ODOUR IMPACT ASSESSMENT REPORT
FOR ENVIRO WASTE SERVICES GROUP PTY LTD
14-16 KIORA CRESCENT, YENNORA NSW

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Benbow ENVIRONMENTAL

Engineering a Sustainable Future for Our Environment

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1. INTRODUCTION

Benbow Environmental has been engaged by Enviro Waste Services Group Pty Ltd to undertake an odour impact assessment for a proposed liquid waste processing facility to be located at 14-16 Kiora Crescent, Yennora NSW 2161. The assessment determines the predicted odour contribution from the proposed site operations at the nearest sensitive receptors.

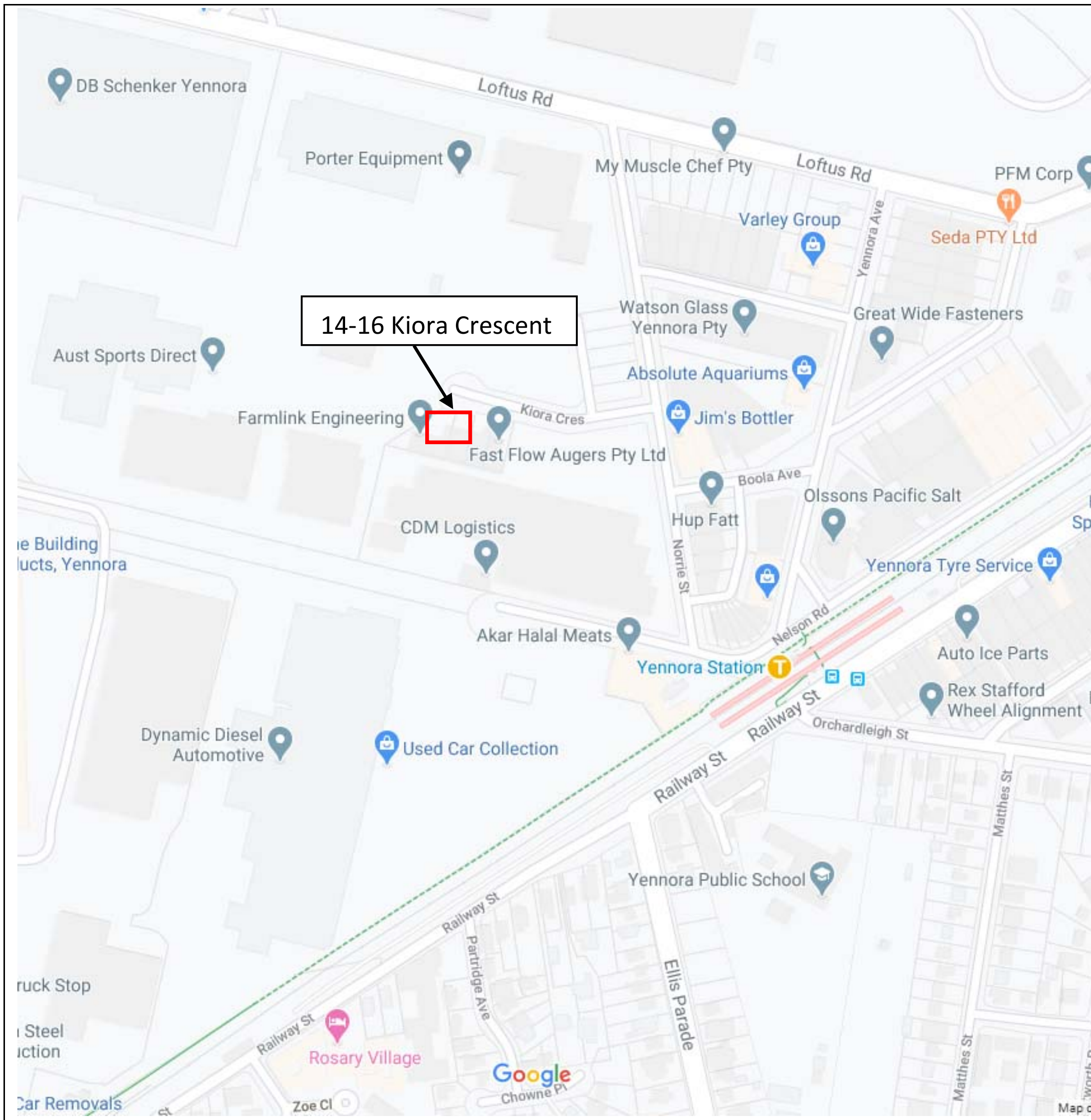
This odour assessment has been prepared in accordance with the NSW EPA guidelines *"Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales"* (2016) and *"Assessment and Management of Odour from Stationary Sources in New South Wales"* (November 2006).

2. PROPOSED DEVELOPMENT

2.1 SITE LOCATION

The development is located on two properties identified as a 575 m^2 site at 14 Kiora Crescent, Yennora NSW 2161 (known as Lot 49 DP18211) and a 1,113 m^2 site at 16 Kiora Crescent, Yennora NSW 2161 (known as Lot 50 DP18211). Both sites are within the Cumberland local government area. The site location is shown in Figure 2-1 and the site aerial is presented in Figure 2-2.

Figure 2-1: Site Location



Source: Google Maps 2020

↑N Not to scale	LEGEND: Site ☐	Benbow Environment 25-27 Sherwood Street NORTHMEAD NSW 2152

Figure 2-2: Site Aerial

Source: Six Maps 2020

↑N Not to scale	LEGEND: Site boundary	Benbow Environment 25-27 Sherwood Street NORTHMEAD NSW 2152

2.2 LAND USE

The site is situated in IN1 – General Industrial land use zoning under the Holroyd LEP 2013 as shown in Figure 2-3. The surroundings, in all directions, are mainly General Industrial IN1, with some Special Infrastructure SP2 (T5 – Leppington railway line) to the east and south and beyond that, Low Density Residential R2. Further to the east there are smaller areas of Light Industrial IN2. Beyond the General Industrial IN1 to the north there are also areas of Low Density Residential R2, Public Recreation RE1 and Environmental Conservation E2. At the edge of the General Industrial IN1 in the west is Prospect Creek, Environmental Conservation E2, beyond that is an area of Low Density Residential R2, Public Recreation RE1 and High Density Residential R4.

The T5 – Leppington railway line is located 325 m to the south east of the site. The Horsley Drive is located 1.02 km to the south west of the site and Prospect Creek is located 735 m to the south west.

The closest residential area is 330 m south-southeast of the site boundary.

2.3 EXISTING ODOUR ENVIRONMENT

The proposed development is within an existing industrial area. Industrial facilities surrounding the development include mechanical and automotive repairs, several logistics facilities and transport services. Existing odour within the area is typical of an industrial environment and expected to be higher than residential developments. There is no background data available for background odour levels in NSW.

Figure 2-3: Surrounding land use zoning

Source: https://www.planningportal.nsw.gov.au

LEGEND:

Site location

- B1 - Neighbourhood Centre
- B2 - Local Centre
- B3 - Commercial Core
- B4 - Mixed Use
- B5 - Business Development
- B6 - Enterprise Corridor
- B7 - Business Park
- B8 - Metropolitan Centre
- E1 - National Parks and Nature Reserves
- E2 - Environmental Conservation
- E3 - Environmental Management
- E4 - Environmental Living
- IN1 - General Industrial
- IN2 - Light Industrial
- IN3 - Heavy Industrial
- IN4 - Working Waterfront
- R1 - General Residential
- R2 - Low Density Residential
- R3 - Medium Density Residential
- R4 - High Density Residential
- R5 - Large Lot Residential
- RE1 - Public Recreation
- RE2 - Private Recreation
- RU1 - Primary Production
- RU2 - Rural Landscape
- RU3 - Forestry
- RU4 - Primary Production Small Lots
- RU5 - Village
- RU6 - Transition
- SP1 - Special Activities
- SP2 - Infrastructure
- SP3 - Tourist
- W1 - Natural Waterways
- W2 - Recreational Waterways
- W3 - Working Waterways

Figure 2-4: Site Location

Source: Google Maps 2020

↑N Not to scale	LEGEND: Site		Benbow Environment 25-27 Sherwood Street NORTHMEAD NSW 2152

Figure 2-5: Aerial Photograph of the Site and Surrounding Area

Source: Six Maps 2019

↑N Not to scale	LEGEND: Site	Benbow Environment 25-27 Sherwood Street NORTHMEAD NSW 2152

2.4 Nearest Identified Sensitive Receptors

Table 2-1 provides the list of the identified sensitive receptors in a range of directions that have the potential to be affected by the processes at the subject site. The nearest residential receptor is approximately 330 m south-southeast of the site boundary.

Table 2-1: Nearest Potentially Affected Receivers Considered

Receptor ID	Address	Lot & DP	Approximate distance to site boundary (m)	Type of Receptor
R1	2A Ellis Parade, Yennora	Lot 1 DP 553522	330 m SSE	Residential
R2	45 Railway Street, Yennora	Lot 3 DP 574732	755 m ENE	Residential
R3	66 Byron Road, Guildford	Lot 2 DP 975284	965 m NE	Residential
R4	58 Tamplin Road, Guildford	Lot 7 DP 31391	920 m NNE	Residential
R5	45 Dennistoun Avenue, Guildford West	Lot 118 DP 10981	910 m N	Residential
R6	89 Dennistoun Avenue, Guildford West	Lot 50 DP 39199	1135 m NW	Residential
R7	28 Ace Avenue, Fairfield	Lot 30 DP 539236	830 m W	Residential
R8	17 Pine Road, Fairfield	Lot 39 DP 13605	645 m SW	Residential
R9	104 Railway Street, Yennora	Lot 5 DP 812983	425 m SSW	Residential
R10	Yennora Public School 1-9 Orchardleigh Street, Yennora	Lot 1 DP 447926	335 m SW	School/ Childcare Centre
R11	Mini Masterminds Guildford 16 Junction Street, Old Guildford	Lot 1 DP 509537	1070 m ENE	School/ Childcare Centre
R12	Fairfield High School 405 The Horsley Drive, Fairfield	Lot 1 DP 1063605	710 m W	School/ Childcare Centre
R13	Fairfield Road Park 241 Fairfield Road, Yennora	Lot 23 DP 610787	1020 m WNW	Active Recreation
R14	12 Kiora Crescent, Yennora	Lot 48 DP 18211	Adjacent E	Industrial
R15	7 Kiora Crescent, Yennora	Lot 50 DP 1233715	Adjacent W	Industrial
R16	27-49 Nelson Road, Yennora	Lot 1 DP 746982	Adjacent S	Industrial
R17	1 Norrie St, Yennora	Lot 9 DP 1233715	130 m N	Industrial

Figure 2-6: Nearest Potentially Affected Receivers Considered

2.5 DESCRIPTION OF THE PROPOSAL

The proposed development involves increasing processing quantities at the existing liquid waste recycling facility located at 14 Kiora Crescent, and use of the neighbouring site at 16 Kiora Crescent for out-of-date liquid product/food waste destruction, improved vehicle access, truck manoeuvring and car parking.

The proposed development seeks approval to increase its current processing quantities from 900 tonnes per annum to 110,000 tonnes per annum, and increase the maximum quantity to be stored at any one time from 110 tonnes to 477 tonnes. These increases in handling capacity will be divided between properties at 14 and 16 Kiora Crescent. Waste processing streams and proposed quantities per location are listed below:

14 Kiora Crescent (existing facility – industrial waste treatment/disposal, liquid waste material, sewage sludge, grease trap waste etc)

Processing capacity per annum: 100,000 tonnes.
Maximum storage at any one time: 377 tonnes.

16 Kiora Crescent (additional facility - out-of-date liquid product/food waste destruction)

Processing capacity per annum: 10,000 tonnes.
Maximum storage at any one time: 100 tonnes.

2.6 PROCESS DESCRIPTION

The purpose of the facility is to receive waste liquids and process the liquid so suitably cleaned water is removed for discharge to tradewaste and remaining sludges are sent on by a licenced waste contractor to be further processed, predominantly as grease trap waste.

The processes involved in the site operations are as follows:

1. Waste liquids are collected from sites throughout the Sydney Metropolitan Area. Most of the liquids are collected from special purpose tanks which separate the solid residues from the liquids, minimising the solids collected. The waste liquids are collected via vacuum tankers. The vacuum pump is mounted on the truck and runs on the truck’s diesel engine. A flexible hose connected to the pump and tank intake transfers the liquid through the intake nozzle, hose assembly and then into the tank. A pressure valve allows the displaced air to be released to the atmosphere.

2. The liquids are delivered to the recycling facility. Vacuum trucks reverse into the unloading area located inside the building at 14 Kiora Crescent. Pallets of out-of-date liquid product/food waste for destruction are also delivered to the site and unloaded in the external area outside the building at 16 Kiora Crescent and immediately transferred inside the building.

3. A flexible hose connected to the outlet point of the tanker truck delivering to the building on 14 Kiora Crescent and is connected to a filter which removes any solids. The filtration devices are on wheels and can be manoeuvred such that a flexible hose connected to the outlet of

the filter connected to any one of the tanks within the facility. Typically tanks on the eastern side of the facility (14 Kiora Crescent) are assigned to oily liquid wastes (grease trap waste (K110); waste oil/hydrocarbons mixtures/emulsions in water (J120); surfactants (M250)) and tanks on the western side of the facility store other organic liquid wastes such as stormwater/sewage sludge & residues (K130) and landfill leachates (N205).

4. Solids from the filters are manually transferred to a storage bin that once full is classified in accordance with waste guidelines and sent accordingly to a licenced landfill.

5. The waste liquids are pumped from the tankers using the main pump within the facility not the tanker pump, which is connected to a series of settling tanks and pipework at the facility. The main pumps flow direction and valves throughout the facility controls the movement of liquid waste depending on the operations which vary dependant on volumes of different wastes received.

6. Before final treatment, the majority of the waste liquid destined for tradewaste is pumped from the storage tanks into the DAF (Dissolved air flotation) which separates the solid and remaining oil from the water.

7. Oil and sludge are transferred from the DAF to small storage tanks near the DAF. This is removed from site by a licenced waste contractor to be processed as grease trap waste.

8. Wastewater from the DAF is discharged to the Sydney Water sewer under a Trade Wastewater Agreement.

9. The pallets transferred to the 16 Kiora Crescent building where out-of-date liquids are fed onto a conveyor and shredded. The shredder removes the liquid from the packaging to be transferred into IBCs (1000 L container). Any packaging unsuitable for handling are manually poured into IBCs. Packaging is recycled. The liquid waste is either sent offsite for reuse or further processed at within the 14 Kiora Crescent Building.

2.7 PROPOSED SITE ACTIVITIES AND SITE USE

The proposed site activities and site use are described for the two properties below.

<u>14 Kiora Crescent</u>

The facility would receive an increased quantity of liquid wastes of a type that it is already licenced to receive including:

- Residues from industrial waste treatment/disposal operations – landfill leachates (N205);
- Liquid waste material in glass, plastic or aluminium containers;
- Surface active agents (surfactants) containing principally organic constituents and which may contain metals and inorganic materials (M250);
- Waste oil/hydrocarbons mixtures/emulsions in water (J120);
- Sewage sludge & residues (K130); and
- Grease trap waste (K110).

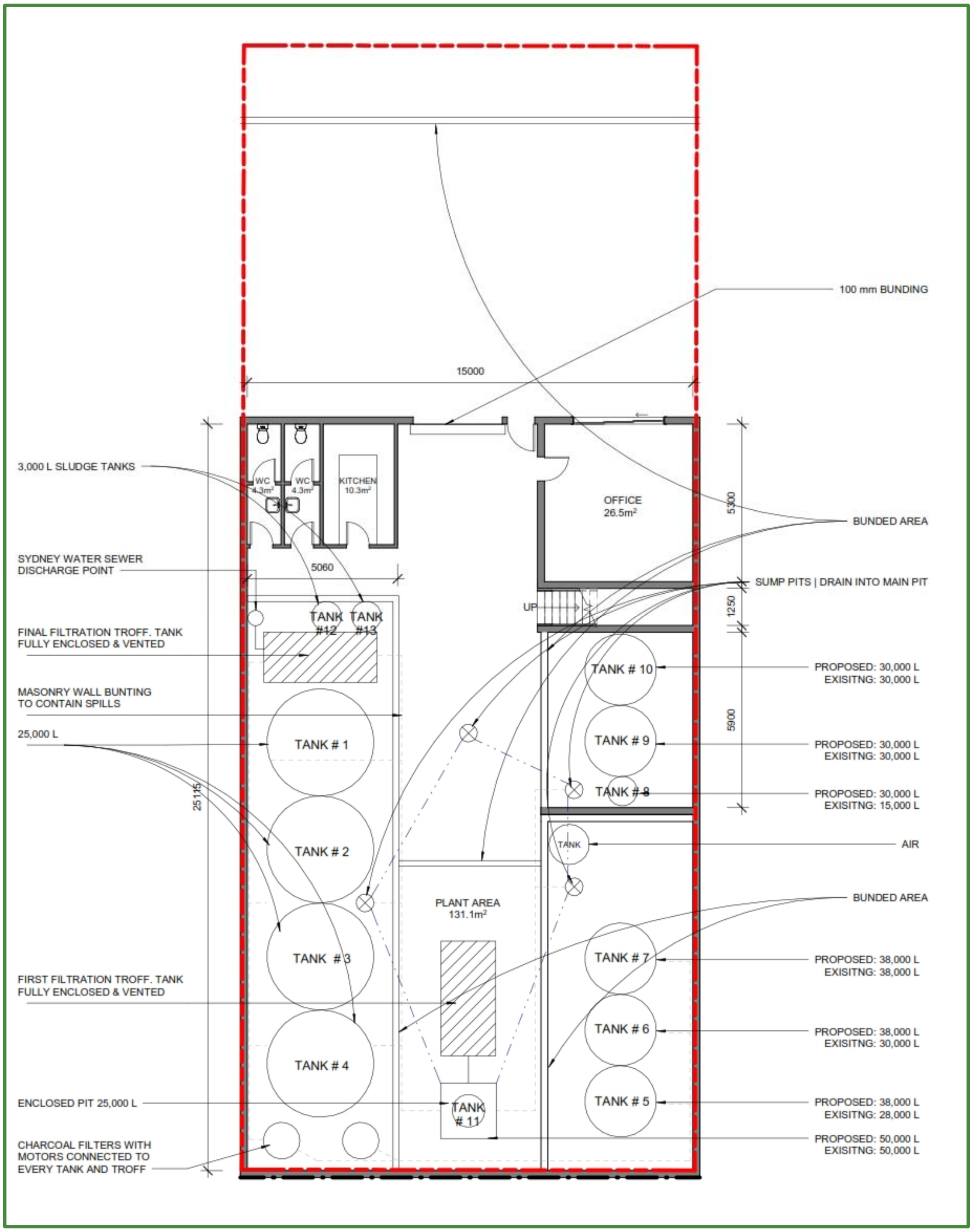
The operation of the facility involves the following activities to be undertaken on site:

- Unloading and loading of liquid waste from tanker trucks;
- Filtration of solid debris;
- Separation of solids;
- Separation of oils and sludge; and
- Separation of oil and water.

The increased processes quantities would utilise the existing equipment onsite. Minor modifications to tank sizes would be required to achieve a maximum storage at any one time: 377 tonnes.

Figure 2-7 shows the proposed site plan and layout (including tank quantities) at the 14 Kiora Crescent site.

Figure 2-7: Proposed floor plan for 14 Kiora Crescent



16 Kiora Crescent

The facility at 16 Kiora Crescent would receive up to 10,000 tonnes per annum of waste including out-of-date liquid product/food waste for destruction. The total waste storage at any one time is limited to 100 tonnes. Additionally, the site at 16 Kiora Crescent would provide office space, access for trucks and car parking.

Annual tonnage of incoming and outgoing waste from the out-of-date liquid product destruction process is detailed below.

Incoming waste type (tonnes per annum)

- Out-of-date liquids (food waste): 6,700
- Shampoo/liquid soaps: 1,600
- Shoes: 200
- Clothes: 250
- Makeup: 1,250

  Total: 10,000 tonnes

Outgoing waste type (tonnes per annum)

- Plastic: 950
- Cardboard: 950
- Aluminium: 950
- Liquid food waste: 4,600
- Liquid waste (other – for processing at 14 Kiora Crescent): 1,100
- Steel: 450
- Timber: 250
- Glass: 450
- Cloth: 200
- General solid waste: 100

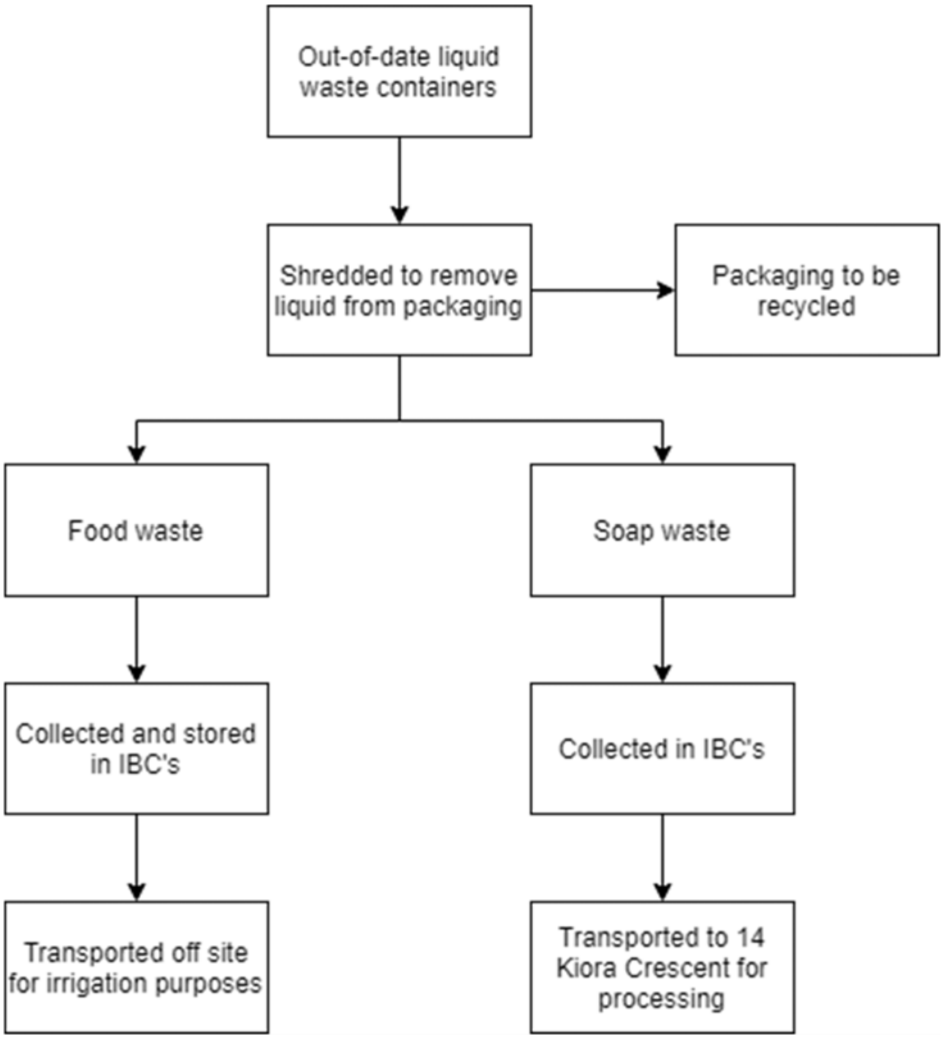
  Total: 10,000 tonnes

The destruction and disposal of out-of-date liquid products/food wastes would involve the following:

- Out-of-date, expired or perishable liquid food waste (such as fruit juices, soft drinks, shampoos and soaps) are divided by waste stream (food waste/liquid soaps etc) and fed into a shredder to separate liquids from packaging.
- Shredded packaging containers (cardboard, plastics, aluminium) are collected and recycled.
- Liquid food wastes are collected into intermediate bulk containers (IBCs) and stored at 16 Kiora Crescent.
- Liquid soap wastes are collected and sent to 14 Kiora Crescent for further processing.
- IBCs containing food waste are transported off site to be used in irrigation practices for agricultural properties/farmlands. The contents of the IBCs would comply with the relevant resource recover exemptions/orders and/or NSW Department of Environment and Conservation "Use of Effluent by Irrigation" (2004) and ANZECC & ARMCANZ "Guidelines for Fresh and Marine Water Quality" Volume 3, Primary Industries — Rationale and Background Information (Irrigation and general water uses, stock drinking water, aquaculture and human consumers of aquatic foods) (2000).

Figure 2-8 shows the process diagram for out-of-date liquid product destruction at 16 Kiora Crescent.

Figure 2-8: Process diagram of liquid product waste destruction

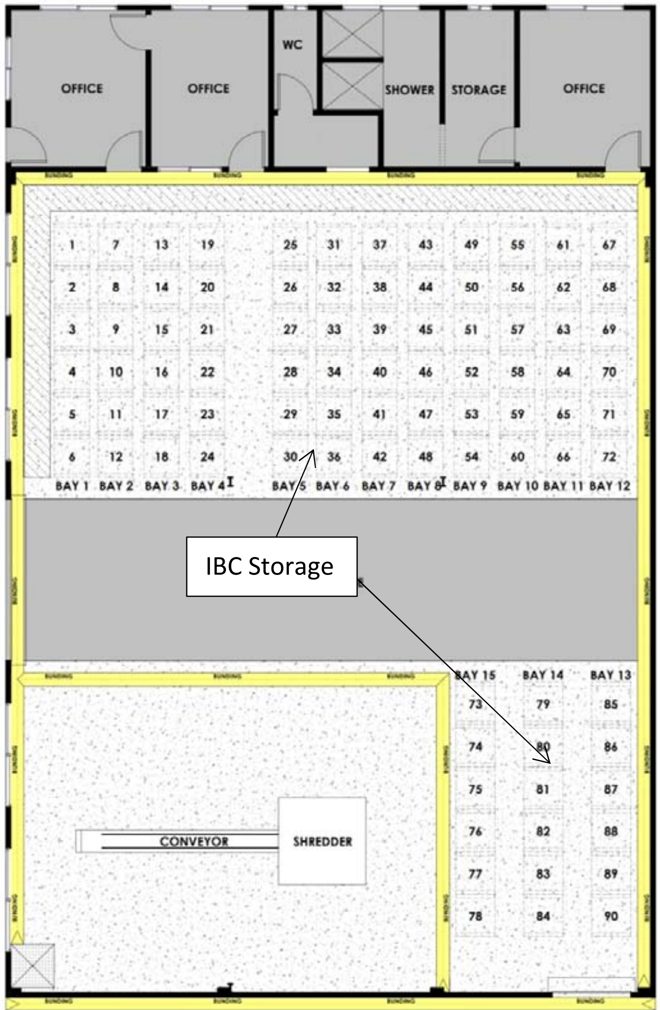


Additionally, the site at 16 Kiora Crescent would also provide improved access and manoeuvring arrangements and reduce the requirement for trucks to use the street for manoeuvring purposes.

Car parking currently provided on 14 Kiora Crescent is impractical as truck paths cross car parking spaces. Car and tanker truck parking would be provided for the development at the rear of 16 Kiora Crescent.

The proposed warehouse floorplan for 16 Kiora Crescent is shown below in Figure 2-9.

Figure 2-9: Proposed floor plan for product destruction processes at 16 Kiora Crescent



2.8 Hours of Operation

The facility proposes to operate 24 hours a day, seven days a week.

3. METEOROLOGY AND LOCAL AIR QUALITY

3.1 PROJECT SITE REPRESENTATIVE METEOROLOGY

The nearest weather monitoring station within proximity to the subject site is the Bankstown AWS operated by the Bureau of Meteorology. This monitoring station is located approximately 5.2 kilometres away to the south-southeast of the subject site and was considered to be the most representative of meteorological conditions due to the vicinity, completeness and latest data available for assessment.

Available long term meteorological trends from Bankstown AWS were compared to annual data for a five consecutive years (2013-2018). The year 2015 was selected as the most representative year and was used to make inferences about meteorological conditions at the site in this section.

3.2 WIND ROSE PLOTS

Wind rose plots show the direction from which the wind is coming with triangles known as "petals". The petals of the plots in Figure 3-1 summarise wind direction data into 8 compass directions ie. north, northeast, east, southeast, etc.

The length of the triangles, or "petals", indicates the frequency that the wind blows from the direction presented. Longer petals for a given direction indicate a higher frequency of wind from that direction. Each petal is divided into segments, with each segment representing one of the six wind speed classes. Thus, the segments of a petal show what proportion of wind for a given direction falls into each class.

The proportion of time for which wind speed is equal to or less than 0.5 m/s, when speed is negligible, is referred to as calm hours or "calms". Calms are not shown on a wind rose as they have no direction, but the proportion of time that they make up for the period under consideration is noted under each wind rose.

The concentric circles in each wind rose are the axes that denote wind frequencies. In comparing the plots it should be noted that the axis varies between wind roses, although all wind roses are the same size. The frequencies shown in the first quadrant (top-left quarter) of each wind rose are stated beneath the wind rose.

3.3 LOCAL WIND TRENDS

Seasonal wind rose plots for this site utilising Bankstown AWS 2015 data have been included as Figure 3-1.

Based on the information presented from the 2015 data for Bankstown annual average wind speeds of 2.97 m/s and a calms frequency of 15.92% were estimated. Annual winds from the south and northwest were found to be dominant and were present for approximately 13% and 12% of the time.

The average summer wind speed was estimated to be 3.39 m/s, with a calms frequency of 12.55%. Northeast and south east winds were found to be dominant at a frequency of around

19% and 16%. Winds from the east and south were found to be present for approximately 14% of the time each while the remainder of the wind directions have contributions of less than 26%.

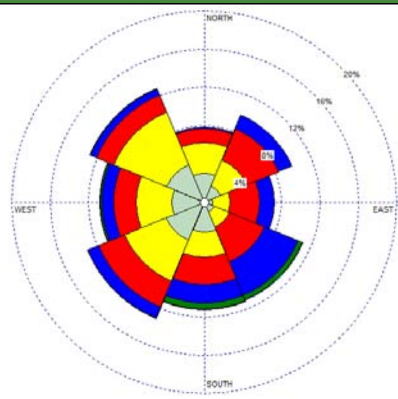
In autumn, dominant winds are blowing from the southwest (18%). All other wind directions occurred at frequencies less than 14%. The average autumn wind speed was 2.98 m/s with a calms frequency of 15.31%.

The winter season data showed the prevalence of winds from the northwest, west and southwest at frequencies of approximately 24%, 17% and 15% respectively. All other wind directions occurred at frequencies less than 10%. The average winter wind speed was determined to be 2.38 m/s with a calms frequency of 19.16%.

In the springtime, average wind speeds of 3.12 m/s with a frequency of calms of 16.62% were recorded. Dominant winds were found to be present from the south, southeast and northeast (~13% each). The rest of the wind directions were found to be present at frequencies less than 11%.

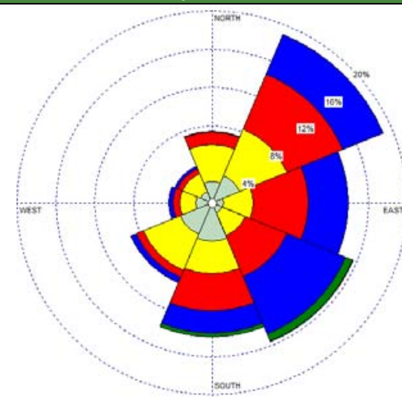
Figure 3-1: Wind Rose Plots for the Referenced Meteorological Station – Bureau of Meteorology Bankstown AWS (2015)

All Seasons



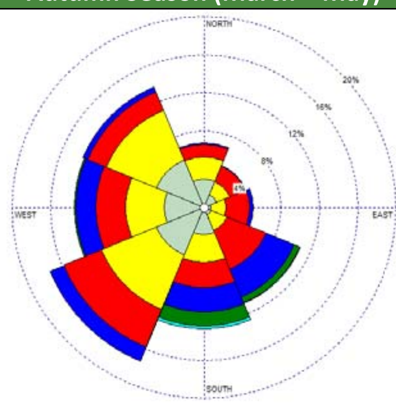
Average Wind Speed: 2.97 m/s
Calms Frequency: 15.92%
Axis Frequencies: 4%, 8%, 12%, 16%, 20%

Summer Season (December – February)



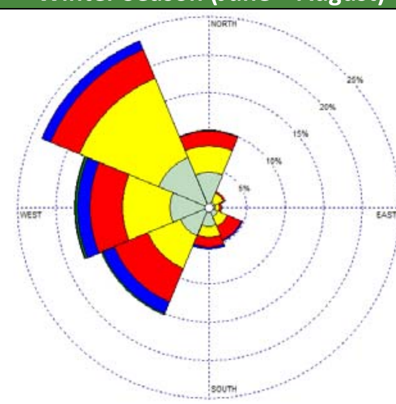
Average Wind Speed: 3.39 m/s
Calms Frequency: 12.55%
Axis Frequencies: 4%, 8%, 12%, 16%, 20%

Autumn Season (March – May)



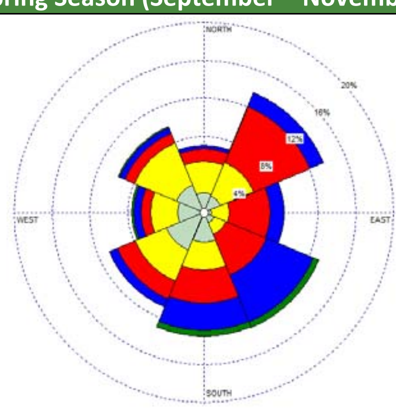
Average Wind Speed: 2.98 m/s
Calms Frequency: 15.31%
Axis Frequencies: 4%, 8%, 12%, 16%, 20%

Winter Season (June – August)



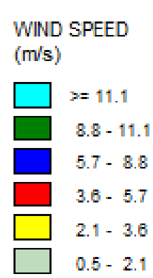
Average Wind Speed: 2.38 m/s
Calms Frequency: 19.16%
Axis Frequencies: 5%, 10%, 15%, 20%, 25%

Spring Season (September – November)



Average Wind Speed: 3.12 m/s
Calms Frequency: 16.62 %
Axis Frequencies: 4%, 8%, 12%, 16%, 20%

Legend



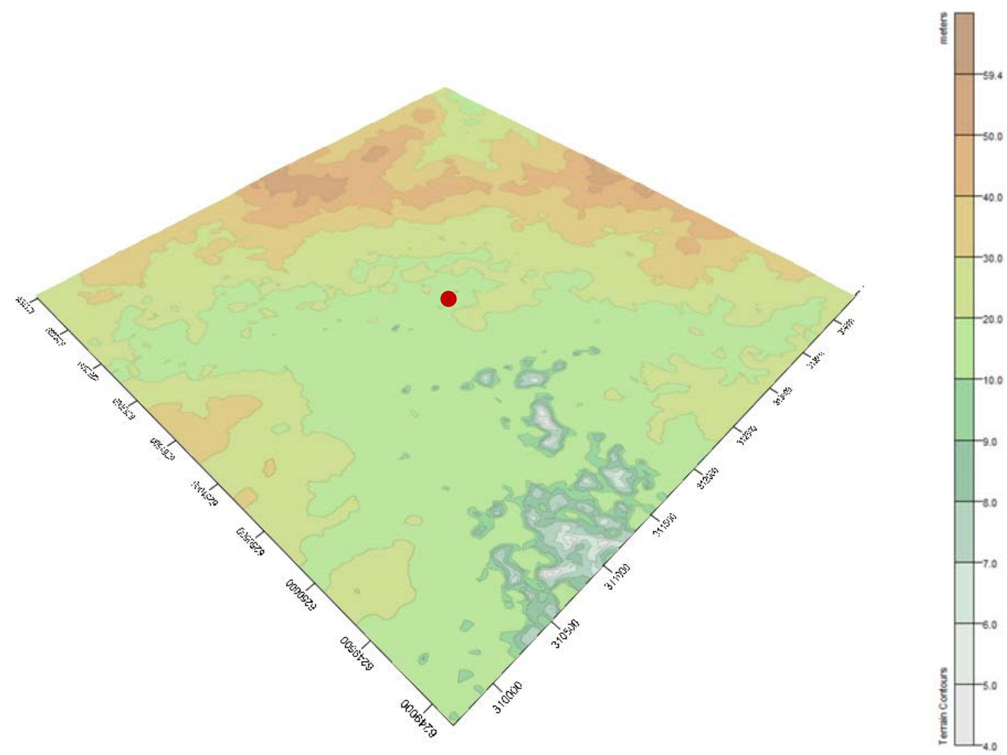
3.4 TERRAIN AND STRUCTURAL EFFECTS ON DISPERSION

The meteorological condition known as katabatic flow (or katabatic drift) is often identified as the condition under which maximum environmental impacts from primarily ground-based sources are likely to occur. Katabatic flow is simply the movement of cold air down a slope, generally under stable atmospheric conditions. Under such circumstances, dispersion of airborne pollutants is generally slow and the associated impacts can reach their peak.

Katabatic flow is unlikely to affect the impact of emissions from the subject site at the identified receptors as the terrain is relatively flat in the area surrounding the site and receptors. Figure 3-2 with all axes equally scaled, shows the terrain as it actually exists when viewed in a conventional three-dimensional view.

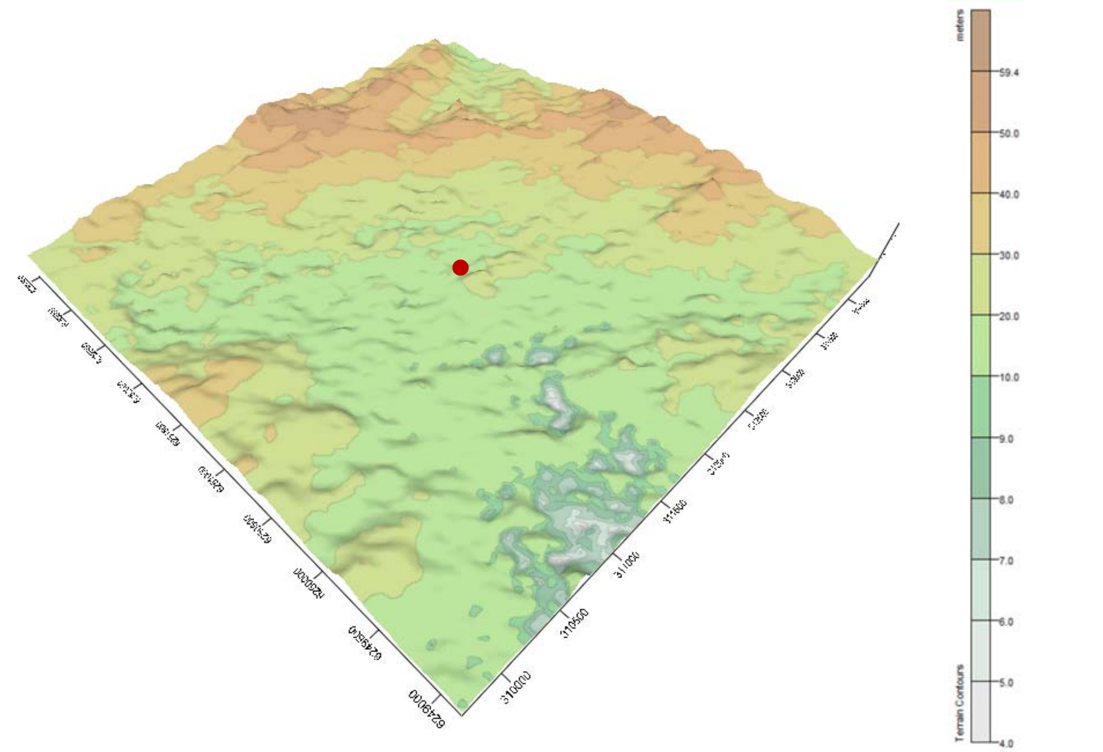
Figure 3-3 shows the terrain with the z-axis (i.e. vertical axis) exaggerated by a factor of 10 (i.e. a given distance on the x-axis or y-axis appears three times as great on the z-axis) in order to provide a clearer description of the topography. A coloured scale bar shows elevations corresponding to the colours used in the figures. It should be noted that these figures are an approximation of the actual terrain, based on terrain information that have been digitised from local contour terrain maps.

Figure 3-2: Local Topography of Site, no vertical exaggeration



● = Approximate site location

Figure 3-3: Local Topography of Site, factor of 10 vertical exaggeration



● = Approximate site location

4. AIR QUALITY CRITERIA AND GUIDELINES

4.1 PROTECTION OF THE ENVIRONMENT OPERATIONS ACT 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) applies the following definitions relating to air pollution:

> ***"Air pollution"*** *means the emission into the air of any air impurity.*
>
> *While "air impurity" includes smoke, dust (including fly ash), cinders, solid particles of any kind, gases, fumes, mists odours, and radioactive substances*

The following sections of this Act have most relevance to the site:

- *Section 124 Operation of Plant - other than domestic plant*

  The occupier of any premises who operates any plant in or on those premises in such a manner as to cause air pollution from those premises is guilty of an offence if the air pollution so caused, or any part of the air pollution so caused, is caused by the occupier's failure:

  (a) to maintain the plant in an efficient condition, or

  (b) to operate the plant in a proper and efficient manner.

- *Section126 Dealing with Materials*

  (1) The occupier of any premises who deals with materials in or on those premises in such a manner as to cause air pollution from those premises is guilty of an offence if the air pollution so caused, or any part of the air pollution so caused, is caused by the occupiers failure to deal with those materials in a proper and efficient manner.

  (2) In this section:

  deal *with materials means process, handle, move, store or dispose of the materials.*

  Materials *includes raw materials, materials in the process of manufacture, manufactured materials, by-products or waste materials.*

- *Section 127 Proof of causing pollution*

  To prove that air pollution was caused from premises within the meaning of Sections 124 – 126, it is sufficient to prove that air pollution was caused on the premises, unless the defendant satisfies the court that the air pollution did not cause air pollution outside the premises.

- *Section 128 Standards of air impurities not to be exceeded*

  (1) The occupier of any premises must not carry on any activity, or operate any plant, in or on the premises in such a manner as to cause or permit the emission at any point specified in or determined in accordance with the regulations of air impurities in excess of:

  (a) The standard of concentration and the rate, or

  (b) The standard of concentration or the rate.

  Prescribed by the regulations in respect of any such activity or any such plant.

  (2) Where neither such a standard nor rate has been so prescribed, the occupier of any premises must carry on any activity, or operate any plant, in or on the premises by such practicable means as may be necessary to prevent or minimise air pollution.

- *Section 129 Standards of air impurities not to be exceeded*

  (1) The occupier of any premises at which scheduled activities are carried on under the authority conferred by a licence must not cause or permit the emission of any offensive odour form the premises to which the licence applies.

  (2) It is a defence in proceedings against a person for an offence against this section if the person establishes that:

  (a) The emission is identified in the relevant environment protection licence as a potentially offensive odour and the odour was emitted in accordance with the conditions of the licence directed at minimising the odour, or

  (b) The only persons affected by the odour were persons engaged in the management or operation of the premises.

  (3) A person who contravenes this section is guilty of an offence.

The proposed development is required to comply with this Act.

4.2 PROTECTION OF ENVIRONMENT OPERATIONS (CLEAN AIR) REGULATION 2010

In accordance with Part 5 of the *Protection of the Environment Operations (Clean Air) Regulation 2010* (herein referred to as the Clean Air Regulation 2010), the activities and plant would belong to Group 6 (Standards for scheduled premises) as it is to be *commenced to be carried on, or to operate, on or after 1 September 2005 as a result of an environment protection licence granted under the Protection of the Environment Operations Act 1997 pursuant to an application made on or after 1 September 2005*.

Schedule 4 of the Clean Air Regulation 2010 provides standards of concentration for scheduled premises for general activities and plant. Schedule 4 does not list any standards of concentration for emissions of odour.

4.3 NSW Environment Protection Authority Guidelines

The document, "*Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*" (AMMAAP) published by the NSW Environment Protection Authority (NSW EPA) provides guidance on methodology and thresholds that are to be used for the air impact assessment of a proposed development. This odour impact assessment has been conducted in accordance with these guidelines, summarised in Table 4-1.

Table 4-1: Relevant odour impact assessment criteria from the Approved Methods for Modelling and Assessment of Air Pollutants in New South Wales (2016)

Size of Affected Community	Odour Performance Criteria (Odour Units) (to be complied with for 99.0% of the time)
Urban (Population ≥ ≈ 2000)	2.0 OU/m^3
Population ≈ 500	3.0 OU/m^3
Population ≈ 125	4.0 OU/m^3
Population ≈ 30	5.0 OU/m^3
Population ≈ 10	6.0 OU/m^3
Single residence (≤ ≈ 2)	7.0 OU/m^3

The Approved Methods provides the following formula to determine the appropriate impact assessment criteria for complex mixtures of odorous air pollutants:

Impact Assessment Criteria (OU) = [log_{10} (population)-4.5]/-0.6

The affected community is based on the population within the 2 OU contour. This means the criteria varies dependant on the modelling results and the average household size in the Cumberland LGA is 3.2 people according to the 2016 Census (ABS, 2018 (Statistics, 2016)). The criterion for the scenario is described in Section 7.3.

5. AIR QUALITY IMPACT MITIGATION MEASURES

The majority of sources of impacts will be generated within the building located at 14 Kiora Crescent: The waste liquid brought on site is pumped directly from the vacuum tankers into tanks therefore minimising release of odorous emissions during the unloading process. Unloading is undertaken within a bunded area thus minimising the spread of potentially odorous oils should a spill occur.

Similarly, the untreated liquids are securely stored in tanks in the bunded area limiting the movement of odorous liquids if a leak was to occur. All tanks are almost fully enclosed with only small diameter breathing vents which vent to the biotrickling filter system and then are dispersed through a stack.

The facility used the following mitigation measures:

- Biotrickling filter system;
- Vertical dispersion stack, 6 m above roofline;
- Indoor operations; and
- Deodoriser.

The deodoriser system is explained in Section 5.4.

Minor odours may be generated from the out-of-date liquid product destruction within the building at 16 Kiora Crescent, these are considered negligible and are not offensive in nature (aka smell of orange juice). The operational processes at this site would sufficiently mitigate air quality impact risk, these include:

- Indoor operations; and
- Deodoriser.

Further assessment of 16 Kiora Crescent is not warranted on the basis that there were no odour generating processes and the liquids are not left to putrefy or generate odorous emissions. Our experience with similar facilities is similar to the operations intended at this site – no odour controls or detailed assessment is needed. Good housekeeping practices are expected.

5.1 BIOTRICKLING FILTER SYSTEM

All displaced air from tank filling is vented through an existing biotrickling filter (supplied by Gebel Tanks). The biotrickling filter system uses a packed bed consisting of porous material that bacteria affix to and create a biomass film, this film degrades pollutants that are transferred to the packed bed as the air/gas is transported through the material.

The odour impact assessment assumes maximum designed flow rate of the biotrickling filter for 100% of the proposed operating time which is within the capabilities of the filtration system. Existing processing quantities do not operate at max flow rate constantly or for 100% of the time. This is considered to accurately represent worst case scenario regardless of quantities.

The maximum flow rate through the system is not expected to increase and therefore the biotrickling filter system is considered adequate for the proposed increased quantities.

The biotrickling filter system is currently maintained, and will continue to be maintained, by the proponent. This is undertaken on a monthly basis and includes system checks and replacement of filters.

5.2 STACK

From the biotrickling system the site discharges the air vertically through a stack 6 m above the roofline.

5.3 BUILDING

All liquid waste handling occurs within the building, reducing odour impacts from fugitive emissions.

5.4 DEODORISER

There are 5 existing deodoriser spray points in the facility. Two are positioned at the top of the front roller door and spray inwards, two more in on the back wall of the facility pointed towards the filtering/screening process, and one positioned directly above the DAF plant.

The deodoriser system sprays every 15 minutes. No additional changes are considered required due to the increased quantities as the deodoriser concentration in the air at any one time using this spraying frequency is considered optimum.

6. EMISSIONS TO AIR

6.1 POTENTIAL EMISSION SOURCES

Potential sources of emissions to air include odour from liquid wastes, chemical compounds (e.g. volatile organic compounds (VOCs), vapours, noxious fumes) and dust or particulate matter.

Odour from unprocessed liquid wastes received and stored on the site is identified as the primary potential source of emissions to air. These liquids are pumped directly into tanks within the facility and emissions of odour may occur from these wastes during processing and handling. Identified odour emission sources are discussed below.

Vapours and/or noxious fumes have the potential to be released to air during liquid waste handling and transfer. Specific chemical compound emissions to air associated with the proposed development is considered negligible as contaminants have low vapour pressures. As the recycling processes does not include heating it is unlikely that more harmful pollutants are generated. Furthermore as discussed in Section 5, potentially hazardous chemical compounds are vented through a biotrickling filter that degrades these compounds before being emitted to air. The specific reduction efficiency varies on average between 80-99% depending on the contaminant. Additionally, all operations take place within the building where control measures mitigate the release of emissions to air.

Dust and particulate matter associated with the activities and processes on site are considered negligible. The nature of the wastes and materials handled are liquid and therefore do not generate dust or particulate matter. Additionally, the site is covered in sealed hardstand, therefore wheel generated dust from vehicle movement is considered negligible.

6.2 ODOUR EMISSION SOURCES

There are three points of odour emission that are identified in the recycling process:

- Solids filter;
- Biotrickling filter (BTF) system vent/stack; and
- Dissolved Air Floatation (DAF) treatment tank.

The solids filter emits odour during periods that it is opened for cleaning. There are two Solids filters but typically only one is opened for cleaning at a time. All displaced air from tank filling is vented through a biotrickling filter (supplied by Gebel Tanks). There are two pumps for the air transport system through the vents and BTF system, each pump results in a 7 $m^{3/}$min (0.117 m^3/s) maximum flow rate from the BTF vent. Under normal operations one pump is running and the second is a backup. It is very rare that both pumps operate at the same time.

Emissions of the solids filter and the DAF treatment tank both are both through the roller door of the building and one exhaust vent on the roof. The odour emissions for both sources has been calculated individually and modelled as a cumulative volume source to account for all emissions from the building.

Types of odour are dependent on the various wastes, including:

- Cooking oil;
- Industrial waste;
- Surfactants;
- Grease trap waste; and
- Sewage sludge.

Odour sampling of similar types of waste have been used in this assessment to determine emission rates for modelling.

6.2.1 Odour Sampling

Odour sampling was undertaken on the 8th December 2016 at a similar facility. Two odour samples were taken from a vat of unfiltered cooking oil. Odour samples were analysed in accordance with AS/NZS4323.3:2001 by Odour Research Laboratories Australia a NATA accredited laboratory. The full test report is provided as Attachment 1. A summary of the odour analysis is provided in the table below. Figure 6-1 provides a photo of the sampled material.

Table 6-1: Odour Sample Results

Sample ID	Sample Odour Concentration (OU)
Sample A	1700
Sample B	350

For the purpose of this assessment the highest concentration value has been used in the odour emission rate calculation rather than by taking the average of the two sample results.

Figure 6-1: Sample unfiltered cooking oil

6.2.2 Modelling Assumptions

The following assumptions were made in this assessment:

- Emissions of odour from processing occur 24/7;
- All tanks vent through the BTF vent/stack;
- The solid filter and DAF are modelled as a combined volume source (the building); and
- Emissions from the building are at the height of the roller door.

6.2.2.1 Reduction factor

Biotrickling filters are known to be an efficient technology for odour treatment. As specific reduction efficiency varies on average between 80-99% depending on the contaminant, we have conservatively applied no reduction factors to emissions from the BTF vent to account for worst case emissions.

The solid filter and DAF treatment tank are within the building. The enclosed area will reduce the emissions to the environment, as such these sources have been cumulatively modelled as a volume source and a reduction factor of 0.1 has been applied to the volume source. This method is reflected in standard dust emission assessments and considered appropriate due to the particulate nature of odour.

There is also a deodoriser system within the building that will combat nuisance level of odours but has not been included in the modelling.

6.3 GREENHOUSE GAS IMPACTS

The proposal provides for reduction to greenhouse emissions from the waste sector by:

- Increasing diversion of organics from landfill
- Reducing transport distances to disposal sites for local waste producers

Opportunities to reduce greenhouse gas emissions need to be considered as an ongoing objective within the site's Environmental Management Plan.

7. AIR IMPACT MODELLING

7.1 DISPERSION MODEL

The new generation air dispersion model, AERMOD was used for the prediction of off-site impacts associated with the air emissions from the proposed operations. AERMOD uses air dispersion based on planetary boundary layer turbulence structure and scaling concepts. The AERMOD model replaced AUSPLUME as the air dispersion model accepted by the Victorian EPA in January 2014 and is a suitable model to use for this air assessment.

Air emissions from the proposed development can be considered to have been adequately represented using the modelling program.

7.1.1 Peak-to-Mean Ratios

The evaluation of odour impacts requires the estimation of peak ground level concentrations on the time scale of less than one second. However, dispersion model predictions are typically valid for averaging periods of one hour or longer. As such, dispersion models need to be supplemented in order to simulate more accurately the atmospheric dispersion of odours and the instantaneous perception of odours by the human nose - humans detect odour over a period of approximately one second or less.

Peak concentrations can be estimated from ensemble means by use of peak-to-mean ratios (ratios between extreme short-term concentrations and longer-term averages), which help to account for any odour fluctuation above and below the mean odour level of the 1-hour averaging period. Peak-to-mean ratios depend on the type of source, atmospheric stability and distance downwind. Table 7-1 shows the EPA-recommended factors for estimating peak concentrations for different source types, stabilities and distances, as developed by Katestone Scientific (1995 and 1998) and reproduced in the *Approved Methods* (NSW EPA, 2016).

P/M60 ratios selected for this assessment are presented in Table 7-2 and applied to our odour emission rates entered into the dispersion model so that they vary with wind speed and stability class. The peak-to-mean ratio adjusted figures and the source types are shown in Table 7-1.

Table 7-1: Peak to Mean Ratio for Estimating Peak Odour Concentrations

Source Type	Pasquill-Gifford Stability Class	Near-field P/M60*	Far-field P/M60*
Area	A, B, C, D	2.5	2.3
	E, F	2.3	1.9
Line	A – F	6	6
Surface wake-free point	A, B, C	12	4
	D, E, F	25	7
Tall wake-free point	A, B, C	17	3
	D, E, F	35	6
Wake-affected point	A – F	2.3	2.3
Volume	A – F	2.3	2.3

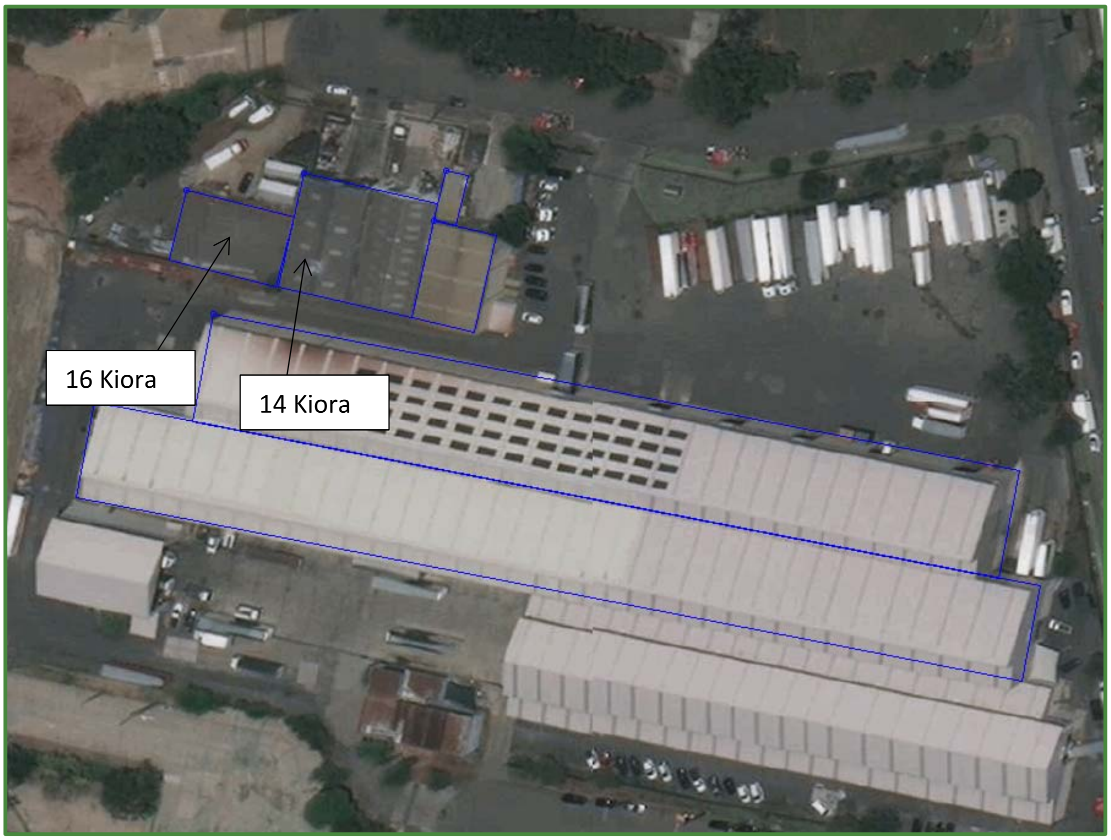
Note: * Ratio of peak 1-second average concentrations to mean 1-hour average concentrations.
Source: NSW EPA Approved Methods, Section 6.6.

7.1.2 Building-Wake Effects

Building-wake effects occur when emissions from a source are hindered as they move from winds "washing" the emissions down to the nearest building structure. This phenomenon can enhance off-site impacts (depending on the location of the building structure, wind direction and the source).

Building-wake effects are considered in the air dispersion modelling phase of the assessment by representing all buildings and structures on and around the site as structures in the model using the BPIP/PRIME algorithm. Buildings considered in the assessment are outlined in blue and shown in Figure 7-1.

Figure 7-1: Buildings included in model.



7.2 Air Emissions Inventory

Sources included in the odour emission dispersion model are shown in Figure 7-2 and source parameters are detailed in Table 7-2.

Figure 7-2: Sources included in model

Table 7-2: Air Emissions Inventory

Source ID	Source Type	Odour Sample	Area (m^2)	Release Height (m)	Velocity (m/s)	Flow Rate (OUm^3/s)	Emission Rate (OU/s)	Peak to mean Ratio	Emission Rate (OU/s)	Reduction Factor	Emission Rate used in Model (OU/s)	Temperature (°C)
BTF vent	Point Source	1700	0.008	14	14.85	0.117	198	2.3	198	N/A	456	Ambient
Filter *	N/A	1700	2	N/A	0.1	0.2	340	N/A	N/A	N/A	N/A	N/A
DAF *	N/A	1700	1	N/A	0.1	0.1	170	N/A	N/A	N/A	N/A	N/A
Building (DAF + Filter)	Volume Source	N/A	388	6	N/A	N/A	Filter + DAF = 510	2.3	1173	0.1	117	Ambient

Note: The filter and DAF are not modelled individually.

7.3 Modelling Results

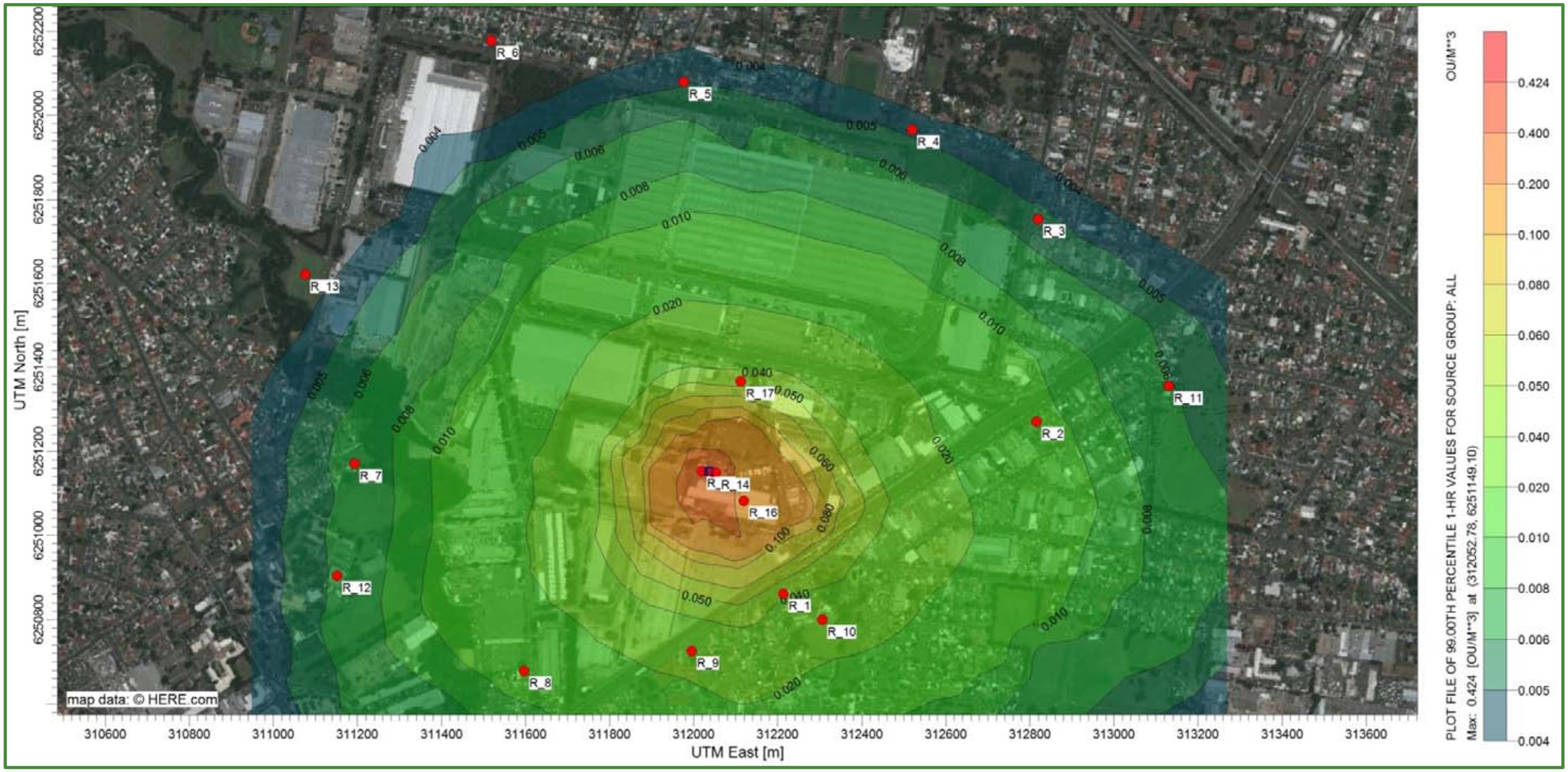
Within the 2 OU contour there are 0 houses and therefore a population of 0. As per the population based selection method described in Section 4.3, an odour concentration criterion of 7 OU/m^3 for residences ≤ ≈ 2 has been considered to be applicable for the purpose of this assessment.

The estimated ground level impact results for odour are given in Table 7-3 for the identified receptors. An isopleth is provided as Figure 7-3.

Table 7-3: 99th Percentile Odour Impact Results at Identified Receptors

Receptor	Impact OU	Criteria OU	Complies? (Y/N)
R1	0.041	7	Y
R2	0.011		Y
R3	0.005		Y
R4	0.005		Y
R5	0.005		Y
R6	0.003		Y
R7	0.007		Y
R8	0.011		Y
R9	0.028		Y
R10	0.029		Y
R11	0.006		Y
R12	0.006		Y
R13	0.004		Y
R14	0.424		Y
R15	0.394		Y
R16	0.156		Y
R17	0.046		Y

Figure 7-3: 99th Percentile Odour Impact Isopleth



8. SUMMARY

The predicted 99th percentile ground level impacts were significantly below the odour concentration limit of 7 OU. As such odour emitted from the site would be very minor and is not anticipated to cause nuisance or offence to persons within the vicinity of the site.

Given the above predicted results, it is the opinion of Benbow Environmental that further odour controls are not necessary to be implemented at the site.

The assessment concludes that the operation of the proposed waste liquid recycling facility meets the most relevant and applicable air assessment criteria in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW.

This concludes the report.

Kate Barker	Matthew Taylor	R T Benbow
Environmental Scientist	Environmental Scientist	Principal Consultant

9. LIMITATIONS

Our services for this project are carried out in accordance with our current professional standards for site assessment investigations. No guarantees are either expressed or implied.

This report has been prepared solely for the use of Enviro Waste Services Group Pty Ltd, as per our agreement for providing environmental services. Only Enviro Waste Services Group Pty Ltd is entitled to rely upon the findings in the report within the scope of work described in this report. Otherwise, no responsibility is accepted for the use of any part of the report by another in any other context or for any other purpose.

Although all due care has been taken in the preparation of this study, no warranty is given, nor liability accepted (except that otherwise required by law) in relation to any of the information contained within this document. We accept no responsibility for the accuracy of any data or information provided to us by Enviro Waste Services Group Pty Ltd for the purposes of preparing this report.

Any opinions and judgements expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal advice.

ATTACHMENTS

Attachment 1: ORLA Report

Odour Research Laboratories Australia

A Division of Peter W. Stephenson & Associates Pty Ltd
ACN 002 600 526 (Incorporated in NSW)
ABN 75 002 600 526

52A Hampstead Road
Auburn NSW 2144 Australia
Tel: (02) 9737 9991
E-Mail: pstephenson@orla.com.au

Olfactometry Test Report

The measurement was commissioned by SEMA on behalf of:

Client	Organisation:	Benbow Environmental
	Address:	PO Box 687 Parramatta NSW 2124
	Contact:	Katie Trahair
	Sampling Site:	N/A
	Telephone:	(02) 9890 5099
	Email:	ktrahair@benbowenviro.com.au
Project	ORLA Report Number:	5754/ORLA/01
	Project Manager:	Peter Stephenson
	Testing operator:	Ali Naghizadeh
	ORLA Sample number(s):	4648, 4649
	SEMA Sample number(s):	725965 to 725966 inclusive
Order	Analysis Requested:	Odour Analysis
	Order requested by:	SEMA on behalf of Benbow Environmental
	Date of order:	09 December 2016
	Order number:	4674
	Telephone:	02 9737 9991
	Signed by:	Ali Naghizadeh
	Order accepted by:	Ali Naghizadeh
Report	Date of issue:	09 December 2016

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NATA accredited laboratory number 15043.

Accredited for Compliance with ISO/IEC 17025.

Investigated Item	Odour concentration in odour units 'ou' determined by Sensory odour concentration measurements, of an odour sample supplied in a sampling bag. All samples were received in good condition.
Analysis Method	The samples were analysed in accordance with AS/NZS4323.3:2001.
Identification	The odour sample bags were labelled individually. Each label recorded the testing laboratory, sample number, sampling location (or Identification) sampling date and time, dilution ratio (if dilution was used) and whether further chemical analysis was required.
Method	The odour concentration measurements were performed using dynamic olfactometry according to the Australian Standard 'Determination of Odour Concentration by Dynamic Olfactometry AS/NZS4323.3:2001. The odour perception characteristics of the panel within the presentation series for the samples were analogous to that for n-butanol calibration. Any deviation from the Australian standard is recorded in the 'Comments' section of this report.
Instrument Used	The Olfactometer used during this testing session was: AC'SCENT International Olfactometer
Measuring Range	The measuring range of the AC'SCENT International olfactometer is $12 \leq \chi \leq 76,000$ ou. If the measuring range was insufficient the odour samples will have been pre-diluted.
Environment	The measurements were performed in an air- and odour-conditioned room. The room temperature is maintained between $\pm 3^{o}$C.
Measuring Dates	The date of each measurement is specified with the results.
Instrument Precision	The precision of this instrument (expressed as repeatability) for a sensory calibration must be $r \leq 0.05$ in accordance with the Australian Standard AS/NZS4323.3:2001. AC'SCENT International Olfactometer: $r = 0.0054$ (February 2016) Compliance – Yes
Instrumental Accuracy	The accuracy of this instrument for a sensory calibration must be $A \leq 0.20$ in accordance with the Australian Standard AS/NZS4323.3:2001. AC'SCENT International Olfactometer: $A = 0.027$ (February 2016) Compliance – Yes
Lower Detection Limit (LDL)	The LDL for the AC'SCENT International Olfactometer has been determined to be 12 ou
Traceability	The measurements have been performed using standards for which the traceability to the national standard has been demonstrated. The assessors are individually selected to comply with fixed criteria and are monitored every session to keep within the limits of the standard. The results from the assessors are traceable to primary standards of n-butanol in nitrogen.

09 December 2016

Peter Stephenson
Managing Director

Odour Olfactometry Results – 5754/ORLA/01

Sample Location	Sample ID No.	Sampling Date & Time	ORLA Sample No.	Analysis Date & Time (Completed)	Panel Size	Valid ITEs	Sample Pre-Dilution	Sample Odour Concentration (ou) [1 *]	Sample Odour Concentration (ou) [2 *]	Odour Character & Hedonic Tone [^ +]
Sample ID: Sample A	725965	08-12-2016 10:40	4648	09-12-2016 10:35	4	8	Nil	1,700	1,700	Oil, grease, dirt, potato, earthy, musty, hessian, yeast, soil, dirt, dust, plastic (-2.3)[^]
Sample ID: Sample B	725966	08-12-2016 10:45	4649	09-12-2016 11:05	4	8	Nil	350	350	Greasy, cooking oil, oil, exhaust gas, dirt, potato, yeast, paint, plastic, savoury (-3.0)[^]

Odour Panel Calibration Results – 5754/ORLA/01

Reference Odorant	ORLA Sample No.	Concentration of Reference Gas (ppm)	Reference Gas Measured Concentration (ou)	Panel Average Measured Concentration (ppb) [3]	Does this panel calibration measurement comply with AS/NZS4323.3:P2001 (Yes/No) [4]
n-butanol	4647	52	1,100	49	Yes

Comments: All samples were collected by Benbow Environmental and analysed by Odour Research Laboratories Australia at their Sydney Laboratory.

Notes from Odour Olfactometry Results:

[1] Sample Odour Concentration: as received in the bag

[2] Sample Odour Concentration: allowing for pre-dilution

[3] Panel Average Measured Concentration: indicates the sensitivity of the panel for the session completed

[4] Target Range for reference gas n-butanol is $20 \leq \chi \leq 80$ ppb and compliance with AS/NZ4323.3:2001 is based on the individuals rolling average and not on the panel average measured concentration. Panellist Rolling Average: SR = 59, PR = 49, GP = 62, TL = 57, PRA = 39

^ denotes the Average Hedonic Tone: describes the pleasantness of the odour being presented where (+5) represents Very Pleasant, (0) represents Neutral and (-5) represents Very Unpleasant and has been derived from the panellist responses at the recognition threshold.

+ This value is not part of our NATA Scope of Accreditation and AS4323.3

----------END OF TEST REPORT----------