
NC6	3	12	The Proponent shall ensure that noise from the project does not exceed the noise limits in Table 2.	On one occasion the noise for the plant marginally exceeded the current EPL limit.	Installed new silencer and low noise fan on Gluten Dryer No.2. No further recommendation is considered necessary.	No further action required.		**Complete**
NC7	3	17	The Proponent shall store all chemicals, fuels and oils used on site in appropriately bunded areas, with impervious flooring and sufficient capacity to	The Proponent has not yet completed a review of the hazardous substance storage depots as recommended in the	The auditor notes that a consultant has been engaged to undertake the review of the hazardous substance storage depots	The review has commenced by a Dangerous Goods consultant. Checklists have been prepared detailing requirements of the	Dec-19	**Complete.** Report & recommendations issued Mar-20.

NC No.	Sched	Cond	Requirement	Finding	Recommendation	Shoalhaven Starches Response	Timeframe	Status
			contain 110% of the largest container stored within the bund. These bunds shall be designed and installed in accordance with the requirements of all relevant Australian Standards, and/or DECC's Storing and Handling Liquids: Environmental Protection manual.	2016 audit.	and it is scheduled to be completed by December 2019. No further recommendation is considered necessary.	relevant Australian Standards.		
NC8	3	22D	Stormwater controls were not implemented within 3 months of the date of the approval.	Stormwater controls were not implemented within 3 months of the date of the approval.	Ensure all approval requirements are captured, tracked and assigned a responsibility in the compliance management system	Stormwater controls were completed in August 2018. Compliance conditions are tracked in the 'Project Status' spreadsheet for each modification.		**Complete**
NC9	3	22E	Prior to the commencement of construction of MOD 12, the Proponent shall re-instate the table drain on the southern side of Bolong Road to the east of the distillery access. The works shall be completed to the satisfaction of Council.	MOD 12 construction commenced prior to re-instating the table drain.	Ensure all approval requirements are captured, tracked and assigned a responsibility in the compliance management system	Construction of the table drain has commenced as part of the road works required under condition 27A. Estimated date of completion is the end of September 2019.	Sep-19	**Complete** Oct-19. Council approval 28-11-19. WAE drawing submitted to Council 19-12-19.
NC10	3	26	The Proponent shall prepare a Flood Mitigation and Management Plan for the project to the satisfaction of the Secretary. This plan must: a) be prepared in consultation with Council and be submitted to the Secretary for approval within 12 months of this approval; b) include: baseline data on local and regional flooding and the	The flood marker required by the Plan had not been installed.	The auditor notes that the Proponent receives an early flood warning from the SES when the level in the Shoalhaven River near the Nowra Bridge reaches a rising level of 1.3m AHD and responsibility for receiving SES and Flood Watch warnings has been assigned to the WHS Manager. Accordingly,	The flood marker has been ordered and will be installed as per the flood plan.	Sep-19	**Complete.** Flood marker installed Oct-19.

NC No.	Sched	Cond	Requirement	Finding	Recommendation	Shoalhaven Starches Response	Timeframe	Status
			predicted flood impacts of the project; details of all reasonable and feasible measures that would be implemented to minimise on-site and off-site flooding; procedures for the monitoring, assessment and compensation of any flood impacts caused by the project; a program for contribution toward the ALERT Flood Warning System operated by Council and the Bureau of Meteorology; and procedures for collaboration and coordination with the paper mill with respect to flood emergency planning.		the auditor recommends that the Proponent either installs the marker, or reconsiders, in consultation with Council, whether this management measure is necessary as part of the overall flood warning system.			
NC11	3	27A	Prior to the commencement of operation of any part of MOD 12, or no later than 31 March 2018, the Proponent shall complete the road and parking works in accordance with the plans approved by Council, as described in Condition 27. The Proponent shall submit works-as-executed plans to Council one month after the completion of the works, or no later than 30 April 2018. Note: The works-as-executed plans shall show the completed works compared to the approved plans.	The works have not been carried out in the agreed time.	Ensure all approval requirements are captured, tracked and assigned a responsibility in the compliance management system	Works are underway. SS to prepare updated status of road works including estimated dates of completion and submit to the DPIE.	Sep-19	**Complete**. Works complete and final WAE plans submitted to Council Feb-20. Additional line marking as requested by Council complete Aug-20.
NC12	3	27B	No later than 31 May 2018, the Proponent shall provide written	The works have not been carried out in the agreed	Ensure all approval requirements are	To be completed once works under condition 27A have been	Oct-19	**In progress.**

NC No.	Sched	Cond	Requirement	Finding	Recommendation	Shoalhaven Starches Response	Timeframe	Status
			evidence to the Secretary of Council's acceptance of the works-as-executed plans and Council's acceptance of care and maintenance responsibilities for the section of Bolong Road from Railway Street to the Dairy Farmers site access.	time.	captured, tracked and assigned a responsibility in the compliance management system	completed.		The last of the works have been completed and the WAE plans were submitted to Council on 26-5-2021. Council to issue acceptance/approvals.
NC13	3	43	The Proponent shall prepare and implement a Vegetation Management Plan for the project to the satisfaction of the Secretary. This plan must: a) be prepared in consultation with DWE and Council and be submitted to the Secretary for approval within 6 months of this approval; b) be prepared in accordance with DWE's Guidelines for Controlled Activities – Vegetation Management Plans; and c) include: • a Landscape Plan for the project, which identifies screen plantings to minimise visual impacts; • detailed plans and procedures to: - restore and maintain the waterways and riparian zones of Shoalhaven River, Bomaderry Creek, Abernethy's Creek and Broughton Creek on the site; - manage weeds in the vicinity of the riparian zones;	The plan was not submitted within the required timeframe.	Ensure all approval requirements are captured, tracked and assigned a responsibility in the compliance management system	The updated plan was submitted to the DPIE on 1st May 2019 and approved by DPIE on 15th May 2019. The plan is tracked in the EMS.		**Complete**

NC No.	Sched	Cond	Requirement	Finding	Recommendation	Shoalhaven Starches Response	Timeframe	Status
			- integrate works into the proposed landscaping for the rest of the site; - manage impacts on fauna; and - monitor the performance of the proposed restoration works.					
NC14	4	2A	The Proponent shall notify the Secretary and any other relevant agencies of any incident or potential incident with actual or potential significant off-site impacts on people or the biophysical environment associated with the facility immediately after the Proponent becomes aware of the incident.	On one occasion an incident was not reported to Planning	Ensure all notification requirements are assigned a responsibility and appropriate systems are in place to trigger them when an incident occurs.	Incident (on 14-12-2017) reported to the EPA was not submitted to the Secretary. This was self-reported by SS as a non-compliance in the Annual Report 2018 and a subsequent warning letter issued by the DPIE on 29-11-18. No further action taken.		**Complete**
NC15	4	2B	Within 7 days of the date of this incident, the Proponent shall provide the Secretary and any relevant agencies with a detailed report on the incident.	On one occasion an incident was not reported to Planning within 7 days.	Ensure all notification requirements are assigned a responsibility and appropriate systems are in place to trigger them when an incident occurs.	As above.		**Complete**

9. INCIDENTS AND NON-COMPLIANCES

9.1 NON-COMPLIANCES

During the reporting period, 2 non-compliances were identified against the conditions of the Consent. Details of the non-compliances are as follows:

9.1.1 Quarterly Boiler 4 Emission Testing (Sch. 3, Cond. 9)

- Quarterly Boiler 4 emission monitoring was not performed in accordance with the Environment Protection Licence (EPL) requirements.
- The monitoring was not completed due to a number of reasons including the unavailability of the emission testing consultant, boiler not operating (shutdown) and the boiler de-commissioned during the last quarter of the reporting year.
- Details of the non-compliance was reported in Shoalhaven Starches 2021-22 EPL Annual Return sent to the EPA.
- Boiler 4 has undergone conversion works from a coal-fired to gas-fired boiler in accordance with MOD 23 approval.
- No further action taken.

9.1.2 Emission Limits – Boiler 5 and 6 Stack (Sch. 3, Cond. 9)

- Boiler 5 and 6 stack (Point 35) exceeded the total solid particles (TSP) EPL limit during Quarter 4 testing.
- Details of the non-compliance was reported in Shoalhaven Starches EPL 2021-22 Annual Return to the NSW EPA.
- The cause of the non-compliance was due to holes in the boiler baghouse filter socks.
- The baghouse filter socks were replaced.

N.B. The above non-compliances exclude the non-compliances raised in the 2019 Independent Environmental Audit which are discussed in Table 17.

9.2 INCIDENTS

There were two reportable incidents which occurred during the reporting period. The details are as follows:

Incident 17-2-2022:

- On Thursday 17th February 2022 at approximately 6:45 am process liquid containing starch material escaped the premises and flowed onto the Bolong Rd southern kerbside guttering.
- The overflow was caused by the failure of a pump on the starch agglomeration tank in the Starch & Gluten Plant.
- The incident was immediately reported to the EPA and DPIE and a detailed incident report submitted within 7 days.
- Measures have been taken to prevent or mitigate against a recurrence of such an event including the installation of a high-level indication downstream of the agglomeration tank weir which will automatically alert the plant operator via the PLC operating system.
- No process liquid entered the waterway and there was no evidence of environmental harm caused by the incident.
- As requested by the EPA, a follow-up letter dated 7-4-2022 was submitted to the EPA detailing the timeframes for completion of the corrective and preventive actions. All actions have been completed.

Incident 18-5-2022:

- On Wednesday 18th May 2022 at approximately 8:30 am a leak was observed escaping out of the ground on a paddock located on the corner of Hannigans' Lane & Bolong Rd Bomaderry.
- The incident was caused by a leak in the underground pipeline caused by a suspected failure of a join in the pipeline.
- The incident was immediately reported to the EPA and DPIE and a detailed incident report submitted within 7 days.

- A clamp repair around the pipeline leak was installed which stopped the leak.
- The faulty section of the pipeline was subsequently replaced.

9.3 LEGAL COMPLIANCE

There have been no penalty notices or legal proceedings received by the company from the NSW EPA or DPIE during the reporting period.

10. ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD

The following activities planned for the next reporting period include:

- Completion of construction of the projects associated with the MOD 16 and MOD 17 approval which includes:
    - Specialty Products Building (SPB) and associated equipment for production of specialised products such as cationic starch.
    - Product Dryer No.9, to be installed within the SPB, to initially dry gluten, and which may be converted to a starch dryer once Gluten Dryer No.8 is installed.
    - Gluten Dryer 8.
- Completion of construction and commissioning of an additional beverage grade ethanol distillery and associated beverage grade ethanol storage tanks approved under MOD 19.
- Completion of construction of the gas-fired cogeneration plant approved under MOD 23.
- Subject to DPIE approval, commencement of construction of the MOD 25 proposed rail line extension.